

HP ProLiant Network Adapter Software and Configuration Guide



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Audience assumptions

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

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Overview

Supported adapters and operating systems

The following is a list of HP NC-Series adapters that are supported on HP ProLiant servers.

Standup adapters:

- HP NC110T PCI Express Gigabit Server Adapter
- HP NC150T PCI 4-port Gigabit Combo Switch Adapter
- HP NC310F PCI-X Gigabit Server Adapter
- HP NC320T PCI Express Gigabit Server Adapter
- HP NC340T PCI-X Quad Port Gigabit Server Adapter
- HP NC360T PCI Express Dual Port Gigabit Server Adapter
- HP NC364T PCI Express Quad Port Gigabit Server Adapter
- HP NC370T PCI-X Multifunction Gigabit Server Adapter
- HP NC370F PCI-X Multifunction Gigabit Server Adapter
- HP NC373F PCI Express Multifunction Gigabit Server Adapter
- HP NC373T PCI Express Multifunction Gigabit Server Adapter
- HP NC380T PCI Express Dual Port Multifunction Gigabit Server Adapter
- HP NC510F PCIe 10 Gigabit Server Adapter **
- HP NC510C PCIe 10 Gigabit Server Adapter **
- HP NC1020 Cu Gigabit Server Adapter 32 PCI Single Port
- HP NC3123 Fast Ethernet Server Adapter *
- HP NC3132 Fast Ethernet Upgrade Module (Dual 10/100) for the NC3134 Server Adapter *
- HP NC3134 Fast Ethernet Server Adapter (Dual Base 10/100) *
- HP NC3135 Fast Ethernet Upgrade Module (Dual 10/100) for the NC3134 Server Adapter *
- HP NC6132 1000 SX Gigabit Upgrade Module for the NC3134 Server Adapter*
- HP NC6134 Gigabit Server Adapter (PCI 1000 SX)
- HP NC6136 Gigabit Server Adapter (PCI 1000 SX)
- HP NC6170 Dual Port PCI-X Gigabit Server Adapter
- HP NC6770 PCI-X Gigabit Server Adapter
- HP NC7131 Gigabit Ethernet Server Adapter
- HP NC7132 Gigabit Ethernet Upgrade Module for the NC3134 Server Adapter *
- HP NC7170 Dual Port PCI-X Gigabit Server Adapter

- HP NC7770 PCI-X Gigabit Server Adapter
- HP NC7771 PCI-X Gigabit Server Adapter

Embedded adapters:

- HP NC105i PCIe Gigabit Server Adapter
- HP NC320i PCI Express Gigabit Server Adapter
- HP NC324i PCI Express Dual Port Gigabit Server Adapter
- HP NC325i PCI Express Dual Port Gigabit Server Adapter
- HP NC326i PCI Express Dual Port Gigabit Server Adapter
- HP NC370i PCI-X Multifunction Gigabit Server Adapter
- HP NC371i PCI-X Multifunction Gigabit Server Adapter
- HP NC373i Integrated Multifunction Gigabit Server Adapter
- HP NC3161 Fast Ethernet Server Adapter *
- HP NC3163 Fast Ethernet Server Adapter *
- HP NC7760 PCI-X Gigabit Server Adapter
- HP NC7761 PCI-X Gigabit Server Adapter
- HP NC7780 Gigabit Server Adapter
- HP NC7781 PCI-X Gigabit Server Adapter
- HP NC7782 Dual Port PCI-X Gigabit Server Adapter

Mezzanine adapters:

- HP NC320m PCIe Gigabit Server Adapter
- HP NC325m PCI Express Quad Port 1 Gb Server Adapter for c-Class BladeSystem
- HP NC326m PCI Express Dual Port 1 Gb Server Adapter for c-Class BladeSystem
- HP NC360m Dual Port 1GbE BL-c Adapter
- HP NC364m Quad Port 1GbE BL-c Adapter
- HP NC373m PCI Express Dual Port Multifunction Gigabit Server Adapter for c-Class BladeSystem
- HP NC374m PCI Express Dual Port Multifunction Gigabit Server Adapter
- HP NC512m Dual Port 10 GbE Adapter for c-Class BladeSystem

* Not supported on Windows Server 2003 x64

** Not supported in the NCU on Windows Server 2008 and Windows Server 2008 x64 in this release

Supported operating systems

These server adapters are supported on the following operating systems.

Microsoft

- Windows Server 2008
- Windows Server 2008 x64 Editions
- Windows Server 2003

- Windows Server 2003 x64 Editions
- Windows® 2000 (NDIS5)
- DOS NDIS2*

NetWare

- NetWare 6.5 Server
- NetWare 6.6 Server
- NetWare Open Enterprise Server

Linux 32

- Red Hat Enterprise Linux 5
- Red Hat Enterprise Linux 4
- Red Hat Enterprise Linux 3
- SUSE Linux Enterprise Server 10 Service
- SUSE Linux Enterprise Server 9 Service

Linux 64

- Red Hat Enterprise Linux 5 for AMD64 and Intel EM64T
- Red Hat Enterprise Linux 4 for AMD64 and Intel EM64T
- Red Hat Enterprise Linux 3 for AMD64 and Intel EM64T
- SUSE Linux Enterprise Server 10 for AMD64 and Intel EM64T
- SUSE Linux Enterprise Server 9 for AMD64 and Intel EM64T

UNIX

- Unixware 7.x
- OpenUnix 8.x
- Open Server 5.x/6.x

Solaris

- Solaris 10
- Solaris 9

* Unattended Install Only.

Adapter driver and software information

The following drivers and documentation are available in the HP ProLiant Networking SoftPaq. For a complete listing of all files in the HP SoftPaq, go to the \docs\files.txt file in the HP SoftPaq component.

Adapter driver folders in HP SoftPaq

Drivers are found in the following folders:

- Microsoft® Windows Server 2008 \WIN2008

- Microsoft® Windows Server 2008 \WIN2008x64
- Microsoft® Windows Server 2003 \WIN2003
- Microsoft® Windows Server 2003 x64 \WIN2003x64
- Microsoft® Windows® 2000 \WIN2000
- Linux \LINUX

Documentation in the HP SoftPak

- HP Network Adapter Software and Configuration Guide (NACONFIG.pdf)
- HP Accelerated iSCSI for Multifunction Network Adapters (AiSCSIUG.pdf)
- HP Network Adapter License Utility for Windows (NALICNSE.pdf)
- HP Network Adapter Scripting Utility (NICSCRPT.pdf)
- Network adapter user guides (\docs\hw)
- Release notes (Relnotes.txt)
- SetLACState Utility (SetLAC.pdf)

Linux Guides

- Linux readme.txt file is located in the \LINUX directory
- HP iSCSI Boot User Guide for Linux in the \docs directory
- HP ProLiant Accelerated iSCSI for Linux in the \docs directory

Installation

Downloading files

1. Go to the HP website (<http://www.hp.com>).
2. Click **Software & Driver Downloads** from the left menu bar.
3. Type the product name in the **For product** box and press **Enter**. For example, type NC373T.
4. Select an operating system.
5. Click **HP ProLiant Networking**.
6. Click **download** and save the HP SoftPaq (sp#####.exe) file to a directory on your hard drive. The SoftPaq file is a self-extracting executable with a file name based on the SoftPaq number.
7. Click the SoftPaq file to extract the files and then open the **component.htm** file.

Installing network drivers (new installations)

When you install the network adapter in the server for the first time:

1. Connect the cable from the adapter to your network.
2. Power up the server.
3. Start the operating system.
4. Install the appropriate driver component for your operating system as described in "Downloading files (on page 9)."

Removing the driver software

Before physically removing an adapter from your system, first un-team the adapter then remove the driver software.

1. Start your Windows operating system and log in to the system. You must have Network Administrator privileges to remove the driver software.
2. Unteam the adapter using the HP Network Configuration Utility and save your changes.
3. Open the **Device Manager**.
4. Click the plus (+) sign to expand the Network adapters. All installed network adapters display.
5. Right-click the adapter to be removed and choose **Uninstall**.

Uninstall HP NC-Series NetXen 10GbE drivers

To uninstall the HP NC51xx PCIe 10 Gigabit Server Adapter driver software in Windows, perform the following steps:

1. On the desktop, click **Start** and select **Settings > Control Panel > Administrative Tools > Computer Management** to display the Computer Management window.
2. Click **Device Manager** and then scroll down the list of hardware devices to Network Adapters and click the plus (+). This expands the list of adapters currently configured. For example, HP NC510x PCIe 10 Gigabit Server Adapter is listed in the example above and is removed with the following step.
3. Right-click **HP NC510x PCIe 10 Gigabit Server Adapter** and select **Uninstall**.

To uninstall dual port 10GbE adapter driver software in Windows, perform the following steps:

1. On the desktop, click **Start** and select **Settings > Control Panel > Administrative Tools > Computer Management** to display the Computer Management window.
2. Click **Device Manager** and then scroll down the list of hardware devices to Network Adapters and click the plus (+). This expands the list of adapters currently configured.
3. Locate the two ports listed under Network adapters.
For example, HP NC 512m Dual Port 10GbE Multifunction BL-c Adapter and HP NC 512m Dual Port 10GbE Multifunction BL-c Adapter #2 are listed in the Computer Management window shown above and are removed with the following steps.
4. Right-click **HP NC 512m Dual Port 10GbE Multifunction BL-c Adapter** and select **Uninstall**.
5. Right-click **HP NC 512m Dual Port 10GbE Multifunction BL-c Adapter #2** and select **Uninstall**.
6. Locate the NetXen Management Interface listed under System devices in the Device Manager display.
7. Right-click **NetXen Management Interface** and select **Uninstall**.

Adapter support on Windows

The following describes how to install HP NC-series network server adapters on the following operating systems:

- Windows Server 2008
- Windows Server 2008 x64
- Windows Server 2003
- Windows Server 2003 x64

Windows 2008 drivers

The following Windows Server 2008 network adapter drivers are used in this release:

- **N1G60i32.sys** for NC310xx, NC340x, NC61xx, and NC71xx server adapters
- **Q57ND60X.sys** for NC10xx, NC150x, NC32xx, NC10xx, NC67xx, and NC77xx server adapters
- **N1E6032.sys** for NC110x, NC360x, NC364x server adapters
- **BXND60X.sys** for all Multifunction server adapters

Components for these drivers are located in the \WIN2008 directory of the HP SoftPaq.

Windows 2008 x64 drivers

The following Windows Server 2008 x64 network adapter drivers are used in this release:

- **N1G6032E.sys** for NC310F, NC340T, NC61xx, and NC71xx server adapters
- **Q57ND60A.sys** for NC105x, NC150x, NC32x, NC10xx, NC67xx, and NC77xx server adapters
- **BXND60A.sys** for Multifunction server adapters
- **N1E6032E.sys** for NC110T, NC360x, NC364x server adapters

Components for these drivers are located in the \WIN2008x64 directory of the HP SoftPaq.

Windows 2003 drivers

The following Windows Server 2003 network adapter drivers are used in this release:

- **N100325.sys** for NC31xx Fast Ethernet server adapters
- **N1000325.sys** for NC310xx, NC340x, NC61xx, and NC71xx server adapters
- **Q57XP32.sys** for NC105x, NC150x, NC32xx, NC10xx, NC67xx, and NC77xx server adapters
- **N1E5132.sys** for NC110x, NC360x, NC364x server adapters
- **BXND51X.sys** for all Multifunction server adapters
- **NXP2NIC.sys** for all NC51xx 10GbE server adapters

Components for these drivers are located in the \WIN2003 directory of the HP SoftPaq.

Windows 2003 x64 drivers

The following Windows Server 2003 x64 network adapter drivers are used in this release:

- **N1G5132E.sys** for NC310F, NC340T, NC61xx, and NC71xx server adapters
- **Q57AMD64.sys** for NC105x, NC150x, NC32x, NC10xx, NC67xx, and NC77xx server adapters
- **BXVBDA.sys** for Multifunction server adapters
- **N1E5132E.sys** for NC110T, NC360x, NC364x server adapters
- **NXP2NC64.sys** for all NC51xx 10GbE server adapters

Components for these drivers are located in the \WIN2003x64 directory of the HP SoftPaq.

Windows 2000 drivers

The following Windows 2000 network adapter drivers are used in this release:

- **N100NT5.sys** for NC31xx Fast Ethernet server adapters
- **N1000NT5.sys** for NC310x, NC340x, NC61xx, and NC71xx Gigabit Ethernet server adapters
- **Q57W2K.sys** for NC150x, NC32xx, NC10xx, NC67xx, and NC77xx Gigabit Ethernet server adapters
- **BXVBDX.sys** for Multifunction Gigabit server adapters
- **N1E5032.sys** for NC360x and NC364T Gigabit Ethernet server adapters

Components for these drivers are located in the \WIN2000 directory in the HP SoftPaq file.

Adapter support on Linux

The following Linux drivers are available for HP adapters:

- bnx2—Supports multifunction server adapters
- diags—HP ProLiant Webmin Network Server Adapter Diagnostics Module
- e1000—Supports NC110T, NC310F, NC340x, NC360x, NC364x, NC61xx, and NC71xx server adapters
- hp-nct—HP Network Configuration Tool (NCT)
- hp-pel—Supports ProLiant licensing
- iSCSI-boot—Supports the HP iSCSI boot feature
- iSCSI-offload—Supports the HP NC-Series Accelerated iSCSI offload feature
- tg3—Supports NC10xx, NC150x, NC320x, NC324x, NC325x, NC326x, NC67xx, and NC77xx server adapters
- utils—HP Network Server Adapter (NIC Information Collector) script - Network Survey Utility
- vlan_init—Supports Initialization and Configuration file for VLAN

The drivers are distributed in source RPM format and are available in the HP SoftPaq file in the \Linux directory. See "Downloading files (on page 9)" for information. The source RPM is suitable for use on any system that has the RPM utility installed and a properly configured kernel source tree.

In addition, the Linux (open source) drivers can be found at the HP software and drivers website (<http://h18000.www1.hp.com/support/files/index.html>).

HP ROMPaqs for specific servers can be found at the HP support website (<http://www.hp.com/support>).

Adapter support on NetWare

A network device driver must be installed before the Gigabit Ethernet adapter can be used with your Novell NetWare system. Before you can successfully install the adapter driver for Novell NetWare, the adapter card must be physically installed in the server and, typically, NetWare OS software must already be running on the server. Make sure that your server meets the hardware and operating system software requirements.

For an adapter installation with an existing NetWare server, NetWare will automatically detect the new adapter and attempt to load the appropriate driver.

To enable the Gigabit Ethernet adapter to function correctly, you need to install the latest support pack files. The latest support pack can be found at the Novell website (<http://www.novell.com>).

Netware install program

A commonly used method to install a driver on a NetWare server is through NWCONFIG. The following drivers are supported.

Driver configuration parameters

Parameter	Options	Description
Checksum =	Default = ON Selections are: ON, OFF, Tx, Rx	Enables or disables the transmit and receive checksum off-loading feature. Checksum is supported under NetWare 5.x only. If you want to enable the CheckSum parameter, you need to load it on the first instance.
Frame = type	Valid types are: Ethernet_802.2, Ethernet_802.3, Ethernet_II, Ethernet_SNAP	Defines the frame type being used by this load instance. Ethernet_802.2 and Ethernet_II are the default values.
node =	NNNNNNNNNNNNNN	Specifies a node address in this field to override the default Media Access Controller (MAC) address (also known as the Locally Administered Address)
name = text		Displays the name assigned to this adapter
PDriver =	Default = OFF Selections are: OFF, ON	Allows driver to operate in persistent driver mode. Persistent driver mode is supported under NetWare 5.x only. Use only if adapter is placed in a Hot Plug PCI slot and only if required to swap with an exact board.
RxBuffers =	Default = 200 Recommended Min = 32 Max = 512 Min = 1 when used with DOS Client32 and when Keywrod P3-1 or 2.	Pre-allocates ECB resources on the adapter for receiving packets
TxDescriptors =	Default = 200 Recommended Min = 100 Max = 512 Min = 1 when used with DOS Client32 and when Keywrod P3-1 or 2.	Pre-allocates ECB resources on the adapter for transmitting packets.
RxFlow =	Default = OFF Selections are: ON, OFF	Allows enabling/disabling of RxFlow control.
TxFlow =	Default = OFF Selections are: ON, OFF	Allows enabling/disabling of TxFlow control.
Slot = n		Identifies the slot number for the specific adapter currently being configured. This parameter is not necessary if only a single adapter is installed.
Speed = n		If link negotiation has been disabled, specifies port speed to be either Auto, 10HD or 10FD, 100HD or 100FD.

Parameter	Options	Description
Jumbo =	Set maximum physical receive packet Size = 18000 in the STARTUP.NCF. Choices are Jumbo = 1514–9000. This keyword is only supported on NetWare 6.x.	Enables/disables Jumbo Frame support. When enabled, jumbo packets of up to 9000 bytes are supported. Not supported on NC1020 adapters.
Link=	Default=FORCE Selections are: AUTO, FORCE	Only used to allow the adapter to negotiate a specific or forced line speed with a switch that is not forced, but instead setup for auto-negotiation. It is best to allow for auto-negotiation of the card and switch by not setting this keyword or the speed keyword. Only use this keyword if the speed keyword is set to something other than AUTO.
RxTicks=	Default = 360 Min = 0, disabled Max = 5000000, 5 seconds Units are in micro seconds	Enables the use of batching receives within a specific time period.
TXPacketsPer	Default = 64 Min = 0, disabled Max = 100	Enables the use of batching transmits to a specific amount of packets.

NOTE: With Jumbo Frames, the first frame must be Ethernet_ii.

Post installation

After NetWare 6.x has been successfully installed, set the minimum packet receive buffers parameter in the startup.ncf file to 1500 for each adapter in the system. Set the maximum packet receive buffers to three times the minimum packet receive buffers. Typically one MB of RAM is required per 1000 receive buffers.

In the `autoexec.ncf` file, delete the packet receive buffers parameter (`RxBuffers=32`) in the load statement for this adapter. Deleting the receive buffers phrase from the load statement resets the receive buffers parameter to the default value of 200 for this adapter. You must reboot the server for the new configuration.

Example:

The default maximum number of receive buffers for the system is 500; the default minimum is 128. Edit the startup.ncf file to have the following entries. The actual numbers will be a function of the number of adapters in the system.

- set maximum packet receive buffers = 30000
- set minimum packet receive buffers = 10000
- set maximum physical receive packet size = 2048

Verifying or modifying adapter properties

When an adapter configuration is saved, the NetWare install program adds load and bind statements to the `autoexec.ncf` file. By accessing this file, you can verify the parameters configured for each adapter, modify them, or enter additional parameters.

NOTE: The Novell monitor program and the CONFIG command are also useful for verifying driver configuration. For information on how to use these programs, refer to the utilities reference in your Novell NetWare online documentation.

The parameters that can be defined in the load statements are described in NetWare server driver LOAD line parameters for HP server adapters below. A valid `autoexec.ncf` file is shown below. One set of load and bind commands is added for each frame type the adapter is configured to support.

Valid Autoexec.ncf file

```
Set Time Zone = PST8PDT
set Daylight Savings Time Offset = 1
set Start Of Daylight Savings Time = (APRIL SUNDAY FIRST 2:00:00 AM)
set End Of Daylight Savings Time = (OCTOBER SUNDAY LAST 2:00:00 AM)
set Default Time Server Type = SINGLE
set Bindery Context = O=LAN

# WARNING!!
file server name NOVELLSERVER51
# WARNING!!
# If you change the name of this server, you must update
# all the licenses that are assigned to this server. Using
# NWAdmin, double-click on a license object and click on
# the Certificate Assignments button. If the old name of
# this server appears, you must delete it and then add the
# new server name. Do this for all license objects.

ServerID 1C8EE2C
LOAD ODINEB.NLM
LOAD TCPIP
LOAD Q57 SLOT=2 FRAME=Ethernet_802.2 NAME=Q57_1_E82
BIND IPX Q57_1_E82 NET=FAFD3D25
LOAD Q57 SLOT=2 FRAME=Ethernet_802.3 NAME=Q57_1_E83
BIND IPX Q57_1_E83 NET=5A2D8D6D
LOAD Q57 SLOT=2 FRAME=Ethernet_SNAP NAME=Q57_1_ESP
BIND IPX Q57_1_ESP NET=477A35BD
LOAD Q57 SLOT=2 FRAME=Ethernet_II NAME=Q57_1_EII
BIND IPX Q57_1_EII NET=C3C8F2E4
BIND IP Q57_1_EII ADDR=172.16.1.1 MASK=ff.ff.0.0

mount all
SEARCH ADD SYS:\JAVA\BIN
SEARCH ADD SYS:\JAVA\NWGFX
```



IMPORTANT: If you modify any adapter parameters, you must reboot the system before the changes will take effect. If you make changes and do not reboot, you may experience configuration problems.

Removing drivers from Autoexec.ncf

To remove the drivers from the `Autoexec.ncf`, locate the LOAD and BIND command lines associated with the driver and remark them out by inserting the pound (#) symbol at the beginning of each command line.

Example:

```
# LOAD Q57 SLOT=2 FRAME=Ethernet_802.2 NAME=Q57_1_E82
```

```
# BIND IPX Q57_1_E82 NET=FAFD3D25
# LOAD Q57 SLOT=2 FRAME=Ethernet_802.3 NAME=Q57_1_E83
# BIND IPX Q57_1_E83 NET=5A2D8D6D
# LOAD Q57 SLOT=2 FRAME=Ethernet_SNAP NAME=Q57_1_ESP
# BIND IPX Q57_1_ESP NET=477A35BD
# LOAD Q57 SLOT=2 FRAME=Ethernet_II NAME=Q57_1_EII
# BIND IPX Q57_1_EII NET=C3C8F2E4
# BIND IP Q57_1_EII ADDR=172.16.1.1 MASK=ff.ff.0.0
```

NetWare server driver LOAD line parameters

This following lists the NetWare server driver LOAD line parameter settings for HP server adapters for N100, N1000, and N1000e.

- **FORCEDUPLEX.** This keyword specifies one of the following duplex modes:
 - **Auto-negotiate.** The adapter negotiates with the switch and hub how to send and receive packets at either full- or half-duplex speed. If unsuccessful at negotiating the duplex, HP server adapters default to half-duplex. You must have an auto-negotiating switch/hub (an Nway switch) to get full-duplex support with the FORCEDUPLEX parameter set to 0 (auto-negotiation).
 - **Full-duplex.** The adapter sends and receives packets at the same time. This improves the performance of your adapter. Set duplex mode to full-duplex ONLY if you have a hub/switch that supports full-duplex.
 - **Half-duplex.** The adapter performs one operation at a time. It either transmits or receives. To set the adapter to half- or full-duplex mode, you must set the SPEED parameter to either 10 or 100.

NOTE: The HP NC31xx, 340T, and NC71xx Server Adapters support full-duplex and half-duplex. The HP NC61xx fiber Gigabit Server Adapters support full-duplex mode only and cannot be changed.

 - Syntax: FORCEDUPLEX=n
Where n =
 - 0—auto-negotiate
 - 1—half-duplex
 - 2—full-duplex
 - Default = auto-negotiate
 - Examples:
 - 100 Mbps full-duplex FORCEDUPLEX=2 SPEED=100
 - 10 Mbps full-duplex FORCEDUPLEX=2 SPEED=10
- **SLOT.** (Required) For PCI adapters, SLOT is derived from bus number and device location as defined by the PCI specification. One way to determine the slot number is to load the driver from the command line. You will be prompted with valid device number(s) for the adapter(s). Select one of them.
 - Syntax: SLOT=n
Where n = 1, 2, 3, 4,...
- **SPEED.** This keyword specifies the speed the driver uses. If you do not use this parameter, the driver automatically detects the network speed. If unable to detect, the driver defaults to 10 Mbps. If you use this parameter, the driver operates at the specified speed instead of auto detecting network speed.
 - Syntax: SPEED=n

Where n = 10 or 100 or 1000

- Default = The adapter automatically detects network speed.
- **NODE.** This keyword specifies a locally administered address (LAA) unique to each adapter. Use this option to provide your own unique node address for the adapter. The node address is a 12-digit hexadecimal number. The second digit must be one of the following digits: 2, 6, A, E.
 - Syntax: NODE=xnxxxxxxxxxx
Where n = 2, 6, A, E
Where x = hexadecimal number
 - Default = The adapter's assigned address
- **FRAME.** This keyword indicates one of four valid frame types the system is transmitting and receiving.
 - Syntax: FRAME=n
Where n = Ethernet_802.2, Ethernet_802.3, Ethernet_II, Ethernet_SNAP
 - Default = Ethernet_802.2
- **POLL.** This keyword is used to enable polling mode in the driver with interrupt backup. If polling is enabled, interrupts will be reduced, allowing the processor to spend more time performing other functions. In polling mode, interrupts will occur only when receive resources have been reduced to less than half. If polling is not enabled, the driver will perform in traditional interrupt mode.
 - Syntax: POLL=n
 - Where n = 0 (interrupt mode), 1 (polling mode with interrupt backup)
 - Default = 0 (interrupt mode)

NOTE: The POLL parameter is for the N100.LAN, N1000.LAN, and N1000e.LAN drivers.

- **SPURIOUS.** This keyword is used to reduce the number of spurious interrupts reported by the OS on the driver interrupt line. This automatically loads for 10, 100, and 1000 adapters.
 - Syntax: SPURIOUS=n
Where n = 0 or 1
0—Driver operates in normal mode
1—Driver operates to reduce the number of spurious interrupts
 - Default = 1

NOTE: The minimum threshold for acceptable number of spurious interrupts is 200 interrupts per second, which is the default value of the environmental variable "set display spurious interrupt alerts threshold."

- **RXCHECKSUM.** This keyword is used to enable or disable the offload of Receive Packet Checksum verification to the adapter. This automatically loads for 10/100 adapters.
 - Syntax: RXCHECKSUM=n
Where n = 0 or 1
0—Does not offload Rx Checksum verification to the adapter
1—Offloads Rx Checksum verification to the adapter
- Default = 0

Advanced Network Services help - supported keywords

- **AGG_SELECTION**
 - Syntax: AGG_SELECTION=[BANDWIDTH | COUNT]
 - Description: Sets active aggregator selection mode by bandwidth or count
- **BALANCE_INTERVAL**
 - Syntax: balance_interval=nnn
 - Description: Changes Balance interval, nnn counts 1/18 sec
- **BALANCE_SET_DEFAULT**
 - Syntax: balance_set_default
 - Description: Restores Balance interval to factory settings
- **COMMIT**
 - Syntax: commit [team=nnn]
 - Description: Sets a certain mode. Use after binding to base drivers with Team=nnn.
- **DELAY**
 - Syntax: delay=nnn
 - Description: Delays the commit in nnn seconds
- **FRAME**
 - Syntax: frame=[ETHERNET_802.2 | ETHERNET_802.3 | ETHERNET_II | ETHERNET_SNAP]
- **HELP**
 - Syntax: -H
 - Description: Displays Help
 - Example: CPQANS -H
- **JOIN_INDIVIDUALS**
 - Syntax: join_individuals=[yes | no]
 - Description: Joins all individual links to one aggregator
- **LBN**
 - Syntax: Reset LBN=nnn
 - Example: cpqans reset lbn=nnn
 - Description: Resets the logical board number (LBN) of a bound adapter. Supported only after commit command. Default value = 0
- **MAX_TX_QUEUE**
 - Syntax: max_tx_queue=nnn
 - Description: Sets the Max number of TX ECBs queued for send
- **MODE**
 - Syntax: mode=[NFT | ALB | FEC | GEC | 802.3AD]
- **NAME**
 - Syntax: name=[any unique name]
 - Description: Sets a unique name

- **PRIMARY**
 - Syntax: primary | secondary
 - Description: Identifies the primary adapter. Supported only in BIND command
- **PROBE_BURST_SIZE**
 - Syntax: probe_burst_size=nnn
 - Description: Changes number of probes to send in a retry
- **PROBE_CHECK_INTERVAL**
 - Syntax: probe_check_interval=nnn
 - Description: Changes probes check interval
- **PROBE_RECHECK_INTERVAL**
 - Syntax: probe_recheck_interval=nnn
 - Description: Changes probe retries check interval
- **PROBE_RETRY_COUNT**
 - Syntax: probe_retry_count=nnn
 - Description: Changes probes retry count
- **PROBE_SEND_INTERVAL**
 - Syntax: probe_send_interval=nnn
 - Description: Changes probes send interval, nnn counts 1/18 sec
- **PROBE_SET_DEFAULT**
 - Syntax: probe_set_default
 - Description: Restores probes settings to factory settings
- **PROBES**
 - Syntax: probes=[on | off]
 - Description: Enables/disables probes
- **PROBES**
 - Syntax: probes=[BROADCAST | MULTICAST]
 - Description: Changes probes addressing
- **RECOMMIT**
 - Syntax: recommit [team=nnn]
 - Description: Resets a certain mode. Use after hot binding to base drivers with Team=nnn
- **REMOVETEAM**
 - Syntax: removeteam [team=nnn]
 - Description: Removes a team. Use after hot binding to base drivers with Team=nnn
- **REMOVEVLANID**
 - Syntax: RemoveVlanID=nnn
 - Description: Removes the selected VLAN
- **RESET**
 - Syntax: RESET LBN=nnn

- Description: Supported only after Commit command
- **SECONDARY**
 - Syntax: primary | secondary
 - Description: Identifies the secondary adapter. Supported only in BIND command.
- **SMPMODE**
 - Syntax: SMPMODE=[SMP | NONSMP]
 - Description: Enables/disables SMP aware
- **STATUS**
 - Syntax: status [team=nnn]
 - Description: Prints CPQANS status
- **TEAM**
 - Syntax: team=nnnn
 - Description: Identifies the team. nnnn=DecimalNumber.
- **TX_ECBS_TO_USE**
 - Syntax: tx_ecbs_to_use=nnn
 - Description: Sets number of TX ECBs to allocate per virtual adapter
- **VLANID**
 - Syntax: VlanID=nnn
 - Description: Sets team to VLAN mode. Creates MLID edge

Firmware upgrade utility

HP Multifunction Gigabit Server Adapter Firmware Upgrade Utility

The HP Multifunction Gigabit Server Adapter Firmware Upgrade Utility supports the following adapters.

- NC37xx
- NC380x

The utility runs under DOS from a bootable diskette or USB drive. To install, copy all files and folders to a bootable diskette or USB drive. See "Downloading files (on page 9)."

Three commands are provided with the utility.

- **INSISCSI**, which installs or upgrades the iSCSI boot option ROM. This command upgrades the iSCSI boot option ROM if the iSCSI boot option ROM is already installed and its version is out of date.
This command also installs the iSCSI boot option ROM to replace the PXE option ROM for NC37xT, NC37xF, and NC380T adapters.
- **INSPXE**, which installs or upgrades the PXE option ROM. This command upgrades the PXE option ROM if the PXE option ROM is already installed and its version is out of date.
This command also installs the PXE option ROM to replace the iSCSI boot option ROM for NC37xT, NC37xF, and NC380T adapters.
- **NICFWUPG**, which upgrades iSCSI boot option ROM, PXE option ROM, and Boot Code. This command upgrades the firmware components that are currently installed if they are out of date.

These commands run interactively by default. For each adapter, the current version and new version of each firmware component is compared. If the installed version is older, you are prompted to accept the upgrade by answering Y, or reject the upgrade with N.

Using the -S option the user can optionally select the non-interactive mode, which causes the firmware to automatically update if the installed version is out of date.

Output

The output is saved in a file named `nic_fw\fwupglog.txt`.

HP Gigabit Server Adapter Firmware Upgrade Utility for C-Class BladeSystem

The HP Gigabit Server Adapter Firmware Upgrade Utility for c-Class BladeSystem uses two separate utilities (**ccfwupg1.bat** and **ccfwupg2.bat**) to upgrade firmware on the c-Class BladeSystem adapters.

The **ccfwupg1.bat** command upgrades the Boot Code and Option ROM firmware image on the following c-Class Multifunction Gigabit Server Adapters:

- HP NC373i Multifunction Gigabit Server Adapter
- HP NC373m Multifunction Gigabit Server Adapter

The **ccfwupg2.bat** command upgrades the Boot Code and Option ROM firmware image on the following c-Class Gigabit Server Adapters:

- HP NC326i PCIe Dual Port Gigabit Server Adapter
- HP NC326m PCIe Dual Port Gigabit Server Adapter
- HP NC325m PCIe Quad Port Gigabit Server Adapter

Upgrading firmware

To upgrade the boot code and Option ROM image on the adapter, complete the following:

1. Download and extract the HP SoftPak as described in "Downloading files (on page 9)."
2. Copy all files and folders from the `\apps\ccfwupg\ccfwupg1` directory or the `\apps\ccfwupg\ccfwupg2` directory to a bootable diskette or USB drive.
3. Boot to DOS using the diskette.
4. Type **ccfwupg1.bat** or **ccfwupg2.bat** and press the **Enter** key. A confirmation message displays when the upgrade is complete.

HP NC-Series NetXen Online Firmware Upgrade Utility

The HP NC-Series NetXen Online Firmware Upgrade Utility for Windows upgrades the flash memory for HP NC51xx PCIe 10 Gigabit server adapters. Use the following steps to upgrade the firmware.

NOTE: Driver and firmware compatibility must be maintained to ensure proper functionality. Make sure that the driver and firmware versions match for this release.

The HP NC-Series NetXen Online Firmware Upgrade Utility for Windows upgrades the flash memory for HP NC51xx PCIe 10 Gigabit server adapters. Use the following steps to upgrade the firmware.

NOTE: Driver and firmware compatibility must be maintained to ensure proper functionality. Make sure that the driver and firmware versions match for this release.

1. Click the `sp#####.exe` file to run the self-extracting executable file. One of the extracted files is the `nxfash.exe`. This utility upgrades the firmware.
2. Navigate to where the files were downloaded. Ensure that the following binaries are located in the directory:
 - `nxfash.exe`
 - `nxudiag.exe`
 - `cx4_hp_romimage`
 - `xfp_hp_romimage`
 - `hmez_romimage`
3. To upgrade the firmware for a specific adapter, launch the `nxfash.exe` by typing the following command line syntax in a DOS command window:


```
nxfash -i NX_NIC -all
```

where,

- o -i indicates the interface command
- o NX_NIC specifies the interface, NX_NIC, NX_NIC1, etc. (must be upper case)
- o -all updates all of the firmware

While upgrading, you should notice that a back up file of the current firmware is generated. If a restore is required, use this back up file to restore the adapter to its previous state.

4. After installing the firmware, reboot the system to complete the firmware installation.

Command line arguments

The HP NC51xx Series Online Firmware Upgrade Utility for Windows (nxflash.exe) recognizes the following command line arguments. The command and its arguments are case sensitive.

Command	Definition	Description
-i	interface	Specifies the interface [NX_NIC, NX_NIC1, etc.]
-info	information	Displays board type, board chip revision, serial ID, firmware version, BIOS version, MAC address and subsystem ID.
-a, -all	Update all of firmware	Updates the flash memory using appropriate romimage file. The tool determines which rom image file to use.
-r, -restore <image file>	Restore flash memory	Restores flash memory using backup romimage. The romimage is contained in the image file.
-opt-rom-on	Enable expansion ROM	Enables the adapter's PXE functionality.
-opt-rom-off	Disable expansion ROM	Disables the adapter's PXE functionality.
-h, -help	help	Displays the help menu.
-v, -version	Version	Displays the nxflash utility's version information

Adapter configurations

HP NC-Series 10GbE Adapters

The following information describes the adapter properties available for HP NC-Series 10GbE adapters in the Windows operating system.

See the HP Network Configuration Utility online help for the properties available through the NCU.

See the Linux readme files for the properties available through the various Linux operating systems.

Windows Server 2003 and Windows Server 2003 x64 configurations

Although the default values should be appropriate in most cases, you may change any of the available options to meet the requirements of your specific system. It is recommended that you use the HP Network Configuration Utility to update HP NC-Series adapter properties. However, if you choose to update the properties using the operating system's Device Manager, the following lists the properties that are available for your HP adapter. The properties that are available through the HP NCU will differ. See the online help file for NCU adapter property information.

HP NC-Series NetXen 10GbE adapter properties

The following describes the available advanced properties.

Property	Parameter
Flow Control	Enables the Ethernet controller to send out pause frames or accept pause frames at Ethernet level so that traffic is moderated and packets are not dropped. <ul style="list-style-type: none">• Default: Enabled• Values: Enabled/Disabled
Large Send Offload	Enables offloading of TCP Large Send Offload packets. <ul style="list-style-type: none">• Default: Enabled• Values: Enabled/Disabled

Property	Parameter
Locally Administered Address	<p>Enables users or administrators to set the Locally Administered Address. This address overrides the permanent address of the adapter (that may have been flashed to the hardware).</p> <ul style="list-style-type: none"> • Format: Hex • Values: Valid/Not Valid (if Valid, enter the 12 hex characters of MAC address) <p>If an invalid MAC address is entered, an error message is logged in the event log. If the MAC Address entered by the user is determined to be invalid, the user input value is ignored and the MAC address used will be the physical address burned on the card. The following addresses are invalid:</p> <ul style="list-style-type: none"> • 000000000000 • FFFFFFFF • Multicast MAC address
Max Ethernet Frame Size	<p>Sets the Ethernet frame size for packet transmission and receive (does not include MAC Header).</p> <ul style="list-style-type: none"> • Default: 1500 (corresponds to 1514 bytes on the wire + 4 bytes of CRC) • Min: 1500 • Max: 8000
Max Jumbo Buffers	<p>Specifies the number of 8K (jumbo) buffers for receive, in addition to the standard frame size buffers specified by "Max Receive Buffers." This is a separate pool of buffers used by the network adapter when the incoming frame is more than the standard frame size.</p> <ul style="list-style-type: none"> • Default: 4096 • Value: 1024/2048/4096/8192 <p>If the MaxFrameSize is set to 1500, the Max Jumbo Buffers parameter is ignored.</p>
Maximum Receive Buffers	<p>Sets the number of packet buffers on the receive (DMA memory and stack). Size of each buffer is 1536 bytes.</p> <ul style="list-style-type: none"> • Default: 8192 • Value: 1024/2048/4096/8192/16384
QoS Packet Tagging	<p>Specifies support for 802.1p (priority) tagging or 802.1q (Vlan) tagging by the Ethernet controller on a per-packet basis.</p> <ul style="list-style-type: none"> • Default: Enabled • Values: Enabled/Disabled
Receive IP Checksum Offload	<p>Enables the receive IP checksum offload.</p> <ul style="list-style-type: none"> • Default: Enabled • Values: Enabled/Disabled
Receive-side Scaling	<p>Enables dynamic load balancing of incoming traffic across CPUs.</p>
Receive TCP/UDP Checksum Offload	<p>Enables the receive TCP and receive UDP checksum offload.</p> <ul style="list-style-type: none"> • Default: Enabled • Values: Enabled/Disabled

Property	Parameter
Status Ring Size	<p>A descriptor ring size (queue size) for the status given by the network adapter to the driver. Setting this value too low will impact the throughput because the network adapter will start dropping packets. This parameter only affects receive operations and does not affect transmit operations.</p> <ul style="list-style-type: none"> • Default: 8192 • Value: 1024/2048/4096/8192/16384/32768
Transmit IP Checksum Offload	<p>Enables the transmit IP checksum offload.</p> <ul style="list-style-type: none"> • Default: Enabled • Values: Enabled/Disabled
Transmit Ring Size	<p>A descriptor ring size (queue size) for the transmit commands given by the driver to the network adapter. It describes how many transmit operations can be given by the host/driver to the network adapter at one time without overflowing the transmit queue. Each of the entries in this queue describes one transmit/send operation by the driver.</p> <ul style="list-style-type: none"> • Default: 1024 • Value: 1024/2048
Transmit TCP/UDP Checksum Offload	<p>Enables the transmit TCP and transmit UDP checksum offload.</p> <ul style="list-style-type: none"> • Default: Enabled • Values: Enabled/Disabled
Vlan Id	<p>Sets the VLAN ID for this interface (also exposed through the standard OID). QoS Packet Tagging must be enabled or the VLAN ID parameter is ignored.</p> <ul style="list-style-type: none"> • Default: 0 (no VLAN) • Range: 0 – 4095 <p>If multiple VLANs are set, the value is set to 0 (zero) and an intermediate driver is used to set each VLAN.</p>

Configuring multiple NC510x PCIe 10 GbE adapters

Multiple NC510x PCIe 10 GbE stand up adapters can be configured in a single system.

- Requirements—HP recommends installing 2 GB of system memory per 10 GbE port. Each NC510x PCIe 10 GbE adapter installed must have a unique IP address assigned.

NOTE: Windows 32 bit may require the Physical Address Extension (PAE) option to utilize 4 GB or more of memory. PAE is a memory address extension that enables support of greater than 4 GB of physical memory for most 32-bit (IA-32) Intel Pentium Pro and later platforms. For more information, see PAE Memory and Windows information on the Microsoft (<http://www.microsoft.com>) website.

- Installing—Install additional NC510x PCIe 10 GbE stand up adapters in any empty PCI Express slot on the system. In a Windows or Linux operating system, when the NC510x driver is installed, the driver automatically loads for any additional NC510x adapters that are added.
- Enabling—Each adapter can be enabled independently. The user assigns an IP address to each adapter in the system.

- Disabling—Each adapter can be disabled independently.

Configuring multiple ports on 10GbE adapters

HP multiple port adapters—such as the NC512m Dual Port 10 GbE Multifunction BL-c Adapter—have multiple ports on a single card.

- Requirements: Each port requires a separate IP address, and each port should be on a separate subnet for proper network stack functioning.
- Installing: If the driver is installed, it is automatically loaded for each port.
- Enabling: Each port appears as a separate device. Ports can be enabled individually without interfering with the other ports.
- Disabling: Ports can be disabled individually without interfering with other enabled ports.

Please note that multiple HP NC512m Dual Port 10 GbE Multifunction BL-c Adapters are **NOT** supported in a single system.

Boot options

Pre-boot Execution Environment (PXE) allows a server to boot from a remote system using the NC51xx 10 Gigabit Ethernet interface. Through the PXE interface, the server's operating system image is downloaded from a configured boot server.

PXE boot process requirements

The PXE boot process has the following requirements.

- An HP NC51xx network adapter enabled to support PXE boot.
- A Dynamic Host Configuration Protocol (DHCP) server — Used to assign an IP address to the network adapter and to specify a boot image to download and load. Typically, a system administrator configures a DHCP server to provide boot parameters.
- A Trivial File Transfer Protocol (TFTP) server — Used by the network adapter to download a PXE boot loader.
- System BIOS enabled for PCI Expansion ROM scanning of the PCI slot where the network adapter is installed. PCI Expansion ROM scanning allows the network adapter's PXE driver to be loaded and executed during system boot time.

Configuring PCI behavior is system BIOS dependent but usually requires accessing the BIOS setup screen and configuring the PCI advanced or boot properties. Also, the system BIOS must be enabled to boot from the NC51xx network adapter.

- Desired boot order selected to insure that the appropriate boot sequence occurs.

When PCI Expansion ROM scanning is enabled and the NC51xx network adapter is installed correctly, the NC51xx network adapter displays as a boot option in the system BIOS boot order menu.

PXE functionality in the firmware is disabled by default.

Complete the following steps to enable or disable PXE functionality for Windows.

1. Execute the following command to enable PXE functionality:
`nxflash -i NX_NIC<Device #> --opt-rom-on`

2. Execute the following command to disable PXE functionality:
`nxflash -i NX_NIC<Device #> --opt-rom-off`

Complete the following steps to enable or disable PXE functionality for Linux.

1. Execute the following command to enable PXE functionality:
`nxflash -i eth<#> --opt-rom-on`
2. Execute the following command to disable PXE functionality:
`nxflash -i eth<#> --opt-rom-off`

Currently, the PXE interface for NC51xx adapters **DOES NOT** support the Proliant Essentials Rapid Deployment Pack (RDP).

Troubleshooting

Unable to boot host system on Windows or Linux

Problem:

Unable to boot the host system with the network adapter installed on Windows or Linux operating systems.

Troubleshooting:

- Remove the network adapter and reboot. Verify that the system is able to boot without the network adapter.
- Verify that the required minimum 2 GB of system memory per 10 Gigabit Ethernet port is installed on the host system.

NOTE: Windows 32 bit may require the Physical Address Extension (PAE) option to utilize 4 GB or more of memory. PAE is a memory address extension that enables support of greater than 4 GB of physical memory for most 32-bit (IA-32) Intel Pentium Pro and later platforms. For more information, see PAE Memory and Windows information on the Microsoft (<http://www.microsoft.com>) website.

- Verify that you have met the system requirements for your operating system.
- Verify that no error messages occurred during the OS boot sequence.
- Verify that the ROM scan is disabled in the BIOS.
- Verify that no system error messages occurred in the following:
 - eventvwr.exe (Windows event viewer)
 - dmesg (Linux)

HP NC-Series Broadcom adapters

The following information describes the adapter properties available for HP NC-Series Broadcom adapters in the Windows operating system.

See the HP Network Configuration Utility online help for the properties available through the NCU.

See the Linux readme files for the properties available through the various Linux operating systems.

Windows Server 2008 and Windows Server 2008 x64 configurations

Although the default values should be appropriate in most cases, you may change any of the available options to meet the requirements of your specific system. It is recommended that you use the HP Network Configuration Utility to update HP NC-Series adapter properties. However, if you choose to update the properties using the operating system's Device Manager, the following lists the properties that are available for your HP adapter. The properties that are available through the HP NCU will differ. See the online help file for NCU adapter property information.

HP NC-Series Broadcom adapter properties

- **Flow Control.** The Flow Control property allows the user to enable or disable the receipt or transmission of PAUSE frames. PAUSE frames enable the adapter and the switch to control the transmit rate. The side that is receiving the PAUSE frame will momentarily stop transmitting. The recommended selection is Auto and it is the default setting. To disable Flow Control, select Disable from the Value list on the Advanced tab.
 - Auto. (Default) Auto detect flow control
 - Disable. PAUSE frame receipt and transmission is disabled
 - Tx PAUSE. PAUSE frame transmission is enabled
 - Rx PAUSE. PAUSE frame receipt is enabled
 - Rx/Tx PAUSE. PAUSE frame receipt and transmission is enabled
- **Interrupt moderation.** If enabled, helps to reduce number of interrupts per packet, which reduces CPU utilization, while maintaining the same throughput. This feature is useful under heavy network traffic conditions.
 - Default = Enabled
 - Range = Disabled; Enabled
- **IPv4 Checksum Offload.** Describes whether the device enabled or disabled the calculation of IPv4 checksums.
 - Default = Rx/Tx Enabled
 - Range = None; Rx Enabled; Tx Enabled; Rx/Tx Enabled
- **Large Send Offload Version 1 (IPv4).** Describes whether the device enabled or disabled the segmentation of large TCP packets over IPv4 for large send offload version 1 (LSOv1).
 - Default = Enabled
 - Range = Disabled; Enabled
- **Locally Administered Address.** Specifies the user-defined MAC Address of the adapter, which overrides the burned-in MAC Address. This box is disabled if the selected adapter has been teamed.
 - Default = Not Present
 - Range = Value; Not Present
- **Number of Receive Descriptors: Minimum/Maximum.** In high network load situations, increasing receive descriptors can increase performance. The tradeoff is that this also increases the amount of system memory used by the driver. If too few receive descriptors are used, performance suffers. If too many receive descriptors are used, the driver unnecessarily consumes memory resources.
- **Number of Transmit Descriptors: Minimum/Maximum.** Specifies the number of descriptors to allocate per Transmit Control Block (TCB). This value directly affects the number of map registers allocated for the adapter (the higher the number, the more map registers are allocated).
- **Priority and VLAN.** Enables or disables the ability to insert or remove the 802.1q tags for priority and VLAN.
 - Default = Priority & VLAN Enabled
 - Range = Priority & VLAN Disabled; Priority & VLAN Enabled; Priority Enabled; VLAN Enabled
- **Speed & Duplex.** Allows the user to set the connection speed to the network and mode. The Duplex Mode allows the adapter to transmit and receive network data simultaneously. The adapter is set to Auto (optimum connection) by default. Set the speed and mode as described below:

- 1 Gb Full Auto. Sets the speed to 1 Gbps and mode to Full-Duplex
- 10 Mb Full. Sets the speed to 10 Mbps and mode to Full-Duplex
- 10 Mb Half. Sets the speed to 10 Mbps and mode to Half-Duplex
- 100 Mb Full. Sets the speed to 100 Mbps and mode to Full-Duplex
- 100 Mb Half. Sets the speed to 100 Mbps and mode to Half-Duplex
- Auto. (Default) Sets the speed and mode for optimum network connection (recommended)
- **TCP/UDP Checksum Offload (IPv4).** Describes whether the device enabled or disabled the calculation of TCP or UDP checksum over IPv4 packets. If this TCP/UDP Checksum Offload (IPv4) property is present, it overrides the TCP Checksum Offload (IPv4) and UDP Checksum Offload (IPv4) properties and they are disabled.
 - Default = Rx/Tx Enabled
 - Range = Disable; Tx Enable; Rx Enable; Rx/Tx Enabled
- **TCP Checksum Offload (IPv4).** Describes whether the device enabled or disabled the calculation of TCP Checksum over IPv4 packets.
 - Default = Rx/Tx Enable
 - Range = Disable; Tx Enable; Rx Enable; Rx/Tx Enable
- **UDP Checksum Offload (IPv4).** Describes whether the device enabled or disabled the calculation of UDP checksum over IPv4 packets.
 - Default = Rx/Tx Enable
 - Range = Disable; Tx Enable; Rx Enable; Rx/Tx Enable
- **VLAN ID.** The user assigned identifier for a VLAN.
 - Range: 1–4094
- **Wake Up Capabilities.** Determines the type of packets that will cause the adapter to wake up the system.
 - Default = Both
 - Range = Both; Magic Packet; None; Wake Up Frame
- **WOL Speed.** (Not supported on NC150T, NC37x, NC380T, NC67xx, and NC7782 adapters) Specifies the speed at which the adapter connects to the network during Wake-on-LAN mode.
 - Default = Auto
 - Range = Auto; 10 Mb; 100 Mb

Multifunction Gigabit Server adapter properties

- **iSCSI VLAN.** Allows you to create a VLAN for an iSCSI-enabled device.
- **Receive-Side Scaling (RSS).** Enables dynamic load balancing of incoming traffic across CPUs. Microsoft Scalable Networking Pack (SNP) is required when enabling TOE and RSS.
 - Default = Enable
 - Range = Enable; Disable

Windows Server 2003 and Windows Server 2003 x64 configurations

Although the default values should be appropriate in most cases, you may change any of the available options to meet the requirements of your specific system. It is recommended that you use the HP Network Configuration Utility to update HP NC-Series adapter properties. However, if you choose to update the properties using the operating system's Device Manager, the following lists the properties that are available for your HP adapter. The properties that are available through the HP NCU will differ. See the online help file for NCU adapter property information.

HP NC-Series Broadcom and Multifunction adapter properties

- **802.1p QoS Packet Tagging.** The 802.1p QoS parameter is a standard that enables Quality of Service. This property is disabled by default. To change this property, select **Enable** or **Disable**.
- **Checksum Offload.** Normally the Checksum Offload function is computed by the protocol stack. By selecting one of the Checksum Offload properties, the checksum can be computed by the Gigabit Ethernet Adapter.

To enable one of the Checksum Offload properties select the property from the Value list on the Advanced tab.

 - None. Disables checksum offloading
 - Rx TCP/IP Checksum. Enables receive TCP, IP, and UDP checksum offloading
 - Tx TCP/IP Checksum. Enables transmit TCP, IP, and UDP checksum offloading
 - Tx/Rx TCP/IP Checksum. (Default) Enables transmit and receive TCP, IP, and UDP checksum offloading
- **Flow Control.** The Flow Control property allows the user to enable or disable the receipt or transmission of PAUSE frames. PAUSE frames enable the adapter and the switch to control the transmit rate. The side that is receiving the PAUSE frame will momentarily stop transmitting. The recommended selection is Auto and it is the default setting. To disable Flow Control, select Disable from the Value list on the Advanced tab.
 - Auto. (Default) Auto detect flow control
 - Disable. PAUSE frame receipt and transmission is disabled
 - Tx PAUSE. PAUSE frame transmission is enabled
 - Rx PAUSE. PAUSE frame receipt is enabled
 - Rx/Tx PAUSE. PAUSE frame receipt and transmission is enabled
- **Large Send Offload.** Normally, the TCP segmentation is performed by the protocol stack. By enabling the Large Send Offload property, the TCP segmentation can be performed by the Gigabit Ethernet Adapter. To enable the Large Send Offload property, select Enable from the Value drop-down menu on the Advanced tab.
 - Disable. Disables large send offloading
 - Enable. Enables large send offloading
- **Locally Administered Address.** Specifies the user-defined MAC Address of the adapter, which overrides the burned-in MAC Address. This box is disabled if the selected adapter has been teamed.
 - Default = Not Present
 - Range = Value; Not Present

- **Speed & Duplex.** The Speed & Duplex property allows the user to set the connection speed to the network and mode. The Duplex Mode allows the adapter to transmit and receive network data simultaneously. The adapter is set to Auto (optimum connection) by default. Set the speed and mode as described below:
 - 1 Gb Full Auto. Sets the speed to 1 Gbps and mode to Full-Duplex
 - 10 Mb Full. Sets the speed to 10 Mbps and mode to Full-Duplex
 - 10 Mb Half. Sets the speed to 10 Mbps and mode to Half-Duplex
 - 100 Mb Full. Sets the speed to 100 Mbps and mode to Full-Duplex
 - 100 Mb Half. Sets the speed to 100 Mbps and mode to Half-Duplex
 - Auto. (Default) Sets the speed and mode for optimum network connection (recommended)

NOTE: Auto is the recommended selection. It allows the adapter to dynamically detect the line speed and duplex mode of the network. Whenever the network capability changes, the adapter will automatically detect and adjust to the new line speed and duplex mode.

The Half-Duplex selection forces the adapter to connect to the network in Half-Duplex mode. The adapter may not function if the network is not configured to operate at the same mode.

The Full-Duplex selection forces the adapter to connect to the network in Full-Duplex mode. The adapter may not function if the network is not configured to operate at the same mode.

Multifunction Gigabit Server adapter properties

- **iSCSI VLAN.** Allows you to create a VLAN for an iSCSI-enabled device. To enable iSCSI on adapters running on Windows Server 2003 (SP1 or SP2) or Windows Server 2003 x64 (SP1 or SP2), an updated Storport storage driver from article number KB932755 must be downloaded from the Microsoft (<http://www.microsoft.com>) website.
- **TCP Offload Engine (TOE).** Offloads TCP connections to the Multifunction Server Adapter. Microsoft Scalable Networking Pack (SNP) is required when enabling TOE or RSS. For systems running Windows Server 2003 (SP1) and Windows Server 2003 x64 (SP1) you must download SNP and required Microsoft hotfixes and install them on the system. See the Microsoft (<http://www.microsoft.com>) website to download the latest version of the Microsoft Windows Server 2003 Scalable Networking Pack (SNP) and the required Microsoft hotfixes in article numbers 921136, 919948, and 923187 of the Microsoft Knowledge Base (KB).
- **Receive-Side Scaling (RSS).** Enables dynamic load balancing of incoming traffic across CPUs. Microsoft Scalable Networking Pack (SNP) is required when enabling RSS. For systems running Windows Server 2003 (SP1) and Windows Server 2003 x64 (SP1), you must download SNP and the required Microsoft hotfixes from the Microsoft website. See the Microsoft (<http://www.microsoft.com>) website to download the latest version of the Microsoft Windows Server 2003 Scalable Networking Pack (SNP) and the required Microsoft hotfixes in article numbers 921136, 919948, and 923187 of the Microsoft Knowledge Base (KB).

Windows 2000 adapter properties

- **802.1p QoS.** The 802.1p QoS parameter is a standard that enables Quality of Service. This parameter is disabled by default. To change this parameter, select **Enable** or **Disable**.
- **Checksum Offload.** Normally the Checksum Offload function is computed by the protocol stack. By selecting one of the Checksum Offload parameters, the checksum can be computed by the Gigabit Ethernet Adapter.
To enable one of the Checksum Offload parameters, select the parameter.

- None. Disables checksum offloading
- Rx TCP/IP Checksum. Enables receive TCP, IP, and UDP checksum offloading
- Tx TCP/IP Checksum. Enables transmit TCP, IP, and UDP checksum offloading
- Tx/Rx TCP/IP Checksum. (Default) Enables transmit and receive TCP, IP, and UDP checksum offloading
- **Ethernet@WireSpeed.** The Ethernet@WireSpeed parameter enables a 1000Base-T Ethernet adapter to establish a link at a lower speed when only two pairs of wires are available in the cable plant. By default, this parameter is enabled. To disable the Ethernet@WireSpeed parameter, select **Disable** from the Value list on the Advanced tab. This property is not supported on NC1020 and NC7761 adapters.
 - Disable. Disables Ethernet@WireSpeed
 - Enable. (Default) Enables Ethernet@WireSpeed
- **Flow Control.** The Flow Control property allows the user to enable or disable the receipt or transmission of PAUSE frames. PAUSE frames enable the adapter and the switch to control the transmit rate. The side that is receiving the PAUSE frame will momentarily stop transmitting. The recommended selection is Auto and it is the default setting. To disable Flow Control, select Disable from the Value list on the Advanced tab.
 - Auto. (Default) Auto detect flow control
 - Disable. PAUSE frame receipt and transmission is disabled
 - Tx PAUSE. PAUSE frame transmission is enabled
 - Rx PAUSE. PAUSE frame receipt is enabled
 - Rx/Tx PAUSE. PAUSE frame receipt and transmission is enabled
- **Speed & Duplex.** The Speed & Duplex parameter allows the user to set the connection speed to the network and mode. The Duplex Mode allows the adapter to transmit and receive network data simultaneously. The adapter is set to Auto (optimum connection) by default. Set the speed and mode as described below:
 - 10 Mb Full. Sets the speed to 10 Mbps and mode to Full-Duplex
 - 10 Mb Half. Sets the speed to 10 Mbps and mode to Half-Duplex
 - 100 Mb Full. Sets the speed to 100 Mbps and mode to Full-Duplex
 - 100 Mb Half. Sets the speed to 100 Mbps and mode to Half-Duplex
 - Auto. (Default) Sets the speed and mode for optimum network connection (recommended). 1 Gbps speed is enabled by selecting Auto.

NOTE: Auto is the recommended selection. It allows the adapter to dynamically detect the line speed and duplex mode of the network. Whenever the network capability changes, the adapter will automatically detect and adjust to the new line speed and duplex mode.

The Half-Duplex selection forces the adapter to connect to the network in Half-Duplex mode. The adapter may not function if the network is not configured to operate at the same mode.

The Full-Duplex selection forces the adapter to connect to the network in Full-Duplex mode. The adapter may not function if the network is not configured to operate at the same mode.

- **Wake Up Capabilities.** The Wake Up Capabilities parameter allows the user to set the adapter to wake up from a low power mode when it receives a network wake up frame. Two wake up frames are possible: Magic Packet and Wake Up Frame. By default, the adapter is set to Both. To choose

the type of frame that will cause the adapter to wake up, select the appropriate option from the Value drop-down list on the Advanced tab. This property is not supported on NC150T adapters.

- Both. (Default) Selects both Magic Packet and Wake up Frame as wake up frames
- Magic Packet. Selects Magic Packet as the wake up frame
- None. Selects no wake up frames
- Wake Up Frame. Selects Wake up Frame as the wake up frame
- **WOL Speed.** The WOL Speed parameter allows the user to select the speed at which the adapter connects to the network while in Wake-on-LAN mode. By default, the adapter is set to Auto. This property is not supported on NC150T and NC7782 adapters.
 - **10 Mb.** Sets the speed to 10 Mb
 - **100 Mb.** Sets the speed to 100 Mb
- **Auto.** (Default) Sets the speed for optimum network connection

HP NC-Series Intel Adapters

The following information describes the adapter properties available for HP NC-Series Intel adapters in the Windows operating system.

See the HP Network Configuration Utility online help for the properties available through the NCU.

See the Linux readme files for the properties available through the various Linux operating systems.

Windows Server 2008 and Windows Server 2008 x64 configurations

Although the default values should be appropriate in most cases, you may change any of the available options to meet the requirements of your specific system. It is recommended that you use the HP Network Configuration Utility to update HP NC-Series adapter properties. However, if you choose to update the properties using the operating system's Device Manager, the following lists the properties that are available for your HP adapter. The properties that are available through the HP NCU will differ. See the online help file for NCU adapter property information.

HP NC-Series Intel adapter properties

- **Adaptive Interframe Spacing.** Compensates for excessive Ethernet packet collisions on the network. The default setting works best for most computers and networks by dynamically adapting to the network traffic conditions. However, in some rare cases, you may obtain better performance by manually setting the spacing value. Setting a value forces a static gap between packets. Increasing the value increases the delay between frames being transmitted.
 - Default = Disabled
 - Range = Disabled; Enabled
- **Enable PME.** Allows the use of power management and wake-up functions. Supported on NC110x, NC310F, NC340x, NC360x, NC364x, NC6170, and NC7170 adapters only.
 - Default for NC110x, NC360x, and NC364x adapters = OS Controlled
 - Range for NC110x, NC360x, and NC364x adapters = OS Controlled; Disabled; Enabled

- Default for NC6170 and NC7170 adapters = No Action
- Range for NC6170 and NC7170 adapters = Disabled; Enabled; Hardware Default; No Action
- **Flow Control.** Determines the type of flow control that is needed. Flow control enables the transmission of PAUSE frames. Not supported on NC71xx adapters.
 - Default = Rx/Tx Enable
 - Range = Disable; Tx Enable; Rx Enable; Rx/Tx Enable
- **Gigabit Master Slave Mode.** Determines IEEE 802.3ab Master-Slave resolution during gigabit auto negotiation.
 - Default = Auto Detect
 - Range = Auto Detect; Force Master Mode; Force Slave Mode
- **Interrupt moderation.** If enabled, helps to reduce number of interrupts per packet, which reduces CPU utilization, while maintaining the same throughput. This feature is useful under heavy network traffic conditions.
 - Default = Enabled
 - Range = Disabled; Enabled
- **Interrupt moderation rate.** Determines the amount of interrupts per second when the Interrupt moderation parameter is enabled.
 - Default = Adaptive
 - Range = Adaptive; Extreme; High; Low; Medium; Minimal; Off
- **IPv4 Checksum Offload.** Describes whether the device enabled or disabled the calculation of IPv4 checksums.
 - Default = Rx/Tx Enable
 - Range = Disable; Tx Enable; Rx Enable; Rx/Tx Enable
- **Jumbo Packet.** The size, in bytes, of the largest supported Jumbo Packet (an Ethernet frame that is greater than 1514 bytes) that the hardware can support.
 - Default = Disabled
 - Range = 4088 Bytes; 9014 Bytes; Disabled
- **Large Send Offload Version 2 (IPv4).** Describes whether the device enabled or disabled the segmentation of large TCP packets over IPv4 for large send offload version 2 (LSOv2).
 - Default = Enabled
 - Range = Disabled; Enabled
- **Large Send Offload Version 2 (IPv6).** Describes whether the device enabled or disabled the segmentation of large TCP packets over IPv6 for large send offload version 2 (LSOv2).
 - Default = Enabled
 - Range = Disabled; Enabled
- **Link Speed & Duplex.** Sets the connection speed to the network and mode. Full-Duplex Mode allows the adapter to transmit and receive network data simultaneously. This property is not available for NC310F and NC61xx adapters through the Microsoft® User Interface.
 - Default = Auto Negotiation
 - Range for NC340x and NC71xx adapters: Auto Negotiation; 10Mbps/Half-Duplex; 10Mbps/Full-Duplex; 100Mbps/Half-Duplex; 100Mbps/Full-Duplex; 1.0 Gbps/Full-Duplex

- **Locally Administered Address.** Specifies the user-defined MAC Address of the adapter, which overrides the burned-in MAC Address. This box is disabled if the selected adapter has been teamed.
 - Default = Not Present
 - Range: Value; Not Present
- **Log Link State Event.** Enables or disables the logging of link state changes. If enabled, a link up change event or a link down change event generates a message that is displayed in the system event logger.
 - Default = Enabled
 - Range = Disabled; Enabled
- **Priority and VLAN.** Enables or disables the ability to insert or remove the 802.1q tags for priority and VLAN.
 - Default = Priority & VLAN Enabled
 - Range = Priority & VLAN Disabled; Priority & VLAN Enabled; Priority Enabled; VLAN Enabled
- **Receive Buffers.** The size, in bytes, of the receive buffers that the hardware can support. This size is hardware-dependent and can include data buffers, buffer descriptors, and so on.
 - Default = 256
- **Smart Power Down.** (NC110T, NC360x, and NC364T only) Minimizes power consumption by enabling the adapter to enter a deep sleep mode under certain conditions.
 - Default = Hardware Default
 - Range = Disabled; Enabled; Hardware Default
- **TCP Checksum Offload (IPv4).** Describes whether the device enabled or disabled the calculation of TCP Checksum over IPv4 packets.
 - Default = Rx/Tx Enable
 - Range = Disable; Tx Enable; Rx Enable; Rx/Tx Enable
- **TCP Checksum Offload (IPv6).** Describes whether the device enabled or disabled the calculation of TCP checksum over IPv6 packets.
 - Default = Rx/Tx Enable
 - Range = Disable; Tx Enable; Rx Enable; Rx/Tx Enable
- **Transmit Buffers.** The size, in bytes, of the transmit buffers that the hardware can support. This size is hardware-dependent and can include data buffers, buffer descriptors, and so forth.
 - Default = 512 Bytes
- **UDP Checksum Offload (IPv4).** Describes whether the device enabled or disabled the calculation of UDP checksum over IPv4 packets.
 - Default = Rx/Tx Enable
 - Range = Disable; Tx Enable; Rx Enable; Rx/Tx Enable
- **UDP Checksum Offload (IPv6).** Describes whether the device enabled or disabled the calculation of UDP checksum over IPv6 packets.
 - Default = Rx/Tx Enable
 - Range = Disable; Tx Enable; Rx Enable; Rx/Tx Enable
- **Wait for Link.** Determines if the driver waits for auto-negotiation to be successful before reporting the link state. If disabled, the driver does not wait for auto-negotiation. If enabled, the driver does wait

for auto-negotiation. If this feature is on, and the speed is not set to auto-negotiation, the driver will wait for a short time for link to complete before reporting the link state.

- Default = Auto Detect
- Range = Auto Detect; Off; On
- **Wake on Link Settings.** Wakes the computer if the network connection establishes link while the computer is in standby mode. To wake up a system from an S5 state, PME must be enabled.
 - Default = Disabled
 - Range = Disable, Forced; OS Controlled
- **Wake On Settings.** Available only when Enable PME is enabled. Allows you to choose what types of packets will cause the adapter to wake.
 - Default for NC110x and NC364T = Wake on Magic & Directed
 - Default for NC360x and NC364m = OS Controlled
 - Default for NC6170 and NC7170 = Disabled
 - Range = Disabled; Wake on Directed Packet; Wake on Magic & Directed; Wake on Magic Packet; OS Controlled

Windows Server 2003 and Windows Server 2003 x64 configurations

Although the default values should be appropriate in most cases, you may change any of the available options to meet the requirements of your specific system. It is recommended that you use the HP Network Configuration Utility to update HP NC-Series adapter properties. However, if you choose to update the properties using the operating system's Device Manager, the following lists the properties that are available for your HP adapter. The properties that are available through the HP NCU will differ. See the online help file for NCU adapter property information.

HP NC-Series Intel adapter properties

- **802.1p QoS Packet Tagging.** Enables or disables IEEE 802.1p tagging to send network traffic with different priority levels.
 - Default = Disabled
 - Range = Disabled; Enabled
- **Number of Coalesce Buffers.** Specifies the number of memory buffers available to the driver in case the driver runs out of available map registers. This buffer area is also used when a packet consists of many fragments. If no coalesce buffers or map registers are available, the driver is forced to queue the packet for later transmission. The preferred method of transmitting data is to use map registers, since it is the most efficient method.
 - Default = 128 (for NC110x, NC360x, NC364x = 256)
 - Range = 16–768 (increments of 8)
- **Flow Control.** The Flow Control property allows the user to enable or disable the receipt or transmission of PAUSE frames. PAUSE frames enable the adapter and the switch to control the transmit rate. The side that is receiving the PAUSE frame will momentarily stop transmitting. The recommended selection is Auto and it is the default setting. To disable Flow Control, select Disable from the Value list on the Advanced tab.

- Auto. (Default) Auto detect flow control
- Disable. PAUSE frame receipt and transmission is disabled
- Tx PAUSE. PAUSE frame transmission is enabled
- Rx PAUSE. PAUSE frame receipt is enabled
- Rx/Tx PAUSE. PAUSE frame receipt and transmission is enabled

NOTE: User control of Flow Control parameter is not available for NC71xx adapters.

- **Link Speed & Duplex.** Allows the user to set the connection speed to the network and mode. Full-Duplex Mode allows the adapter to transmit and receive network data simultaneously. This property is not available for NC310F and NC61xx adapters through the Microsoft® User Interface.
 - Default = Auto Detect
 - Range = NC340x and NC71xx Adapters: Auto Detect; 10Mbps/Half-Duplex; 10Mbps/Full-Duplex; 100Mbps/Half-Duplex; 100Mbps/Full-Duplex; 1000 Mbps/Full-Duplex
- **Locally Administered Address.** Specifies the user-defined MAC Address of the adapter, which overrides the burned-in MAC Address. This box is disabled if the selected adapter has been teamed.
 - Default = Not Present
 - Range = Value; Not Present
- **Number of Receive Descriptors.** Specifies the number of buffers used by the driver when copying data to the protocol memory. In high network load situations, increasing receive descriptors can increase performance. The tradeoff is that this also increases the amount of system memory used by the driver. If too few receive buffers are used, performance suffers. If too many receive buffers are used, the driver unnecessarily consumes memory resources.
 - Default
 - NC110x, NC310F, NC340x, NC360x, NC364x, NC6170, and NC7170 = 256
 - All others = 160
 - Range
 - NC6132 and NC6134 = 80–768 (increments of 8)
 - NC6136, NC7131, and NC7132 = 80–256 (increments of 8)
 - NC310F, NC340x, NC6170, and NC7170 = 80–4096 (increments of 8)
 - NC110x, NC360x, and NC364x = 80-2048 (increments of 8)
- **Number of Transmit Descriptors.** Specifies the number of resources allocated to transmit packets.
 - Default = 256
 - Range
 - NC6132 and NC6134 = 80–768 (increments of 8)
 - NC6136, NC7131, and NC7132 = 80–256 (increments of 8)
 - NC310F, NC340x, NC6170, and NC7170 = 80–4096 (increments of 8)
 - NC110x, NC360x, and NC364x = 80-2048 (increments of 8)
- **Offload Receive TCP Checksum.** Offloads the task of computing the checksum for incoming TCP or UDP packets, thereby improving performance.
 - Default = On

- Range = Off; On
- **Offload Transmit TCP Checksum.** Offloads the task of computing the checksum for outgoing TCP or UDP packets, thereby improving performance.
 - Default = On
 - Range = Off; On
- **Offload Transmit IP Checksum.** This property does not apply to the NC6132 or NC6134 adapters. Offloads the task of computing the checksum for outgoing IP packets, thereby improving performance.
 - Default = On
 - Range = Off; On
- **Offload Receive IP Checksum.** (NC110x, NC310F, NC340x, NC360x, NC364x, NC6170, and NC7170 only). Offloads the task of computing the checksum for incoming IP packets, thereby improving performance.
 - Default = On (NC110, NC360x, NC364x = Off)
 - Range = Off; On
- **Enable PME** (NC110x, NC310F, NC340x, NC360x, NC364x, NC6170, and NC7170 only). Allows the use of power management and wake-up functions.
 - Default = No Action (NC110x, NC360x, NC364x = OS Controlled)
 - Range = Disabled; Enabled; Hardware Default; No Action (NC110x, NC360x, NC364x = OS Controlled, Disabled, Enabled)
- **Wake On Settings** (NC110x, NC310F, NC340x, NC360x, NC364x, NC6170, and NC7170 only). Available only when Enable PME is enabled. Allows you to choose what types of packets will cause the adapter to wake.
 - Default = Disabled (NC110x, NC360x, NC364x = OS Controlled)
 - Range = Disabled; Wake on Directed Packet; Wake on Magic & Directed; Wake on Magic Packet; OS Controlled
- **Large Send Offload** (Windows® Server 2003 only; NC110x, NC310F, NC340T, NC360x, NC364x, NC6170, and NC7170 only). Enables offloading of large TCP packets.
 - Default = On
 - Range = Off; On
- **Smart Power Down.** (NC110T, NC360x, and NC364T only) Minimizes power consumption by enabling the adapter to enter a deep sleep mode under certain conditions.
 - Default = Hardware Default
 - Range = Disable, Enable, Hardware Default
- **Wake on Link.** (NC110T, NC360x, and NC364T only) Allows wake-up from Advanced Configuration and Power Interface (ACPI) when link is reconnected.
 - Default = Disable
 - Range = Disable, Force

Boot Agent

The Intel® Boot Agent is a software product that allows your networked client computer to boot using a program code image supplied by a remote server.

Implementation support for the Boot Agent includes:

- Multi-protocol boot ROM code designed for remote booting from Gigabit Ethernet Adapters
- Compliance with the Pre-boot eXecution Environment (PXE) Version 2.1 Specification
- Remote Program Load (RPL) runtime and loader software included with some versions of the Boot Agent

Intel® Boot Agent offers:

- Compliance with the Wired for Management Baseline (WfM) 2.0 specification
- Compatibility with legacy boot agent environments that use BOOTP protocol
- Customization in pre-boot, Windows®, and DOS environments

Operating environment

The Boot Agent operates in a client/server environment. Often, in this environment, one or more servers provide remote boot services to a large number of client computers through a common network. The computer system where the Intel® Boot Agent is loaded is considered to be a client with respect to the remote boot capability even if that system acts as a server after the system has finished booting.

Configuration options

The Intel® Boot Agent software provides configuration options that allow you to customize the behavior of the Boot Agent software. You can configure the Boot Agent in a pre-boot environment (before the operating system is loaded).

Configuring the Boot Agent in a pre-boot PXE or RPL environment

You can customize the behavior of the Boot Agent software through a pre-boot (operating system independent) configuration setup program contained within the adapter's flash ROM. A single user interface allows you to configure PXE and RPL protocols on HP Gigabit adapters. You can access this pre-boot configuration setup program each time the client computer cycles through the boot process. The boot process is triggered whenever any of the following boot events occur:

- Power on
- Hard reset (**Reset** button on system, if available)
- Soft reset (**Ctrl+Alt+Del**)
- Operating system or application-initiated system restart

When the boot process begins, the screen clears and the computer begins its Power On Self-Test (POST) sequence. Shortly after completion of the POST, the Boot Agent software stored in flash ROM executes. The Boot Agent then displays an initialization message, similar to the one below, indicating that it is active:

```
Initializing Intel(R) Boot Agent Version X.X.XX
PXE 2.0 Build 083 (WfM 2.0)
Press Ctrl+S to enter the Setup Menu.
```

This display may be hidden by the manufacturer's splash screen. See your manufacturer's documentation for details.

To customize the behavior of the Boot Agent software in a pre-boot PXE or RPL environment complete the following steps:

1. Press the **Ctrl+S** keys immediately after the initialization message appears. A configuration setup menu appears allowing you to set configuration values for the Boot Agent. The configuration setup menu is the same for both kinds of adapters.

If you do not press the **Ctrl+S** keys, the Boot Agent software will proceed with the boot process eventually bringing up the operating system. If you miss your opportunity to press the **Ctrl+S** keys within the allowed number of seconds, reboot the computer to try again. If you select a Setup Menu Wait Time setting of zero or a Show Setup Prompt setting of Disabled, you will not be prompted to press the **Ctrl+S** keys even though you can still enter the configuration setup menu using this key combination.

The configuration setup menu shows a list of configuration settings on the left and their corresponding values on the right. Key descriptions near the bottom of the menu indicate how to change values for the configuration settings. For each selected setting, a brief "mini-Help" description of its function appears just above the key descriptions.

2. Select the setting you need to change by using the arrow keys.
3. After you have accessed the setting you want to change, press the **Spacebar** until the desired value appears.
4. If you want to change additional settings, repeat steps 2 and 3.
5. After you have completed your changes, press the **F4** key to update the adapter with the new values. Any changed configuration values are applied as the boot process resumes.

Boot Agent configuration settings

Configuration settings	Possible values	Description
Network Boot Protocol	<ul style="list-style-type: none"> • PXE (Preboot eXecution Environment) • RPL (Remote Program Load) 	<p>Controls whether the RPL or PXE boot protocol will be used. Select PXE for use with WfM-compatible network management programs, such as Intel® LANdesk® Management Suite, Windows 2000 RIS, and Linux®.</p> <p>Select RPL for legacy-style remote booting, as well as for Novell® Netware® remote boot solutions.</p> <p>Depending on the configuration of the Boot Agent, this parameter may not be changeable.</p>
Boot Order	<ul style="list-style-type: none"> • Use BIOS Setup Boot Order • Try network first, then local drives • Try local drives first, then network • Try network only • Try local drives only 	<p>Sets the boot order in which devices are selected during boot up if the computer does not have its own control method.</p> <p>If your client computer's BIOS supports the BIOS Boot Specification (BBS), or allows PnP-compliant selection of the boot order in the BIOS setup program, then this setting will always be Use BIOS Setup Boot Order and cannot be changed. In this case, refer to the BIOS setup manual specific to your client computer to set up boot options.</p> <p>If your client computer does not have a BBS- or PnP-compliant BIOS, you can select any one of the other possible values listed for this setting except for Use BIOS Setup Boot Order.</p>

Configuration settings	Possible values	Description
Show Setup Prompt	<ul style="list-style-type: none"> • Enabled • Disabled 	<p>Controls whether or not the Boot Agent displays the Ctrl+S prompt after POST.</p> <p>If you select Enabled, the Ctrl+S prompt appears after POST so that you can press Ctrl+S within the number of seconds allowed by the Setup Menu Wait Time setting to display the configuration setup menu.</p> <p>If you select Disabled and/or the Setup Menu Wait Time setting is zero, the Ctrl+S setup prompt will not appear during the boot process. However, you can display the configuration setup menu by repeatedly pressing the Ctrl+S keys immediately after POST until the menu appears. If the configuration setup menu does not appear after repeatedly pressing the Ctrl+S keys, you were likely not fast enough. In this case, reboot and try again.</p>
Setup Menu Wait Time	<ul style="list-style-type: none"> • 0 seconds • 2 seconds • 3 seconds • 5 seconds 	<p>Controls the number of seconds the Boot Agent waits for you to press the Ctrl+S keys, so as to suspend the boot process and then configure the way the Boot Agent operates.</p> <p>If you select a Setup Menu Wait Time setting of zero and/or a Show Setup Prompt setting of Disabled, the Ctrl+S setup prompt will not appear during the boot process. However, you can still display the configuration setup menu by repeatedly pressing the Ctrl+S keys immediately after POST until the menu appears. If the configuration setup menu does not appear after repeatedly pressing the Ctrl+S keys, you were likely not fast enough. In this case, reboot and try again.</p>

If during PXE or RPL boot more than one adapter is installed in a computer and you want to boot from the boot ROM located on a specific adapter, you can do so by removing the adapter from the BIOS Boot Order or disabling the flash by running **IBAUTIL -FlashDisable** on the desired adapter.

To display diagnostics information:

Anytime the configuration setup menu is displayed, you may press the **D** key to display diagnostics information in the lower half of the screen. This information can be helpful during interaction with HP Customer Support personnel or your IT team members. After you press the **D** key, the information displayed remains until you leave the configuration setup screen (either by pressing the **F4** key, pressing the **Esc** key, or by rebooting the computer). For more information about how to interpret the information displayed, refer to the "Diagnostics information for pre-boot PXE or RPL environments" section.

Auxiliary DOS utilities

The IBAUtil allows you to install and configure the Boot Agent using the DOS environment. IBAUtil is a utility program that provides an alternative means for modifying the adapter configuration settings. Use IBAUtil to:

- Change the default settings of your HP NC310F, NC3123, NC6170, or NC7170 adapter.
- Enable/disable the Wake-on-LAN (WOL) and Intel® Boot Agent capabilities.
- Allow in-the-field upgrades to the image stored in the flash component of the adapter.

Wake-On-LAN and Intel® Boot Agent in a DOS environment

Use IBAUtil to enable or disable WOL or Boot Agent features. To obtain this utility download the HP ProLiant Networking SoftPaq as described in "Downloading files (on page 9)" and navigate to the APPS\BOOTAGNT\N100X directory.

- Wake-On-LAN. When enabled, the adapter can react to special "wake up" packets and power up the computer without end user intervention. However, there is a higher power draw when the system is in the suspended state when this is enabled. It is strongly recommended that no more than two adapters should have this feature enabled per computer.
- Intel Boot Agent. When enabled, the computer can initiate PXE/RPL boot if a valid flash image is present on the adapter.

Running IBAUtil in DOS

IBAUtil (for DOS) must be run with the computer booted to DOS only. This utility cannot be run in a DOS window in any Microsoft® Windows® product or in DOS compatibility mode in IBM OS/2.

The syntax for issuing IBAUtil command line parameters in DOS is:

```
IBAUTIL [-option]...
```

DOS command line parameters

IBAUtil accepts up to 16 simultaneous parameters and does not perform both operations if orthogonal parameters (like the commands -FLASHENABLE -FLASHDISABLE used together) are supplied. If opposing parameters are specified, IBAUtil exits with an error.

The parameters are grouped with their orthogonal pairs, where applicable. -HELP, -EXITCODES and -IMAGEVERSION have special overriding characteristics. Unless noted, all other parameters may be used in conjunction with all other parameters.

If you enter **IBAUTIL** without any command line options, the utility displays a listing of all of the Intel® network adapters found in your system.

Valid parameters are listed below. All other parameters generate an error.

Parameter	Description
-HELP or -?	Displays command line help and exits. When -HELP is set, all other parameters are ignored.
-EXITCODES	Displays exit code help. When -EXITCODES are set, all other parameters except -HELP are ignored.
-IMAGEVERSION or -IV	Displays the PXE versions stored within the IBAUtil. When -IMAGEVERSION is set, all other parameters except -EXITCODES and -HELP are ignored.
Adapter Selection Options	
-ALL	Selects all adapters found in system, works for both EEPROM and Flash activity.
-NIC=XX	Selects a specific adapter (1-16).
-BLINK	Blinks the LED on the selected adapter for 10 seconds to provide a method for identifying an adapter.
Flash Programming Options	
-AUTO or -QUIET	Runs IBAUtil without asking for user intervention. It does NOT create a backup image. This parameter must be used with -NIC or -ALL if there is more than one adapter in the system. It runs without -ALL or -NIC=xx if there is only one adapter in the system.

Parameter	Description
-UPGRADE or -UP	Downloads the Boot Agent stored within IBAUtil to the adapters in the system.
-FLASHENABLE or -FE	Enables Boot ROM. Saves
-FLASHDISABLE or -FD	Disables Boot ROM.
-SAVE	Saves existing Intel Boot Agent and EEPROM settings to a file. The file is named based on the PCI Vendor and Device ID of the adapter.
-RESTORE	Restores previously saved Intel Boot Agent image. IBAUtil looks for a file name based on the PCI Vendor and Device ID of the adapter. If -RESTORE is used with -UPGRADE, an error is generated.
Power Management Options	
-WOLDISABLE or -WOLD	Disables WOL bit on Fast Ethernet and disables APMPME and APME EEPROM bits on gigabit.
-WOLENABLE or -WOLE	Enables WOL bit on Fast Ethernet and enables APMPME and APME EEPROM bits on gigabit.
-LWSENABLE OR -LWSE	Enables changing the legacy OS Wakeup Support Option on 10/100 adapters.
-LWSDISABLE OR -LWSD	Disables changing the legacy OS Wakeup Support Option on 10/100 adapters.
PXE/RPL Configuration Options	
-SETUPENABLE or -STE	Enables Setup Menu.
-SETUPDISABLE OR -STD	Disables Setup Menu.
-DEFAULTCONFIG or -DEFCFG	Resets configuration and control words in the EEPROM back to default settings.
-TITLEENABLE OR -TLE	Enables initial title message.
-TLEDISABLE OR -TLD	Disables initial title message.
-PROCOLENABLE OR -PROE	Enables changing the boot protocol option.
-PROCOLDISABLE OR -PROD	Disables changing the boot protocol option.
-ORDERENABLE OR -ORDE	Enables changing the boot order option.
-ORDERDISABLE OR -ORDD	Disables changing the boot order option.
-SETWAITTIME=X or -SWT=X	Sets the setup delay time for the adapter to X seconds. Valid delay times are 0, 2, 3, and 5. Only the first instance of this parameter is valid. All other instances of the parameter generate an error.
-RPL BOOT	Sets the network boot protocol to RPL if an RPL image is present in the adapter's flash.
-PXE BOOT	Sets the network boot protocol to PXE if a PXE image is present in the adapter's flash.

DOS error codes

IBAUtil returns codes to the DOS command line when an error occurs.

- 0–Success
- 1–Operator termination

- 2–Invalid adapter
- 3–Bad command line parameter
- 4–EEPROM checksum failure
- 5–EEPROM read failure
- 6–EEPROM write failure
- 7–EEPROM dump failure
- 8–(Not used)
- 9–No memory
- 10–No adapters found

Examples of IBAUtil command lines

The following are examples of some typical IBAUtil command lines.

- Disables WOL on all HP network adapters:
IBAUTIL -ALL -WOLDISABLE
- Enables WOL on the second HP network adapter found in your system:
IBAUTIL -NIC=2 -WOLENABLE
- Updates the Boot Agent image on all HP network adapters:
IBAUTIL -ALL -UPGRADE
- Enables the Boot ROM on the first HP Network Adapter found in your system:
IBAUTIL -NIC=1 -FE

Boot Agent messages

The following error and information messages may be displayed during initialization. Possible causes and how to avoid an error condition are provided where applicable.

- **Flash device wrong size**
This error message can occur when using IBAUtil. The full version of Boot Agent software cannot be loaded into a flash ROM device smaller than 64 KB. If a 32 KB (or smaller) flash ROM device is detected in the adapter, the flash update software returns this message. Assuming the device is socketed, remove the "too small" device and install a blank 64 KB (or larger) flash ROM device.
- **Invalid PMM function number**
PMM is not installed or is not working correctly. Try updating the BIOS.
- **PMM allocation error**
PMM could not or did not allocate the requested amount of memory for driver usage.
- **Press Ctrl+S to enter the Setup Menu.**
Instructs you how to enter the configuration setup menu.
- **PXE-E00: This system does not have enough free conventional memory. The Boot Agent cannot continue.**
System does not have enough free memory to run PXE image. The Boot Agent was unable to find enough free base memory (below 640K) to install the PXE client software. The system cannot boot via PXE in its current configuration. The error returns control to the BIOS and the system does not attempt to remote boot. If this error persists, try updating your system's BIOS to the most-recent version. Contact your system administrator or HP customer support to resolve the problem.

- **PXE-E01: PCI Vendor and Device IDs do not match!**

Image vendor and device ID do not match those located on the card. Be sure the correct flash image is installed on the adapter.
- **PXE-E04: Error reading PCI configuration space. The Boot Agent cannot continue.**

PCI configuration space could not be read. Machine is probably not PCI compliant. The Boot Agent was unable to read one or more of the adapter's PCI configuration registers. The adapter may be misconfigured, or the wrong Boot Agent image may be installed on the adapter. The Boot Agent returns control to the BIOS and not attempt to remote boot. Try to update the flash image. If this does not solve the problem, contact your system administrator or HP Customer Support.
- **PXE-E05: The LAN adapter's configuration is corrupted or has not been initialized. The Boot Agent cannot continue.**

The adapter's EEPROM is corrupted. The Boot Agent determined that the adapter EEPROM checksum is incorrect. The agent will return control to the BIOS and not attempt to remote boot. Try to update the flash image. If this does not solve the problem, contact your system administrator or HP Customer Support.
- **PXE-E06: Option ROM requires DDIM support.**

The system BIOS does not support DDIM. The BIOS does not support the mapping of the PCI expansion ROMs into upper memory as required by the PCI specification. The Boot Agent cannot function in this system. The Boot Agent returns control to the BIOS and does not attempt to remote boot. You may be able to resolve the problem by updating the BIOS on your system. If updating your system's BIOS does not solve the problem, contact your system administrator or HP customer support to resolve the problem.
- **PXE-E07: PCI BIOS calls not supported.**

BIOS-level PCI services not available. Machine is probably not PCI compliant.
- **PXE-E09: Unexpected UNDI loader error. Status == xx**

The UNDI loader returned an unknown error status. xx is the status returned.
- **PXE-E20: BIOS extended memory copy error.**

BIOS could not move the image into extended memory.
- **PXE-E20: BIOS extended memory copy error. AH == xx**

Error occurred while trying to copy the image into extended memory. xx is the BIOS failure code.
- **PXE-E51: No DHCP or BOOTP offers received.**

The Boot Agent did not receive any DHCP or BOOTP responses to its initial request. Be sure that your DHCP server (and/or proxyDHCP server, if one is in use) is properly configured and has sufficient IP addresses available for lease. If you are using BOOTP, be sure that the BOOTP service is running and is properly configured.
- **PXE-E53: No boot filename received.**

The Boot Agent received a DHCP or BOOTP offer, but has not received a valid filename to download. If you are using PXE, please check your PXE and BINL configuration. If you are using BOOTP, be sure that the TFTP service is running and that the specific path and filename are correct.
- **PXE-E61: Media test failure.**

The adapter does not detect link. Be sure that the cable is good and is attached to a working hub or switch. The link light visible from the back of the adapter should be lit.

- **PXE-EC1: Base-code ROM ID structure was not found.**
No base code can be located. An incorrect flash image is installed or the image has become corrupted. Try to update the flash image.
- **PXE-EC3: BC ROM ID structure is invalid.**
Base code cannot be installed. An incorrect flash image is installed or the image has become corrupted. Try to update the flash image.
- **PXE-EC4: UNDI ROM ID structure was not found.**
UNDI ROM ID structure signature is incorrect. An incorrect flash image is installed or the image has become corrupted. Try to update the flash image.
- **PXE-EC5: UNDI ROM ID structure is invalid.**
The structure length is incorrect. An incorrect flash image is installed or the image has become corrupted. Try to update the flash image.
- **PXE-EC6: UNDI driver image is invalid.**
The UNDI driver image signature is invalid. An incorrect flash image is installed or the image has become corrupted. Try to update the flash image.
- **PXE-EC8: !PXE structure was not found in UNDI driver code segment.**
The Boot Agent cannot locate the needed !PXE structure resource. An incorrect flash image is installed or the image has become corrupted. Try to update the flash image.
- **PXE-EC9: PXENV + structure was not found in UNDI driver code segment.**
The Boot Agent cannot locate the needed PXENV+ structure. An incorrect flash image is installed or the image has become corrupted. Try to update the flash image.
- **PXE-MOF: Exiting Intel Boot Agent.**
Ending execution of the ROM image.
- **This option has been locked and cannot be changed.**
You have attempted to change a configuration setting that has been locked by your system administrator with IBAUtil. This message can appear from the configuration setup menu when operating in a stand-alone environment. If you think you should be able to change the configuration setting, consult your system administrator.
- **PXE-MOE: Retrying network boot; press ESC to cancel.**
The Boot Agent did not successfully complete a network boot due to a network error (such as not receiving a DHCP offer). The Boot Agent continues to attempt to boot from the network until successful or until canceled by the user. This feature is disabled by default. For information on how to enable this feature, contact HP Customer Support.

Troubleshooting procedures

The following list of problems and associated solutions covers a representative set of problems that you might encounter while using the Boot Agent. If you are experiencing a problem that is not listed in this section, contact HP Customer Support.

After booting, my computer experiences problems

After the Boot Agent product has finished its sole task (remote booting), it no longer has any effect on the client computer operation. Thus, any issues that arise after the boot process is complete are most likely not related to the Boot Agent product.

If you are having problems with the local (client) or network operating system, contact the operating system manufacturer for assistance. If you are having problems with some application program, contact the application manufacturer for assistance. If you are having problems with any of your computer's hardware or with the BIOS, contact HP Customer Support for assistance.

Cannot change boot order

If you are accustomed to redefining your computer's boot order using the motherboard BIOS setup program, the default settings of the Boot Agent setup program can override that setup. To change the boot sequence, you must first override the Boot Agent setup program defaults. To start the Boot Agent configuration setup program, press the **Ctrl+S** keys during the time the initialization message appears. A configuration setup menu appears allowing you to set configuration values for the Boot Agent. If you do not press the **Ctrl+S** keys, the Boot Agent software proceeds with the boot process, eventually bringing up the operating system. To change your computer's boot order setting, refer to the "Configuring the Boot Agent in a pre-boot PXE or RPL environment" section.

My computer does not complete POST

If your computer fails to boot with an adapter installed, but does boot when you remove the adapter, try moving the adapter to another computer and using IBAUtil to disable the flash chip.

If this does not work, the problem may be occurring before the Boot Agent software even begins operating. In this case, there may be a BIOS problem with your computer. Contact HP Customer Support for help in correcting your problem.

Not getting a prompt to go to Boot Agent setup program

This is actually a feature of the Boot Agent product. As part of the Boot Agent's Configuration Setup Program, two of the options, Show Setup Prompt and Setup Wait Time, allow the boot process to proceed after POST without interruption by the **Ctrl+S** prompt (Press the **Ctrl+S** keys to enter the Setup Menu)

If the Show Setup Prompt has previously been set to Disabled and/or if the Setup Menu Wait Time option is set to zero seconds, the prompt does not display after POST. However, even though you are not prompted to press the **Ctrl+S** keys, you can still enter the configuration setup menu to customize configuration settings as follows:

Repeatedly press the **Ctrl+S** keys immediately after POST until the Configuration Setup Menu appears. If the Configuration Setup Menu does not appear after repeatedly pressing the **Ctrl+S** keys, you were likely not fast enough. In this case, reboot and try again.

While in the Configuration Setup Menu, you can restore the prompt message as follows:

- If Show Setup Prompt has been set to Disabled, change it to Enabled.
- If Setup Menu Wait Time is set to zero seconds, change it to any of the wait time values that exceed zero seconds. Refer to the list of possible Set Menu Wait Time values shown in the "Boot Agent configuration settings" section.

There are configuration/operation problems with the boot process

If your PXE client receives a DHCP address, but then fails to boot, you know the PXE client is working correctly. Check your network or PXE server configuration to troubleshoot the problem. Contact HP Customer Support if you need further assistance.

Diagnostics information for pre-boot PXE or RPL environments

Anytime the Configuration Setup Menu is displayed (refer to the "Configuring the Boot Agent in a pre-boot PXE or RPL environment" section), you may press the **D** key to display diagnostics information on the screen. This information can be helpful during interaction with HP Customer Support personnel or your IT

team members. After you press the **D** key, the information remains displayed until you reboot your computer.

Actual diagnostics information may vary, depending upon the adapter(s) installed in your computer.

Diagnostics information may include the following items:

- **PWA Number**—The Printed Wire Assembly number of the device as stored in the EEPROM
- **MAC Address**—The individual address of the device as stored in the EEPROM
- **I/O**—The I/O address for PCI access determined by the software. On cards without an I/O address, all zeros are displayed
- **Memory**—The memory map PCI access address determined by the software
- **Slot**—The slot number reported by the BIOS. The number displayed is the BIOS version of the PCI slot number. Therefore, actual positions of adapters within slots may not be displayed as expected. Slots are not always enumerated in an obvious manner, and the diagnostics will only report what is indicated by the BIOS.

HP NC-Series 31xx Fast Ethernet Adapters

The following information describes the adapter properties available for HP NC-Series 31xx Faster Ethernet adapters in the Windows operating system.

See the HP Network Configuration Utility online help for the properties available through the NCU.

See the Linux readme files for the properties available through the various Linux operating systems.

Windows Server 2003 and Windows Server 2003 x64 configurations

Although the default values should be appropriate in most cases, you may change any of the available options to meet the requirements of your specific system. It is recommended that you use the HP Network Configuration Utility to update HP NC-Series adapter properties. However, if you choose to update the properties using the operating system's Device Manager, the following lists the properties that are available for your HP adapter. The properties that are available through the HP NCU will differ. See the online help file for NCU adapter property information.

NC31xx Fast Ethernet adapter properties

- **802.1p QoS Packet Tagging.** Enables or disables IEEE 802.1p tagging to send network traffic with different priority levels.
 - Default = Off
 - Range = Off; On
- **Coalesce Buffers.** Specifies the number of memory buffers available to the driver in case the driver runs out of available map registers. This buffer area is also used when a packet consists of many fragments. If no coalesce buffers or map registers are available, the driver is forced to queue the packet for later transmission. The preferred method of transmitting data is to use map registers, since it is the most efficient method.
 - Default = 8

- Range = 1–32
- **Flow Control Settings.** The Flow Control property allows the user to enable or disable the receipt or transmission of PAUSE frames. PAUSE frames enable the adapter and the switch to control the transmit rate. The side that is receiving the PAUSE frame will momentarily stop transmitting. The recommended selection is Off and it is the default setting. To disable Flow Control, select Off from the Value list on the Advanced tab.
 - Default = Off
 - Range = Off, Generate, Respond, Respond and Generate
 - Off. PAUSE frame receipt and transmission is disabled
 - Generate. PAUSE frame transmission is enabled
 - Respond. PAUSE frame receipt is enabled
 - Respond and Generate. PAUSE frame receipt and transmission is enabled
- **Link Speed & Duplex.** Allows the user to set the connection speed to the network and mode. Full-Duplex Mode allows the adapter to transmit and receive network data simultaneously.
 - Default = Auto Detect
 - Range
 - 100 Mbps/Full-Duplex: Sets the speed at 100 Mbps and mode to Full-Duplex
 - 100 Mbps/Half-Duplex: Sets the speed at 100 Mbps and mode to Half-Duplex
 - 10 Mbps/Full-Duplex: Sets the speed at 10 Mbps and mode to Full-Duplex
 - 10 Mbps/Half-Duplex: Sets the speed at 10 Mbps and mode to Half-Duplex
 - Auto Detect: Sets the speed and mode for optimum network connection
- **Locally Administered Address.** Specifies the user-defined MAC Address of the adapter; overrides the burned-in MAC Address. This is a read-only field if the adapter is teamed.
 - Default = Not Present
 - Range = Value; Not Present
- **Receive Buffers.** Specifies the number of buffers used by the driver when copying data to the protocol memory. In high network load situations, increasing receive buffers can increase performance. The tradeoff is that this also increases the amount of system memory used by the driver. If too few receive buffers are used, performance suffers. If too many receive buffers are used, the driver unnecessarily consumes memory resources.
 - Default = 48
 - Range = 8–1024 (increments of 1)
- **Transmit Control Blocks.** Specifies the number of resources that are allocated to transmit packets.
 - Default = 16
 - Range = 1–64

Diagnostics

HP NC-Series NetXen 10GbE diagnostics

Please note that network traffic will be interrupted while you are running diagnostic tests.

The diagnostic utilities for Windows operating systems perform the following tests:

- Control registers test
- Flash memory test
- Interrupt loop-back test
- Internal loop-back test*
- External full duplex loop-back test*
- Link test
- LED test*
- All tests

* Not supported on NC512m adapters.

To execute the user diagnostic utility in a Windows operating system, complete the following steps:

1. Change to the folder where the softpaq was extracted.
2. Enter the following diagnostic command:

```
nxudiag.exe -i NX_NIC<Device #>
```

Where: NX_NIC<Device #> = an interface

Test descriptions

Control registers. Reads the values stored in the control registers. The setting or clearing of specific bits during the initialization process indicates whether the board has been configured correctly. Performs a write/read back/compare operation to selected registers to verify each register's accessibility.

Flash memory. Reads the contents of the flash memory, calculates the checksum, and then compares the calculated checksum to the value stored in memory.

Interrupt loop-back test. Communicates with the driver to force the hardware to generate selected interrupts. Then, the utility reads the interrupt status register to verify that the interrupt was generated and processed.

Internal loopback. Sets the Ethernet core (Media Access Control) to perform a loop-back operation. Sends packets to itself and then compares the contents of the packets to verify that the sent and received values are the same. No external hardware is required for the internal loop-back test.

External loopback. Sends packets to itself through the optical transmit lane, reads the contents on the receive lane, and then compares the contents of the packets to verify that the sent and received values are the same.

For CX4 (copper interface) applications an external module is required to connect the four transmit lanes to the four corresponding receive lanes. This module must contain all of the associated handshake signals required to redirect the four transmit lanes to the four receive lanes.

For XFP (10 Gigabit small form factor pluggable module) applications, an 850 nm multi-mode cable with LC connectors is required to connect the transmit lane to the receive lane externally.

Link. Reports the status of the link as up or down.

LED. Interactive test that causes the LEDs to blink. The software/driver has no auto-detect mechanism for checking LEDs. Visually inspect the LEDs on the adapter. The LEDs should blink for several seconds. No blinking LEDs indicates that the test failed.

All Tests. Runs all of the diagnostic tests described in this section by using the single command.

HP NC-Series Broadcom Multifunction adapter diagnostics

1. Boot to DOS or the EFI shell.
2. From the DOS prompt navigate to the \APPS\DIAGS\MFDIAG directory.
3. Type XDIAG and press the **Enter** key. The diagnostic tests run automatically.

About the XDIAG.exe diagnostic tests

The xdiag.exe diagnostic tests are divided into four groups: Group A: Register tests; Group B: Memory tests; Group C: Block tests; an Group D: Miscellaneous tests.

Group A: Register tests

- **A1. Register test**

This tests the chip registers, accessible through PCI/PCI-E bus, for their read-only and read/write attributes. Some critical registers are not tested as the system and/or the chip becomes unstable when the values change.

- **A2. PCI configuration test**

This test checks the functionality of the BAR size configuration by examining the BAR value as the BAR size varies.

- **A3. Interrupt test**

This test checks to see if the system (OS) receives the interrupt artificially generated by the chip and if the software ISR is properly invoked.

- **A4.**

Not used

- **A5. MSI test**

This test checks for the correct behavior of the MSI, making sure no interrupt is generated other than the message. It also runs the negative test to make sure no message is generated when interrupt is masked off.

- **A6. Memory BIST**

This tests all memory modules inside the chip using Built-In-Self-Test (BIST).

- **A7. Network link test**

This tests the external link connection. For the fiber medium, this is simply another external loopback test. For the copper medium, this is not applicable.

Group B: Memory tests

Various patterns (0x55aa55aa, 0xaa55aa55, & address) are used to test each of the memory blocks.

- B1. TXP scratchpad
- B2. TPAT scratchpad
- B3. RXP scratchpad
- B4. COM scratchpad
- B5. CP scratchpad
- B6. MCP scratchpad
- B7. TAS header buffer
- B8. TAS payload buffer
- B9. RBUF via GRC
- B10. RBUF via indirect access
- B11. RBUF Cluster list
- B12. TSCH list
- B13. CSCH List
- B14. RV2P scratchpads
- B15. TBDC memory
- B16. RBDC memory
- B17. CTX page table
- B18. CTX memory

Group C: Block tests

- **C1. CPU logic and DMA interface tests**

The tests check the basic logic functionalities of each of the on-chip CPUs. The tests also cover the DMA interface exposed to the CPUs. These tests require the presence of a test firmware file inside the "diagfw" directory.

- **C2. RBUF allocation test**

This tests the Rx buffer allocation interface.

- **C3. CAM access test**

This tests read, write, add, modify, and cache hit functionalities of the associative memory.

- **C4. TPAT cracker test**

This tests the packet cracking logic block as well as the checksum/CRC offload logic. This test requires the presence of a test firmware file inside the "diagfw" directory.

- **C5. FIO register test**

This is another register test dedicated for register interface only exposed to the internal CPUs. This test requires the presence of the test firmware files in the "diagfw" directory.

- **C6. NVM access and reset-corruption tests**
This tests the non-volatile memory access (both read and write). It also tests for appropriate access arbitration among multiple entities (CPUs). Another test is to check to issue chip reset while NVM block is servicing data to look for any NVM data corruption. This test requires the presence of a test firmware file inside the “diagfw” directory.
- **C7. Core-reset integrity test**
This test issues multiple chip resets and constant driver load/unload to check for boot ROM appropriately loads the bootcode. This test requires a proper bootcode to be programmed into the non-volatile memory.
- **C8. DMA engine test**
This tests the internal DMA engine by performing both DMA reads and writes at various location and various sizes. CRC check is performed to ensure data integrity. DMA write test also checks to ensure that the DMA writes do not corrupt the neighboring host memory. This test requires the presence of test firmware files inside the “diagfw” directory.
- **C9. VPD test**
This tests the VPD interface used by the bootcode. This test requires a proper bootcode to be programmed into the non-volatile memory.
- **C10.**
Not used
- **C11. FIO Events test**
This test checks for the event bits in the CPU’s Fast IO interface, making sure appropriate bits are triggered when a particular event occurs (GPIO bit changes, NVM access, and so on).

Group D: Miscellaneous tests

- **D1. MAC loopback test**
This test puts the chip in the MAC loopback mode and transmits 5000 layer two packets of various sizes and receives them and checks the packet integrity.
- **D2. PHY loopback test**
This test puts the chip in the PHY loopback mode and transmits 5000 layer two packets of various sizes and receives them and checks the packet integrity.
- **D3. External loopback test**
This test puts the chip in the PHY loopback mode and transmits various number of layer two packets of various sizes and receives them and checks the packet integrity. The number of packets is determined by the speed. For 10Base-T, only 1000 packets are used; for 100Base-T, 5000; for gigabit traffic, 20000 packets are used. This test requires an external loopback terminator to the traffic to be returned, and is turned off by default.
- **D4. LSO test**
This test checks the functionality of the large send offload by submit big TCP packets to the chip and expects the chip to segment them into multiple smaller TCP packets (based on the MSS). The packets are returned in the MAC loopback mode and their integrity is checked upon receive.
- **D5. EMAC statistics test**
This test checks the basic statistics information maintained by the chip by sending and receiving packets of various sizes.

- **D6. RPC test (D06)**

This test checks the receive catch-up path by sending packets to a different Tx chain. The packets will go through the RPC logic and return to the receive buffers as Rx packets. The integrity of each packet is checked to ensure no data corruption.

HP NC-Series Broadcom adapter diagnostics

Starting the Q57DIAG.exe tests

1. Boot to DOS or the EFI shell.
2. From the DOS prompt or shell navigate to the \APPS\DIAGS\Q57 directory.
3. Type Q57DIAG.exe and press the **Enter** key. The diagnostic tests run automatically.

Test descriptions

The tests are divided into four groups: Register tests, Memory tests, Miscellaneous tests, and Data tests. They are identified as group A, B, C, and D.

Group A: Register tests

- **A1. Indirect register test**

Using indirect addressing method, this test writes increment data into the MAC Hash Register table and reads back for verification. The memory read/write is done 100 times while incrementing test data.

- **A2. Control register test**

Each register specified in the configuration contents are defined as read only bit and read/write bit. The test writes zero and one into the test bits to ensure the read only bits are not changed and read/write bits are changed accordingly.

- **A3. Interrupt test**

This test verifies the interrupt functionality. It enables interrupt and then waits for the interrupt to occur. It waits for 500ms and reports an error if it could not generate interrupts.

- **A4. Built-In-Self test**

This test initiates Hardware Built-In-Self-Test (BIST) and then waits for the test result returned by hardware. The hardware could not generate interrupts.

- **A5. PCI Cfg register test**

This test verifies the access integrity of the PCI config registers.

Group B: Memory tests

- **B1. Scratch pad test**

This tests the scratch pad SRAM on board. The following tests are performed:

- **Address test:** Writes each address with unique increment data. Reads back data to ensure data is correct. After filling the entire data with the unique data, the program reads back data again to ensure data stays the same.
- **Walking one bit test:** For each address, data one is written and read back for testing. Then the data is shifted left one bit, so the data becomes two and the same test is run again. It repeats for 32 times until the test bit is shifted out of test data. The same test is repeated for the entire test range.

- **Pseudo random data test:** A pre-calculated pseudo random data is used to write a unique data into each test RAM. After the first pass of the test, the program reads back one more time to ensure data stays correct.
- **B2. BD SRAM test**
This tests the BD SRAM by performing the tests as described in test B1. The Scratch pad test.
- **B3. DMA SRAM test**
This tests DMA SRAM by performing the tests described in test B1. The Scratch pad test.
- **B4. MBUF SRAM test**
This tests DMA SRAM by performing the tests described in test B1. The Scratch pad test.
- **B5. MBUF SRAM via DMA test**
Eight test pattern data are used in the test. They are described below. A 0x1000 sized data buffer is used for this test. Before each pattern test, the buffer is initialized and filled with the test pattern. It then, performs size 0x1000 transmit DMA from host buffer to adapter MBUF memory. It verifies the data integrity in MBUF against host memory and repeats the DMA for the entire MBUF buffer. Then it performs receive DMA from adapter to host. The 0x1000-byte test buffer is cleared to zero before each receive-DMA. It verifies the data integrity and the test is repeated for the entire MBUF SRAM range.
Test Pattern Description:
"16 00's 16 FF's" Fill the entire host DMA buffer with 16 bytes of 00's and then 16 bytes of FF's.
"16 FF's 16 00's" Fill the entire host DMA buffer with 16 bytes of FF's and then 16 bytes of 00's.
"32 00's 32 FF's" Fill the entire host DMA buffer with 32 bytes of 00's and then 32 bytes of FF's.
"32 FF's 32 00's" Fill the entire host DMA buffer with 32 bytes of FF's and then 32 bytes of 00's.
"00000000's" Fill the entire host DMA buffer with all zeros.
"FFFFFFFF's" Fill the entire host DMA buffer with all FF's.
"AA55AA55's" Fill the entire host DMA buffer with data 0xAA55AA55.
"55AA55AA's" Fill the entire host DMA buffer with data 0x55AA55AA.

Group C: Miscellaneous tests

- **C1. NVRAM test**
An increment test data is used in the EEPROM test. It fills the test data into the test range and reads it back to verify the content. After the test, it fills data with zeros to clear the memory.
- **C2. CPU test**
This test opens the file cpu.bin. If the file exists and the content is good, it loads code to the Rx and Tx CPU and verifies CPU execution.
- **C3. DMA test**
This tests both high and low priorities DMA. It moves data from host memory to adapter SRAM, verifies data, and then moves data back to the host memory again to verify data.
- **C4. MII test**
This function is identical to A2. Control Register Test. Each Register specified in the configuration contents is defined as read only bit and read/write bit. The test writes zero and one into the test bits to ensure the read only bits are not changed and read/write bits are changed accordingly.
- **C5. VPD test**

The content of VPD is saved first before performing the test. After it is saved, the test writes one of the five pattern test data, 0xff, 0xaa, 0x55, increment data, or decrement data, into VPD memory. By default, increment data pattern is used. It writes and reads back the data for the entire test range, and then it restores the original content.

- **C6. ASF test**

The function of this test is as follows:

- Reset test. Sets the reset bit and polls for self-clearing. Verifies the reset value of the registers.
- Event Mapping Test. Sets SMB_ATTEN bit by changing ASF_ATTEN LOC bits. Verifies the mapping bits in TX_CPU or RX_CPU event bits.
- Counter Test. Clears WG_TO, HB_TO, PA_TO, PL_TO, RT_TO bits by setting those bits. Makes sure the bits are clear. Clears the Timestamp Counter. Writes a value 1 into each of the PL, PA, HB, WG, RT counters. Sets the TSC_EN bit. Polls each PA_TO bit and counts up to 50 times. Checks if PL_TO gets set at the end of 50 times. Continues to count up to 200 times. Checks if all other TO bits are set and verifies the Timestamp Counter is incremented.

- **C7. Expansion ROM test**

This tests the ability to enable/disable/access the expansion ROM on the device.

Group D: Driver associated tests

- **D1. Mac loopback test**

This is an internal loopback data transmit/receive test. It initializes MAC into internal loopback mode, and transmits 100 packets. The data should be routed back to the receive channel and is received by the receive routine, which verifies the integrity of data. One Gigabit rate is used for this test.

- **D2. Phy loopback test**

This test is the same as D1. Mac Loopback Test except the data is routed back via physical layer device. One Gigabit rate is used for this test.

- **D5. MII miscellaneous test (copper only)**

This function tests the auto-polling and phy-interrupt capabilities. These are the functionalities of the phy.

- **D6. MSI test**

This tests the Testing Message Interrupt Function to see if it handles this interrupt correctly. The default is disabled.

Error codes and messages

- Got 0x%08x @ 0x%08x. Expected 0x%08x
- Cannot run test while chip is running
- Invalid adapter device
- Read only bit %s got changed after writing zero at offset 0x%X
- Read only bit %s got changed after writing 1's at offset 0x%X
- Read/Write bit %s did not get cleared after writing zero at offset 0x%X
- Read/Write bit %s did not get set after writing 1's at offset 0x%X
- BIST failed.
- Could not generate interrupt

- Test aborted by user
- Tx DMA:Got 0x%08x @ 0x%08x. Expected 0x%08x
- Rx DMA:Got 0x%08x @ 0x%08x. Expected 0x%08x
- Tx DMA failed
- Rx DMA failed
- Data error, got 0x%08X at 0x%08X, expected 0x%08X
- Second read error, got 0x%08X at 0x%08X, expected 0x%08X
- Failed writing EEPROM at 0x%04X
- Failed reading EEPROM at 0x%04X
- EEPROM data error, got 0x08X at 0x04X, expected 0x%08X
- Cannot open file %s
- Invalid CPU image file %s
- Invalid CPU image size %d
- Cannot allocate memory
- Cannot reset CPU
- Cannot release CPU
- CPU test failed
- Invalid Test Address Range
- Valid adapter address is 0x%08x-0x%08x and exclude 0x%08x-0x%08x
- DMA:Got 0x%08x @ 0x%08x. Expected 0x%08x
- Unsupported PhyId %04X:%04X
- Too many registers specified in the file, max is %d
- Cannot write to VPD memory
- VPD data error, got %08X @ 0x04X, expected %08X
- No good link! Check Loopback plug
- Cannot TX Packet!
- Requested to Tx %d. Only %d is transmitted
- Expected %d packets. Only %d good packets are received
- %d unknown packets have been received
- %d bad packets have been received
- %c%d is an invalid Test
- EEPROM checksum error
- Error in reading WOL/PXE
- Error in writing WOL/PXE
- No external memory detected
- DMA buffer %04X is large, size must be less than %04X

- File size %d is too big, max is %d
- Invalid %s
- Failed writing 0x%x to 0x%x
- *1
- *1
- *1
- *1
- Cannot perform task while chip is not running. (need driver)
- Cannot open register define file or content is bad
- ASF Reset bit did not self-cleared
- ATTN_LOC %d cannot be mapped to %cX CPU event bit %d
- %s Register is not cleared to zero after reset
- Cannot start Register Timer
- poll_ASF bit did not get reset after acknowledged
- Timestamp Counter is not counting
- %s Timer is not working
- Cannot clear bit %s in %cX CPU event register
- Invalid "EEPROM_FILENAME" file size, expected %d but only can read %d bytes
- Invalid magic value in %s, expected %08x but found %08x
- Invalid manufacture revision, expected %c but found %c
- Invalid Boot Code revision, expected %d.%d but found %d.%d
- Cannot write to EEPROM
- Cannot read from EEPROM
- Invalid Checksum
- Invalid Magic Value
- Invalid MAC address, expected %02X-%02X-%02X-%02X-%02X-%02X
- Slot error, expected an UUT to be found at location %02X:%02X:00
- Adjacent memory has been corrupted while testing block 0x%08x-0x%08x
- Got 0x%08x @ address 0x%08x. Expected 0x%08x
- *1 Internal Use. Program will not generate this error.

HP NC-Series Intel adapter diagnostics

1. Boot to DOS or the EFI shell.
2. From the DOS prompt navigate to the \APPS\DIAGS\N100X directory.

3. Type `DIAGS` and press the **Enter** key. The test utility program automatically scans the hardware and lists all supported adapters. If you have a multiport adapter, each port is listed separately starting with "Port 1."
4. Using the arrow keys, select the adapter to test then press the **Enter** key. The main menu of the diagnostic utility appears.

Beginning adapter tests

Selecting **Begin Adapter Tests** brings up the test screen. While tests are being performed, a rotating spinner is shown letting the user know that the application is still running. The results of the tests are displayed as each test is performed. If multiple test passes are selected, then the results contain a count of test failures. A list containing zeros means that all tests have passed.

If there is no responder on the network, then the Network Test will indicate a failure. To correct this situation, set up a system on the network to act as a responder then re-run the test.

Changing test options

The test setup screen allows you to select and configure the specific tests desired. Toggle between options by using the arrow keys and pressing the **Enter** key. The utility displays only those test options that are supported by your adapter.

The following is a list of the available test options.

- **Number of test passes**—This option determines how many times a test runs. While the test is running, the information on the screen is continuously updated. When you press the **Esc** key, the test is cancelled and control is returned to the Test Adapter menu.
- **Diagnostic Log**—This test is disabled by default. If enabled, the program will ask for a directory for the log file. The file it places here is named `DIAGS.LOG`.
- **Device Registers**—Test patterns are written, read, and verified through the adapter's device registers to check proper functionality.
- **FIFO**—This option writes test bit patterns to the adapter's FIFO buffers to check the FIFOs proper functionality.
- **EEPROM**—This option tests both the readability of the EEPROM as well as the integrity of the data stored in the EEPROM. It reads EEPROM and calculates the checksum. This checksum is then compared to the checksum stored in the EEPROM. If the values are not identical, the test reports failure.
- **Interrupt**—This option tests the adapter's ability to generate an interrupt and have it propagated through the system to the Programmable Interrupt Controller (PIC). The test triggers an interrupt by setting the interrupt cause register and then verifies that an interrupt has been triggered. On EFI, interrupts are not supported, Therefore, this test sets the interrupt cause register and reads the interrupt set register, which verifies the card internally registered an interrupt.
- **Loopback Tests**—These options are internal loopback tests. These tests set the adapter in the appropriate loopback mode and send packets back through the adapter's receive circuitry and logic.
- **Link**—This option checks to see whether or not the adapter has link.
- **Network Test**—This option tests network communication. It looks for a responder and then sends packets. If no responder is found, then the test reports failure. If packets are received back from the responder, the test reports success.

Displaying Diagnostic Log

The Display Diagnostic Log option allows you to view a detailed report of the tests you just ran. When Diagnostic Log is enabled, test results are recorded in a log file named DIAGS.LOG. If it does not already exist, the test utility creates it. If it already exists, new data is appended to it. The DISPLAY DIAGNOSTIC LOG command displays the contents of the log file for your convenience. Each entry in the log file is time stamped. The test run banner identifies the tested adapter according to its bus slot address.

Accessing the networking submenu

The networking submenu allows you to setup the adapter as a responder and to detect a spanning tree on the network.

- **Setting up as a responder**—This allows the user to set up the adapter as a responder so another system can perform the continuous network test. Selecting this option displays the transmit/receive screen. This test will fail if the adapter does not have link. Although you can use a variety of adapters as responders, and either connect directly (with a crossover cable) or through a switch, ideal results are obtained with a same-type adapter.

When you press the **Esc** key, the responder operation is cancelled and control is immediately returned to the Test Adapter menu.

- **Detecting spanning tree**—This allows the user to detect if a spanning tree is used on the network.

Technical support

Before you contact HP

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For the name of the nearest HP authorized reseller:

- In the United States, see the HP US service locator webpage (http://www.hp.com/service_locator).
- In other locations, see the Contact HP worldwide (in English) webpage (<http://welcome.hp.com/country/us/en/wwcontact.html>).

For HP technical support:

- In the United States, for contact options see the Contact HP United States webpage (http://welcome.hp.com/country/us/en/contact_us.html). To contact HP by phone:
 - Call 1-800-HP-INVENT (1-800-474-6836). This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.
 - If you have purchased a Care Pack (service upgrade), call 1-800-633-3600. For more information about Care Packs, refer to the HP website (<http://www.hp.com>).
- In other locations, see the Contact HP worldwide (in English) webpage (<http://welcome.hp.com/country/us/en/wwcontact.html>).

Free automated customer support services

The following sites offer troubleshooting information, compatibility notes, and software upgrades (including Softpaqs and drivers).

HP Worldwide Web Server

- Navigate to a specific product, and then look for support information from the list of support resources at the HP support website (<http://h18007.www1.hp.com/support/files/server>).
- For downloadable support software for HP Digital Networking Products, Hubs, Integrated Access Devices, Modems and ISDN, Adapters, Remote Access Concentrators/Servers, Software, and Switches, go to the HP software and drivers website (<http://h18007.www1.hp.com/support/files/server>).
- All SoftPaqs sorted by SoftPaq number can be found at the HP ftp support website (<ftp://ftp.compaq.com/pub/softpaq/>).
An ASCII version of a SoftPaq can be found by selecting a SoftPaq at the HP ftp support website. (<ftp://ftp.compaq.com/pub/softpaq/>)
- An index of available software sorted by product can be found at the HP software and drivers website (<http://h18007.www1.hp.com/support/files/server>).

HP FTP Server

Navigate to a specific product, and then look for support information from the list of support resources at the HP ftp support website (<ftp://ftp.compaq.com/pub/softpaq/>).

Acronyms and abbreviations

BIOS

Basic Input/Output System

DHCP

Dynamic Host Configuration Protocol

IPL

initial program load

MAC

Media Access Control

PCI

peripheral component interface

PDU

power distribution unit

PXE

Preboot Execution Environment

ROM

read-only memory

RSS

Receive-Side Scaling

SAN

storage area network

TCP/IP

Transmission Control Protocol/Internet Protocol

TOE

TCP/IP Offload Engine

UNDI

Universal Network Driver Interface

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