

# HP XC System Software Hardware Preparation Guide Version 3.2.1



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# About This Document

This document describes how to prepare the nodes in your HP cluster platform before installing HP XC System Software.

An HP XC system is integrated with several open source software components. Some open source software components are being used for underlying technology, and their deployment is transparent. Some open source software components require user-level documentation specific to HP XC systems, and that kind of information is included in this document when required.

HP relies on the documentation provided by the open source developers to supply the information you need to use their product. For links to open source software documentation for products that are integrated with the HP XC system, see “Supplementary Software Products” (page 14).

Documentation for third-party hardware and software components that are supported on the HP XC system is supplied by the third-party vendor. However, information about the operation of third-party software is included in this document if the functionality of the third-party component differs from standard behavior when used in the XC environment. In this case, HP XC documentation supersedes information supplied by the third-party vendor. For links to related third-party Web sites, see “Supplementary Software Products” (page 14).

Standard Linux® administrative tasks or the functions provided by standard Linux tools and commands are documented in commercially available Linux reference manuals and on various Web sites. For more information about obtaining documentation for standard Linux administrative tasks and associated topics, see the list of Web sites and additional publications provided in “Related Software Products and Additional Publications” (page 15).

## Intended Audience

The information in this document is written for technicians or administrators who have the task of preparing the hardware on which the HP XC System Software will be installed.

Before beginning, you must meet the following requirements:

- You are familiar with accessing BIOS and consoles with either Ethernet or serial port connections and terminal emulators.
- You have access to and have read the HP Cluster Platform documentation.
- You have access to and have read the HP server blade documentation if the hardware configuration contains HP server blade models.
- You have previous experience with a Linux operating system.

## New and Changed Information in This Edition

- This document was updated to include the following servers:
  - CP3000BL platform:
    - HP ProLiant BL2x220c G5 server blade

## Typographic Conventions

This document uses the following typographical conventions:

% , \$ , or #	A percent sign represents the C shell system prompt. A dollar sign represents the system prompt for the Korn, POSIX, and Bourne shells. A number sign represents the superuser prompt.
<i>audit</i> (5)	A manpage. The manpage name is <i>audit</i> , and it is located in Section 5.
Command	A command name or qualified command phrase.
Computer output	Text displayed by the computer.

<b>Ctrl+x</b>	A key sequence. A sequence such as <b>Ctrl+x</b> indicates that you must hold down the key labeled <b>Ctrl</b> while you press another key or mouse button.
ENVIRONMENT VARIABLE	The name of an environment variable, for example, PATH.
[ERROR NAME]	The name of an error, usually returned in the <code>errno</code> variable.
<b>Key</b>	The name of a keyboard key. <b>Return</b> and <b>Enter</b> both refer to the same key.
<b>Term</b>	The defined use of an important word or phrase.
<b>User input</b>	Commands and other text that you type.
<i>Variable</i>	The name of a placeholder in a command, function, or other syntax display that you replace with an actual value.
[ ]	The contents are optional in syntax. If the contents are a list separated by  , you can choose one of the items.
{ }	The contents are required in syntax. If the contents are a list separated by  , you must choose one of the items.
...	The preceding element can be repeated an arbitrary number of times.
	Separates items in a list of choices.
WARNING	A warning calls attention to important information that if not understood or followed will result in personal injury or nonrecoverable system problems.
CAUTION	A caution calls attention to important information that if not understood or followed will result in data loss, data corruption, or damage to hardware or software.
IMPORTANT	This alert provides essential information to explain a concept or to complete a task.
NOTE	A note contains additional information to emphasize or supplement important points of the main text.

## HP XC and Related HP Products Information

The HP XC System Software Documentation Set, the Master Firmware List, and HP XC HowTo documents are available at this HP Technical Documentation Web site:

<http://docs.hp.com/en/linuxhpc.html>

The HP XC System Software Documentation Set includes the following core documents:

<i>HP XC System Software Release Notes</i>	Describes important, last-minute information about firmware, software, or hardware that might affect the system. This document is not shipped on the HP XC documentation CD. It is available only on line.
<i>HP XC Hardware Preparation Guide</i>	Describes hardware preparation tasks specific to HP XC that are required to prepare each supported hardware model for installation and configuration, including required node and switch connections.
<i>HP XC System Software Installation Guide</i>	Provides step-by-step instructions for installing the HP XC System Software on the head node and configuring the system.
<i>HP XC System Software Administration Guide</i>	Provides an overview of the HP XC system administrative environment, cluster administration tasks, node maintenance tasks, LSF® administration tasks, and troubleshooting procedures.

*HP XC System Software User's Guide*

Provides an overview of managing the HP XC user environment with modules, managing jobs with LSF, and describes how to build, run, debug, and troubleshoot serial and parallel applications on an HP XC system.

QuickSpecs for HP XC System Software

Provides a product overview, hardware requirements, software requirements, software licensing information, ordering information, and information about commercially available software that has been qualified to interoperate with the HP XC System Software. The QuickSpecs are located on line:

<http://www.hp.com/go/clusters>

See the following sources for information about related HP products.

### **HP XC Program Development Environment**

The Program Development Environment home page provide pointers to tools that have been tested in the HP XC program development environment (for example, TotalView® and other debuggers, compilers, and so on).

<http://h20311.www2.hp.com/HPC/cache/276321-0-0-0-121.html>

### **HP Message Passing Interface**

HP Message Passing Interface (HP-MPI) is an implementation of the MPI standard that has been integrated in HP XC systems. The home page and documentation is located at the following Web site:

<http://www.hp.com/go/mpi>

### **HP Serviceguard**

HP Serviceguard is a service availability tool supported on an HP XC system. HP Serviceguard enables some system services to continue if a hardware or software failure occurs. The HP Serviceguard documentation is available at the following Web site:

<http://docs.hp.com/en/ha.html>

### **HP Scalable Visualization Array**

The HP Scalable Visualization Array (SVA) is a scalable visualization solution that is integrated with the HP XC System Software. The SVA documentation is available at the following Web site:

<http://docs.hp.com/en/linuxhpc.html>

### **HP Cluster Platform**

The cluster platform documentation describes site requirements, shows you how to set up the servers and additional devices, and provides procedures to operate and manage the hardware. These documents are available at the following Web site:

<http://www.docs.hp.com/en/highperfcomp.html>

### **HP Integrity and HP ProLiant Servers**

Documentation for HP Integrity and HP ProLiant servers is available at the following web address:

<http://docs.hp.com/en/hw.html>

For c-Class Server BladeSystems, see also the installation, administration, and user guides for the following components:

- HP (ProLiant or Integrity) C-Class Server Blades
- HP BladeSystem c-Class Onboard Administrator

- HP Server Blade c7000 Enclosure
- HP BladeSystem c3000 Enclosure

## Related Information

This section provides useful links to third-party, open source, and other related software products.

**Supplementary Software Products** This section provides links to third-party and open source software products that are integrated into the HP XC System Software core technology. In the HP XC documentation, except where necessary, references to third-party and open source software components are generic, and the HP XC adjective is not added to any reference to a third-party or open source command or product name. For example, the SLURM `srun` command is simply referred to as the `srun` command.

The location of each web address or link to a particular topic listed in this section is subject to change without notice by the site provider.

- <http://www.platform.com>

Home page for Platform Computing Corporation, the developer of the Load Sharing Facility (LSF). LSF-HPC with SLURM, the batch system resource manager used on an HP XC system, is tightly integrated with the HP XC and SLURM software. Documentation specific to LSF-HPC with SLURM is provided in the HP XC documentation set.

Standard LSF is also available as an alternative resource management system (instead of LSF-HPC with SLURM) for HP XC. This is the version of LSF that is widely discussed on the Platform web address.

For your convenience, the following Platform Computing Corporation LSF documents are shipped on the HP XC documentation CD in PDF format:

- *Administering Platform LSF*
- *Administration Primer*
- *Platform LSF Reference*
- *Quick Reference Card*
- *Running Jobs with Platform LSF*

LSF procedures and information supplied in the HP XC documentation, particularly the documentation relating to the LSF-HPC integration with SLURM, supersedes the information supplied in the LSF manuals from Platform Computing Corporation.

The Platform Computing Corporation LSF manpages are installed by default. *lsf\_diff(7)* supplied by HP describes LSF command differences when using LSF-HPC with SLURM on an HP XC system.

The following documents in the HP XC System Software Documentation Set provide information about administering and using LSF on an HP XC system:

- *HP XC System Software Administration Guide*
- *HP XC System Software User's Guide*

- <https://computing.llnl.gov/linux/slurm/documentation.html>

Documentation for the Simple Linux Utility for Resource Management (SLURM), which is integrated with LSF to manage job and compute resources on an HP XC system.

- <http://www.nagios.org/>

Home page for Nagios®, a system and network monitoring application that is integrated into an HP XC system to provide monitoring capabilities. Nagios watches specified hosts and services and issues alerts when problems occur and when problems are resolved.

- <http://oss.oetiker.ch/rrdtool>

Home page of RRDtool, a round-robin database tool and graphing system. In the HP XC system, RRDtool is used with Nagios to provide a graphical view of system status.

- <http://supermon.sourceforge.net/>  
Home page for Supermon, a high-speed cluster monitoring system that emphasizes low perturbation, high sampling rates, and an extensible data protocol and programming interface. Supermon works in conjunction with Nagios to provide HP XC system monitoring.
- <http://www.llnl.gov/linux/pdsh/>  
Home page for the parallel distributed shell (pdsh), which executes commands across HP XC client nodes in parallel.
- [http://www.balabit.com/products/syslog\\_ng/](http://www.balabit.com/products/syslog_ng/)  
Home page for `syslog-ng`, a logging tool that replaces the traditional `syslog` functionality. The `syslog-ng` tool is a flexible and scalable audit trail processing tool. It provides a centralized, securely stored log of all devices on the network.
- <http://systemimager.org>  
Home page for SystemImager®, which is the underlying technology that distributes the golden image to all nodes and distributes configuration changes throughout the system.
- <http://linuxvirtualserver.org>  
Home page for the Linux Virtual Server (LVS), the load balancer running on the Linux operating system that distributes login requests on the HP XC system.
- <http://www.macrovision.com>  
Home page for Macrovision®, developer of the FLEXlm™ license management utility, which is used for HP XC license management.
- <http://sourceforge.net/projects/modules/>  
Web address for Modules, which provide for easy dynamic modification of a user's environment through modulefiles, which typically instruct the `module` command to alter or set shell environment variables.
- <http://dev.mysql.com/>  
Home page for MySQL AB, developer of the MySQL database. This web address contains a link to the MySQL documentation, particularly the *MySQL Reference Manual*.

**Related Software Products and Additional Publications** This section provides pointers to web addresses for related software products and provides references to useful third-party publications. The location of each web address or link to a particular topic is subject to change without notice by the site provider.

#### Linux Web Addresses

- <http://www.redhat.com>  
Home page for Red Hat®, distributors of Red Hat Enterprise Linux Advanced Server, a Linux distribution with which the HP XC operating environment is compatible.
- <http://www.linux.org/docs/index.html>  
This web address for the Linux Documentation Project (LDP) contains guides that describe aspects of working with Linux, from creating your own Linux system from scratch to bash script writing. This site also includes links to Linux HowTo documents, frequently asked questions (FAQs), and manpages.

- <http://www.linuxheadquarters.com>  
Web address providing documents and tutorials for the Linux user. Documents contain instructions for installing and using applications for Linux, configuring hardware, and a variety of other topics.
- <http://www.gnu.org>  
Home page for the GNU Project. This site provides online software and information for many programs and utilities that are commonly used on GNU/Linux systems. Online information include guides for using the bash shell, emacs, make, cc, gdb, and more.

### **MPI Web Addresses**

- <http://www.mpi-forum.org>  
Contains the official MPI standards documents, errata, and archives of the MPI Forum. The MPI Forum is an open group with representatives from many organizations that define and maintain the MPI standard.
- <http://www-unix.mcs.anl.gov/mpi/>  
A comprehensive site containing general information, such as the specification and FAQs, and pointers to other resources, including tutorials, implementations, and other MPI-related sites.

### **Compiler Web Addresses**

- <http://www.intel.com/software/products/compilers/index.htm>  
Web address for Intel® compilers.
- <http://support.intel.com/support/performance/tools/>  
Web address for general Intel software development information.
- <http://www.pgroup.com/>  
Home page for The Portland Group™, supplier of the PGI® compiler.

### **Debugger Web Address**

<http://www.etnus.com>

Home page for Etnus, Inc., maker of the TotalView® parallel debugger.

### **Software RAID Web Addresses**

- <http://www.tldp.org/HOWTO/Software-RAID-HOWTO.html> and <http://www.ibiblio.org/pub/Linux/docs/HOWTO/other-formats/pdf/Software-RAID-HOWTO.pdf>  
A document (in two formats: HTML and PDF) that describes how to use software RAID under a Linux operating system.
- <http://www.linuxdevcenter.com/pub/a/linux/2002/12/05/RAID.html>  
Provides information about how to use the mdadm RAID management utility.

### **Additional Publications**

For more information about standard Linux system administration or other related software topics, consider using one of the following publications, which must be purchased separately:

- *Linux Administration Unleashed*, by Thomas Schenk, et al.
- *Linux Administration Handbook*, by Evi Nemeth, Garth Snyder, Trent R. Hein, et al.
- *Managing NFS and NIS*, by Hal Stern, Mike Eisler, and Ricardo Labiaga (O'Reilly)
- *MySQL*, by Paul Debois

- *MySQL Cookbook*, by Paul Debois
- *High Performance MySQL*, by Jeremy Zawodny and Derek J. Balling (O'Reilly)
- *Perl Cookbook, Second Edition*, by Tom Christiansen and Nathan Torkington
- *Perl in A Nutshell: A Desktop Quick Reference*, by Ellen Siever, et al.

## Manpages

Manpages provide online reference and command information from the command line. Manpages are supplied with the HP XC system for standard HP XC components, Linux user commands, LSF commands, and other software components that are distributed with the HP XC system.

Manpages for third-party software components might be provided as a part of the deliverables for that component.

Using *discover(8)* as an example, you can use either one of the following commands to display a manpage:

```
$ man discover
$ man 8 discover
```

If you are not sure about a command you need to use, enter the man command with the -k option to obtain a list of commands that are related to a keyword. For example:

```
$ man -k keyword
```

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Include the document title, manufacturing part number, and any comment, error found, or suggestion for improvement you have concerning this document.



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# 1 Hardware and Network Overview

This chapter addresses the following topics:

- “Supported Cluster Platforms” (page 19)
- “Server Blade Enclosure Components” (page 22)
- “Server Blade Mezzanine Cards” (page 28)
- “Server Blade Interconnect Modules” (page 28)
- “Supported Console Management Devices” (page 29)
- “Administration Network Overview” (page 30)
- “Administration Network: Console Branch” (page 31)
- “Interconnect Network” (page 31)
- “Large-Scale Systems” (page 32)

## 1.1 Supported Cluster Platforms

An HP XC system is made up of interconnected servers.

A typical HP XC hardware configuration (on systems other than Server Blade c-Class servers) contains from 5 to 512 nodes. To allow systems of a greater size, an HP XC system can be arranged into a large-scale configuration with up to 1,024 compute nodes (HP might consider larger systems as special cases).

HP Server Blade c-Class servers (hereafter called server blades) are perfectly suited to form HP XC systems. Physical characteristics make it possible to have many tightly interconnected nodes while at the same time reducing cabling requirements. Typically, server blades are used as compute nodes but they can also function as the head node and service nodes. The hardware and network configuration on an HP XC system with HP server blades differs from that of a traditional HP XC system, and those differences are described in this document.

You can install and configure HP XC System Software on the following platforms:

- HP Cluster Platform 3000 (CP3000)
- HP Cluster Platform 3000BL (CP3000BL) with HP c-Class server blades
- HP Cluster Platform 4000 (CP4000)
- HP Cluster Platform 4000BL (CP4000BL) with HP c-Class server blades
- HP Cluster Platform 6000 (CP6000).
- HP Cluster Platform 6000BL (CP6000BL) with HP c-Class server blades

For more information about the cluster platforms, see the documentation that was shipped with the hardware.

### 1.1.1 Supported Processor Architectures and Hardware Models

Table 1-1 lists the hardware models that are supported for each HP cluster platform.



**IMPORTANT:** A hardware configuration can contain a mixture of Opteron and Xeon nodes, but not Itanium nodes.

**Table 1-1 Supported Processor Architectures and Hardware Models**

Server Type	Cluster Platform	Processor Architecture	Hardware Model
Blade	CP3000BL	Intel® Xeon™ with EM64T	<ul style="list-style-type: none"> <li>• HP ProLiant BL2x220c G5</li> <li>• HP ProLiant BL260c G5</li> <li>• HP ProLiant BL460c</li> <li>• HP ProLiant BL480c</li> <li>• HP ProLiant BL680c G5</li> </ul>
	CP4000BL	AMD Opteron®	<ul style="list-style-type: none"> <li>• HP ProLiant BL465c</li> <li>• HP ProLiant BL465c G5</li> <li>• HP ProLiant BL685c</li> <li>• HP ProLiant BL685c G5</li> </ul>
	CP6000BL	Intel Itanium®	<ul style="list-style-type: none"> <li>• HP Integrity BL860c</li> </ul>
Non-Blade	CP3000	Intel Xeon with EM64T	<ul style="list-style-type: none"> <li>• HP ProLiant DL140 G2</li> <li>• HP ProLiant DL140 G3</li> <li>• HP ProLiant DL160 G5</li> <li>• HP ProLiant DL360 G4</li> <li>• HP ProLiant DL360 G4p</li> <li>• HP ProLiant DL360 G5</li> <li>• HP ProLiant DL380 G4</li> <li>• HP ProLiant DL380 G5</li> <li>• HP ProLiant DL580 G4</li> <li>• HP ProLiant DL580 G5</li> <li>• HP xw8200 Workstation</li> <li>• HP xw8400 Workstation</li> <li>• HP xw8600 Workstation</li> </ul>
	CP4000	AMD Opteron	<ul style="list-style-type: none"> <li>• HP ProLiant DL145</li> <li>• HP ProLiant DL145 G2</li> <li>• HP ProLiant DL145 G3</li> <li>• HP ProLiant DL165 G5</li> <li>• HP ProLiant DL365</li> <li>• HP ProLiant DL365 G5</li> <li>• HP ProLiant DL385</li> <li>• HP ProLiant DL385 G2</li> <li>• HP ProLiant DL385 G5</li> <li>• HP ProLiant DL585</li> <li>• HP ProLiant DL585 G2</li> <li>• HP ProLiant DL585 G5</li> <li>• HP ProLiant DL785 G5</li> <li>• HP xw9300 Workstation</li> <li>• HP xw9400 Workstation</li> </ul>
	CP6000	Intel Itanium	<ul style="list-style-type: none"> <li>• HP Integrity rx1620</li> <li>• HP Integrity rx2600</li> <li>• HP Integrity rx2620</li> <li>• HP Integrity rx2660</li> <li>• HP Integrity rx4640</li> <li>• HP Integrity rx8620</li> </ul>

HP server blades offer an entirely modular computing system with separate computing and physical I/O modules that are connected and shared through a common chassis, called an enclosure; for more information on enclosures, see “Server Blade Enclosure Components” (page 22). Full-height Opteron server blades can take up to four dual core CPUs and Xeon server blades can take up to two quad cores.

Table 1-2 lists the HP ProLiant hardware models supported for use in an HP XC hardware configuration.

**Table 1-2 Supported HP ProLiant Server Blade Models**

HP ProLiant Blade Model	Height	Core		Built-In NICs	Hot Plug Drives	Mezzanine Slots
		Processor	Number			
BL2x220c G5	half	Intel Xeon	up to two quad core or up to two dual core per server node	2 (1 per server node)	0	2 (1 per server node)
BL260c G5	half	Intel Xeon	up to two quad core or up to two dual core	1	0	1
BL460c	half	Intel Xeon	up to two quad core or up to two dual core	2	2	2
BL465c	half	AMD Opteron	up to two single core or up to two dual core	2	2	2
BL465c G5	half	AMD Opteron	up to two single core or up to two dual core	2	2	2
BL480c	full	Intel Xeon	up to two quad core or up to two dual core	4	4	3
BL680c G5	full	Intel Xeon	two quad core or four quad core	4	2	3
BL685c	full	AMD Opteron	up to four dual core	4	2	3
BL685c G5	full	AMD Opteron	up to four dual core	4	2	3
BL860c	full	Intel Itanium®	up to two quad core or dual core	4	2	3

For more information on an individual server blade, see the QuickSpec for your model. The QuickSpecs are located at the following Web address:

<http://www.hp.com/go/clusters>

## 1.1.2 Supported Server Blade Combinations

The HP XC System Software supports the following server blade hardware configurations:

- A hardware configuration composed entirely of HP server blades, that is, the head node, the service nodes, and all compute nodes are server blades.
- A hardware configuration can contain a mixture of Opteron and Xeon server blades, but not Itanium server blades.
- A mixed hardware configuration of HP server blades and non-blade servers where:
  - The head node can be either a server blade or a non-blade server
  - Service nodes can be either server blades or non-blade servers
  - All compute nodes are server blades

## 1.2 Server Blade Enclosure Components

HP server blades are contained in an enclosure, which is a chassis that houses and connects blade hardware components. An enclosure is managed by an Onboard Administrator. The HP BladeSystem c7000 and c3000 enclosures are supported under HP XC.

This section discusses the following topics:

- “HP BladeSystem c7000 Enclosure” (page 22)
- “HP BladeSystem c3000 Enclosure” (page 25)
- “HP BladeSystem c-Class Onboard Administrator ” (page 27)
- “Insight Display” (page 28)

For more information about enclosures and their related components, see the *HP Server Blade c7000 Enclosure Setup and Installation Guide*.

### 1.2.1 HP BladeSystem c7000 Enclosure

Figure 1-1 shows front and rear views of the HP BladeSystem c7000 enclosure.

**Figure 1-1 HP BladeSystem c7000 enclosure (Front and Rear Views)**

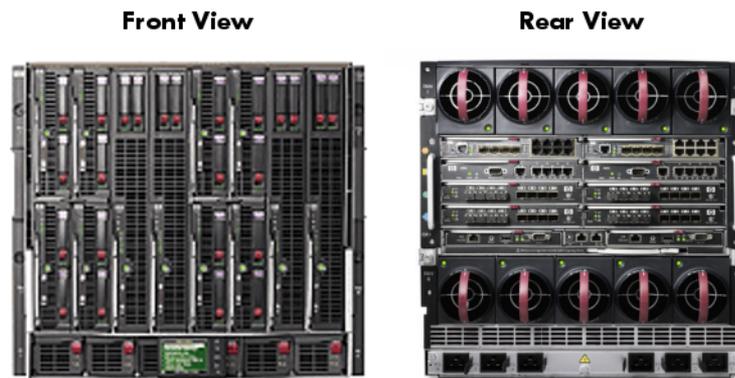
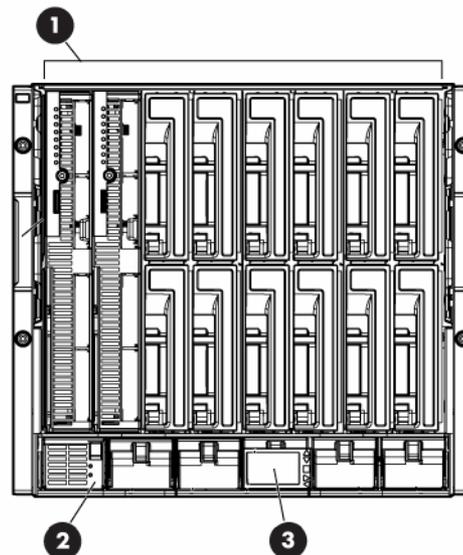


Figure 1-2 is an illustration showing the location of the device bays, power supply bays, and the Insight Display at the front of the HP BladeSystem c7000 enclosure.

**Figure 1-2 HP BladeSystem c7000 Enclosure Bay Locations (Front View)**



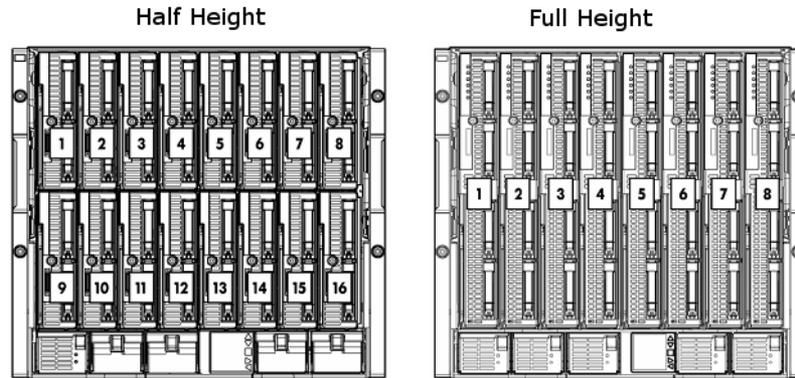
**1** Device bays

2 Power supply bays

3 Insight Display. For more information, see “Insight Display” (page 28).

As shown in Figure 1-3, the HP BladeSystem c7000 enclosure can house a maximum of 16 half-height or 8 full-height server blades. The c7000 enclosure can contain a maximum of 6 power supplies and 10 fans. Figure 1-3 also illustrates the numbering scheme for the server bays in which server blades are inserted. The numbering scheme differs for half height and full height server blades.

**Figure 1-3 HP BladeSystem c7000 Enclosure Bay Numbering for Half Height and Full Height Server Blades**



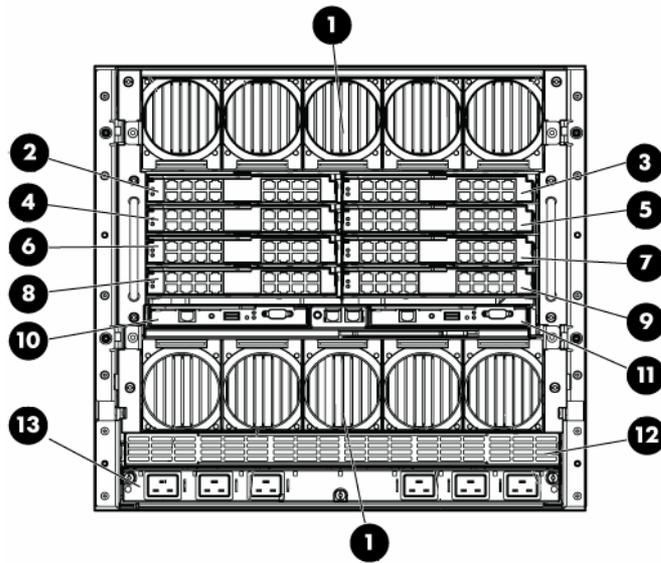
The number of fans in the enclosure influences the placement of the server blades. Use the following table and the numbering scheme in Figure 1-3 to determine the placement of the server blades in the enclosure, based on the number of fans.

Number of Fans	Insert Half-Height Server Blades in These Bays	Insert Full-Height Server Blades in These Bays
4 fans	1, 2, 9, 10 <sup>1</sup>	1 or 2
6 fans	1, 2, 3, 4, 9, 10, 11, 12	1, 2, 3, 4
8 or 10 fans	all server bays	all server bays

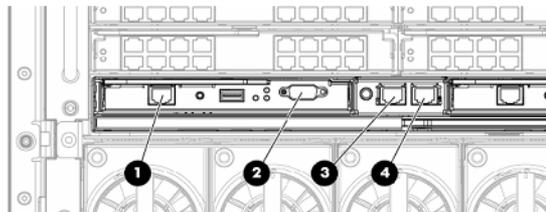
1 Only two servers are supported in this configuration. They can be inserted in any two of these bays.

Figure 1-4 is an illustration showing the location of the fan bays, interconnect bays, onboard administrator bays, the power supply exhaust vent, and the AC power connections at the rear of the HP BladeSystem c7000 enclosure. This figure includes an inset showing the serial connector, onboard administrator/iLO port, and the enclosure Uplink and Downlink ports.

Figure 1-4 HP BladeSystem c7000 Enclosure Bay Locations (Rear View)



- |   |                     |    |                             |
|---|---------------------|----|-----------------------------|
| 1 | Fan Bays            | 8  | Interconnect Bay #7         |
| 2 | Interconnect Bay #1 | 9  | Interconnect Bay #8         |
| 3 | Interconnect Bay #2 | 10 | Onboard Administrator Bay 1 |
| 4 | Interconnect Bay #3 | 11 | Onboard Administrator Bay 2 |
| 5 | Interconnect Bay #4 | 12 | Power Supply Exhaust Vent   |
| 6 | Interconnect Bay #5 | 13 | AC Power Connections        |
| 7 | Interconnect Bay #6 |    |                             |



- |   |  |
|---|--|
| 1 | Onboard Administrator/Integrated Lights Out port |
| 2 | Serial connector                                 |
| 3 | Enclosure Downlink port                          |
| 4 | Enclosure Uplink port                            |

### General Configuration Guidelines

The following are general guidelines for configuring HP BladeSystem c7000 enclosures:

- Up to four enclosures can be mounted in an HP 42U Infrastructure Rack.
- If an enclosure is not fully populated with fans and power supplies, see the positioning guidelines in the HP BladeSystem c7000 enclosure documentation.
- Enclosures are cabled together using their uplink and downlink ports.
- The top uplink port in each rack is used as a service port to attach a laptop or other device for initial configuration or subsequent debugging.

## Specific HP XC Setup Guidelines

The following enclosure setup guidelines are specific to HP XC:

- On every HP BladeSystem c7000 enclosure, an Ethernet interconnect module (either a switch or pass-through module) is installed in interconnect bay #1 (see callout 2 in Figure 1-4) for the administration network.
- Hardware configurations that use Gigabit Ethernet as the interconnect require an additional Ethernet interconnect module (either a switch or pass-through module) to be installed in interconnect bay #2 (see callout 3 in Figure 1-4) for the interconnect network.
- Systems that use InfiniBand as the interconnect require a double-wide InfiniBand interconnect switch module installed in interconnect bays #5 and #6 (see callouts 6 and 7 in Figure 1-4).
- Some systems might need an additional Ethernet interconnect module to support server blades that require external connections. For more information about external connections, see “Cabling for the External Network” (page 41).

### 1.2.2 HP BladeSystem c3000 Enclosure

Figure 1-5 shows the front and rear views of the HP BladeSystem c3000 enclosure.

**Figure 1-5 HP BladeSystem c3000 Enclosure (Front and Rear Views)**



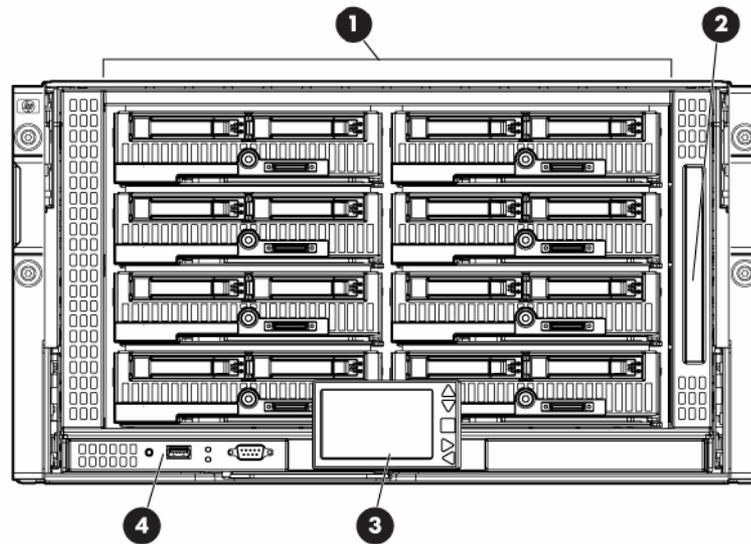
The HP BladeSystem c3000 Enclosure is available as a tower model, as shown in Figure 1-6.

**Figure 1-6 HP BladeSystem c3000 Enclosure Tower Model**



Figure 1-7 is an illustration showing the location of the device bays, optional DVD drive, Insight display, and Onboard Administrator at the front of the HP BladeSystem c3000 Enclosure.

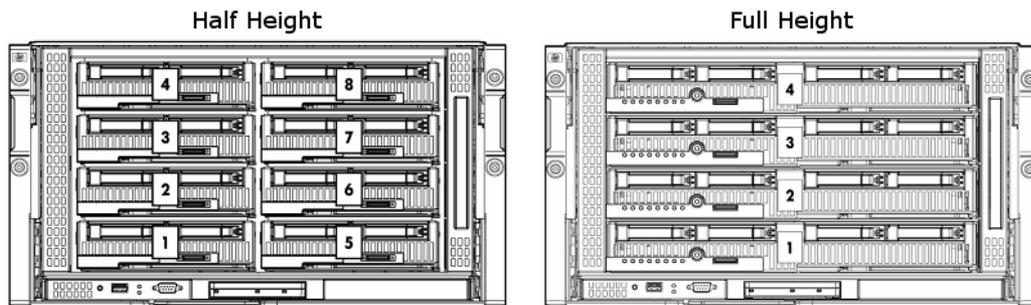
**Figure 1-7 HP BladeSystem c3000 Enclosure Bay Locations (Front View)**



- 1 Device bays
- 2 DVD drive (optional)
- 3 Insight Display. For more information, see “Insight Display” (page 28).
- 4 Onboard Administrator (OA)

The HP BladeSystem c3000 enclosure can house a maximum of 8 half-height or 4 full-height server blades. Additionally, the c3000 enclosure contains an integrated DVD drive, which is useful for installing the HP XC System Software. Figure 1-8 illustrates the numbering of the server bays of the HP BladeSystem c3000 enclosure for both half height and full height server blades.

**Figure 1-8 HP BladeSystem c3000 Enclosure Bay Numbering**

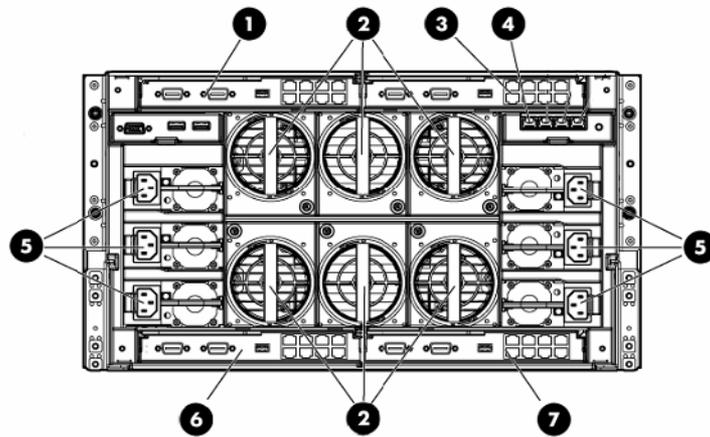


The number of fans in the enclosure influences the placement of the server blades. Use the following table and the numbering scheme in Figure 1-8 to determine the placement of the server blades in the enclosure, based on the number of fans.

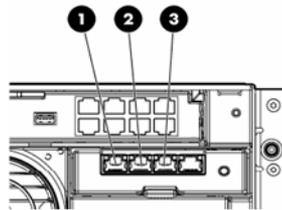
Number of Fans	Insert Half-Height Server Blades in These Bays	Insert Full-Height Server Blades in These Bays
4 fan configuration	1, 2, 5, 6	1, 2
6 fan configuration	any	any

Figure 1-9 is an illustration showing the location of the interconnect bays, fan bays, onboard administrator bays, the enclosure/onboard administrator link module, and power supplies at the rear of the HP BladeSystem c3000 enclosure. This figure includes an inset showing the onboard administrator/iLO port, and the enclosure Uplink and downlink ports.

Figure 1-9 HP BladeSystem c3000 Enclosure Bay Locations (Rear View)



- 1 Interconnect bay #1
- 2 Fans
- 3 Interconnect bay #2
- 4 Enclosure/Onboard Administrator Link Module
- 5 Power Supplies
- 6 Interconnect bay #3
- 7 Interconnect bay #4



- 1 Enclosure Downlink port
- 2 Enclosure Uplink port
- 3 Onboard Administrator/Integrated Lights Out port

### Specific HP XC Setup Guidelines

The following enclosure setup guidelines are specific to HP XC:

- On every enclosure, an Ethernet interconnect module (either a switch or pass-through module) is installed in interconnect bay #1 (see callout 1 in Figure 1-9) for the administration network.
- Hardware configurations that use Gigabit Ethernet as the interconnect can share with the administration network in interconnect bay #1.
- Systems that use InfiniBand as the interconnect require a double-wide InfiniBand interconnect switch module installed in interconnect bays #3 and #4 (see callouts 6 and 7 in Figure 1-9).
- Some systems might need an additional Ethernet interconnect module to support server blades that require external connections. For more information about external connections, see “Cabling for the External Network” (page 41).

### 1.2.3 HP BladeSystem c-Class Onboard Administrator

The Onboard Administrator is the management device for an enclosure, and at least one Onboard Administrator is installed in every enclosure.

You can access the Onboard Administrator through a graphical Web-based user interface, a command-line interface, or the simple object access protocol (SOAP) to configure and monitor the enclosure.

You can add a second Onboard Administrator to provide redundancy.

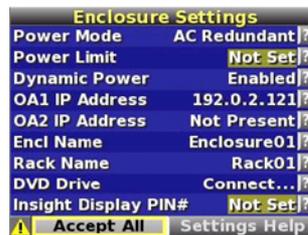
The Onboard Administrator requires a password. For information on setting the Onboard Administrator Password, see “Setting the Onboard Administrator Password” (page 62).

## 1.2.4 Insight Display

The Insight Display is a small LCD panel on the front of an enclosure that provides instant access to important information about the enclosure such as the IP address and color-coded status.

Figure 1-10 depicts the Insight Display.

**Figure 1-10 Server Blade Insight Display**



You can use the Insight Display panel to make some basic enclosure settings.

## 1.3 Server Blade Mezzanine Cards

The mezzanine slots on each server blade provide additional I/O capability.

Mezzanine cards are PCI-Express cards that attach inside the server blade through a special connector and have no physical I/O ports on them.

Card types include Ethernet, fibre channel, or 10 Gigabit Ethernet.

## 1.4 Server Blade Interconnect Modules

An interconnect module provides the physical I/O for the built-in NICs or the supplemental mezzanine cards on the server blades. An interconnect module can be either a switch or a pass-thru module.

A switch provides local switching and minimizes cabling. Switch models that are supported as interconnect modules include, but are not limited to:

- Nortel GbE2c Gigabit Ethernet switch
- Cisco Catalyst Gigabit Ethernet switch
- HP 4x DDR InfiniBand switch
- Brocade SAN switch

A pass-thru module provides direct connections to the individual ports on each node and does not provide any local switching.

Bays in the back of each enclosure correspond to specific interfaces on the server blades. Thus, all I/O devices that correspond to a specific interconnect bay must be the same type.

### Interconnect Bay Port Mapping

Connections between the server blades and the interconnect bays are hard wired. Each of the 8 interconnect bays in the back of the enclosure has a connection to each of the 16 server bays in the front of the enclosure. The built-in NIC or mezzanine card into which the interconnect blade connects depends on which interconnect bay it is plugged into. Because full-height blades consume two server bays, they have twice as many connections to each of the interconnect bays.

See the *HP BladeSystem Onboard Administrator User Guide* for illustrations of interconnect bay port mapping connections on half- and full-height server blades.

## 1.5 Supported Console Management Devices

Table 1-3 lists the supported console management device for each hardware model within each cluster platform. The console management device provides remote access to the console of each node, enabling functions such as remote power management, remote console logging, and remote boot.

HP workstation models do not have console ports.

HP ProLiant servers provide remote management features through a baseboard management controller (BMC). The BMC enables functions such as remote power management and remote boot. HP ProLiant BMCs comply with a specified release of the industry-standard Intelligent Platform Management Interface (IPMI). HP XC supports two IPMI-compliant BMCs: integrated lights out (iLO and iLO2) and Lights-Out 100i (LO-100i), depending on the server model.

Each HP ProLiant server blade has a built-in Integrated Lights Out (iLO2) device that provides full remote power control and serial console access. You can access the iLO2 device through the Onboard Administrator. On server blades, iLO2 advanced features are enabled by default and include the following:

- Full remote graphics console access including full keyboard, video, mouse (KVM) access through a Web browser
- Support for remote virtual media which enables you to mount a local CD or diskette and serve it to the server blade over the network

Each HP Integrity server blade has a built-in management processor (MP) device that provides full remote power control and serial console access. You can access the MP device by connecting a serial terminal or laptop serial port to the local IO cable that is connected to the server blade.

Hardware models that use iLO and iLO2 need certain settings that cannot be made until the iLO has an IP address. The *HP XC System Software Installation Guide* provides instructions for using a browser to connect to the iLO and iLO2 to enable `telnet` access.

**Table 1-3 Supported Console Management Devices**

Hardware Component	Firmware Dependency
<b>CP3000</b>	
HP ProLiant DL140 G2	Lights-out 100i management (LO-100i), system BIOS
HP ProLiant DL140 G3	LO-100i, system BIOS
HP ProLiant DL160 G5	LO-100i, system BIOS
HP ProLiant DL360 G4	Integrated lights out (iLO), system BIOS
HP ProLiant DL360 G4p	iLO, system BIOS
HP ProLiant DL360 G5	iLO2, system BIOS
HP ProLiant DL380 G4	iLO, system BIOS
HP ProLiant DL380 G5	iLO2, system BIOS
HP ProLiant DL580 G4	iLO2, system BIOS
HP ProLiant DL580 G5	iLO2, system BIOS
<b>CP3000BL</b>	
HP ProLiant BL2x220c G5	iLO2, system BIOS, Onboard Administrator (OA)
HP ProLiant BL260c G5	iLO2, system BIOS, Onboard Administrator (OA)

**Table 1-3 Supported Console Management Devices** *(continued)*

<b>Hardware Component</b>	<b>Firmware Dependency</b>
HP ProLiant BL460c	iLO2, system BIOS, Onboard Administrator (OA)
HP ProLiant BL480c	iLO2, system BIOS, OA
HP ProLiant BL680c G5	iLO2, system BIOS, Onboard Administrator (OA)
<b>CP4000</b>	
HP ProLiant DL145	LO-100i
HP ProLiant DL145 G2	LO-100i
HP ProLiant DL145 G3	LO-100i
HP ProLiant DL165 G5	LO-100i
HP ProLiant DL365	iLO2
HP ProLiant DL365 G5	iLO2
HP ProLiant DL385	iLO2
HP ProLiant DL385 G2	iLO2
HP ProLiant DL385 G5	iLO2
HP ProLiant DL585	iLO2
HP ProLiant DL585 G2	iLO2
HP ProLiant DL585 G5	iLO2
HP ProLiant DL785 G5	iLO2
<b>CP4000BL</b>	
HP ProLiant BL465c	iLO2
HP ProLiant BL465c G5	iLO2
HP ProLiant BL685c	iLO2
HP ProLiant BL685c G5	iLO2
<b>CP6000</b>	
HP Integrity rx1620	Management Processor (MP)
HP Integrity rx2600	MP
HP Integrity rx2620	MP
HP Integrity rx2660	MP
HP Integrity rx4640	MP
HP Integrity rx8620	MP
<b>CP6000BL</b>	
HP Integrity BL860c Server Blade (Full-height)	MP

## 1.6 Administration Network Overview

The administration network is a private network within the HP XC system that is used primarily for administrative operations. This network is treated as a flat network during run time (that is, communication between any two points in the network is equal in communication time between any other two points in the network). However, during the installation and configuration of the

HP XC system, the administrative tools probe and discover the topology of the administration network. The administration network requires and uses Gigabit Ethernet.

The administration network has at least one Root Administration Switch and can have multiple Branch Administration Switches. These switches are discussed in “Switches” (page 46).

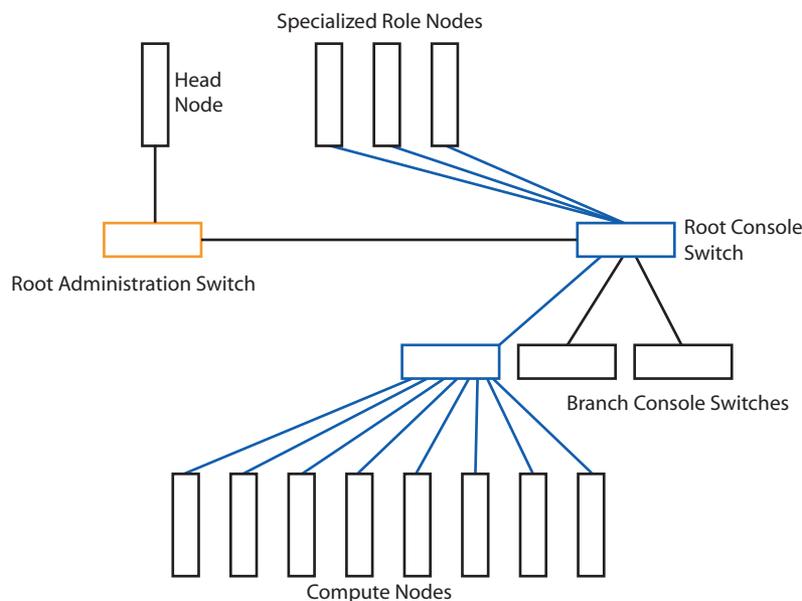
## 1.7 Administration Network: Console Branch

The console branch is part of the private administration network within an HP XC system that is used primarily for managing and monitoring the consoles of the nodes that comprise the HP XC system. This branch of the network uses 10/100 Mbps Ethernet.

During the installation and configuration of the HP XC system, the administrative tools probe and discover the topology of the entire administration network including the console branch.

A (nonblade) HP XC system has at least one Root Console Switch with the potential for multiple Branch Console Switches. Figure 1-11 shows a graphical representation of the console branch.

**Figure 1-11 Administration Network: Console Branch (Without HP Server Blades)**



## 1.8 Interconnect Network

The interconnect network is a private network within the HP XC system. Typically, every node in the HP XC system is connected to the interconnect.

The interconnect network is dedicated to communication between processors and access to data in storage areas. It provides a high-speed communications path used primarily for user file service and for communications within applications that are distributed among nodes of the cluster.

Table 1-4 lists the supported interconnect types on each cluster platform. The interconnect types are displayed in the context of an interconnect family, in which InfiniBand products constitute one family, Quadrics® QsNet<sup>II</sup>® constitutes another interconnect family, and so on. For more information about the interconnect types on individual hardware models, see the cluster platform documentation.

**Table 1-4 Supported Interconnects**

Cluster Platform and Hardware Model	INTERCONNECT FAMILIES					
	Gigabit Ethernet	InfiniBand® PCI-X	InfiniBand PCI Express Single Data Rate and Double Data Rate (DDR)	InfiniBand ConnectX Double Data Rate (DDR) <sup>1</sup>	Myrinet® (Rev. D, E, and F)	QsNet <sup>II</sup>
CP3000	X	X	X	X	X	
CP3000BL	X		X	X		
CP4000	X	X	X	X	X	X <sup>2</sup>
CP4000BL	X		X	X		
CP6000	X	X	X <sup>3</sup>	X <sup>3</sup>		X

1 Mellanox ConnectX Infiniband Cards require OFED Version 1.2.5 or later.

2 The HP ProLiant DL385 G2 and DL145 G3 servers require a PCI Express card in order to use this interconnect.

3 This interconnect is supported by CP6000 hardware models with PCI Express.

### Mixing Adapters

Within a given interconnect family, several different adapters can be supported. However, HP requires that all adapters must be from the same interconnect family; a mix of adapters from different interconnect families is not supported.

### InfiniBand Double Data Rate

All components in a network must be DDR to achieve DDR performance levels.

### ConnectX InfiniBand Double Data Rate

Currently ConnectX adapters cannot be mixed with other types of adapters.

### Myrinet Adapters

The Myrinet adapters can be either the single-port M3F-PCIXD-2 (Rev. D) or the dual port M3F2-PCIXE-2 (Rev. E and Rev F); mixing adapter types is not supported.

### QsNet<sup>II</sup>

The QsNet<sup>II</sup> high-speed interconnect from Quadrics, Ltd. is the only version of Quadrics interconnect that is supported.

## 1.9 Large-Scale Systems

A typical HP XC system contains from 5 to 512 nodes. To allow systems of a greater size, an HP XC system can be arranged into a large-scale configuration with up to 1024 compute nodes (HP might consider larger systems as special cases).

This configuration arranges the HP XC system as a collection of hardware regions that are tied together through a ProCurve 2848 Ethernet switch.

The nodes of the large-scale system are divided as equally as possible between the individual HP XC systems, which are known as **regions**. The head node for a large-scale HP XC system is always the head node of region 1.

## 2 Cabling Server Blades

The following topics are addressed in this chapter:

- “Blade Enclosure Overview” (page 33)
- “Network Overview ” (page 33)
- “Cabling for the Administration Network” (page 37)
- “Cabling for the Console Network” (page 38)
- “Cabling for the Interconnect Network” (page 39)
- “Cabling for the External Network” (page 41)

### 2.1 Blade Enclosure Overview

An HP XC blade cluster is made up of one or more "Blade Enclosures" connected together as a cluster. Each blade enclosure must contain the following:

- 1 to 16 blade servers
- 1 Ethernet Interconnect blade in bay 1 for the Administration Network
- 1 Onboard Administrator (OA) for managing the enclosure



---

**NOTE:** Enclosures might also have a redundant Onboard Administrator.

---

- The requisite number of fans and power supplies to fill the needs of all the hardware

In addition, each enclosure needs an additional blade interconnect module for the cluster interconnect. On a Gigabit Ethernet (GigE) cluster, this could be either another Ethernet Switch or an Ethernet pass-thru module in bay 2. On an InfiniBand (IB) cluster, this would be one of the double-wide IB Blade switches in bays 5 and 6.

In certain circumstances, there might need to be an additional Ethernet interconnect blade needed to support any required external connections. This would only be needed on Gigabit Ethernet clusters with half-height blades that need external connections. For more information, see “Configuring the External Network: Option 2” (page 42).

The various enclosures that make up a cluster are connected to each other through external ProCurve switches. Every cluster needs at least one ProCurve Administrative Network switch (a 2800 series) and may optionally have a Console Network Switch (a 2600 series). It is possible to have the Console and Administrative Network combined over the single 2800 series switch on smaller configurations.

Gigabit Ethernet clusters require one or more external Ethernet switches to act as the cluster interconnect between the enclosures. This can be set up one of two ways.

- If the cluster uses Ethernet switches in each enclosure, then you need a smaller external interconnect because you only need one connection for each enclosure in the cluster (although this might be a trunked connection).
- If the cluster uses Ethernet pass-through modules in each enclosure, you need a large external Ethernet switch with enough connections for each node in the cluster.

InfiniBand clusters require one or more external IB switches, with at least one managed switch to manage the fabric.

### 2.2 Network Overview

An HP XC system consists of several networks: administration, console, interconnect, and external (public). In order for these networks to function, you must connect the enclosures, server blades, and switches according to the guidelines provided in this chapter.

Chapter 3 (page 45) describes specific node and switch connections for non-blade hardware configurations.

A hardware configuration with server blades does not have these specific cabling requirements; specific switch port assignments are not required. However, HP recommends a logical ordering of the cables on the switches to facilitate serviceability. Enclosures are discovered in port order, so HP recommends that you cable them in the order you want them to be numbered. Also, HP recommends that you cable the enclosures in lower ports and cable the external nodes in the ports above them.

The configuration of an HP XC Blade System depends on its size. Larger clusters require additional switches to manage the additional enclosures or regions. Figure 2-1 (page 35), Figure 2-2 (page 36), and Figure 2-3 (page 37) provide a general view of the cabling requirements for small, medium, and large systems.

Additionally, Appendix B (page 143) provides several network cabling illustrations based on the interconnect type and server blade height to use as a reference.

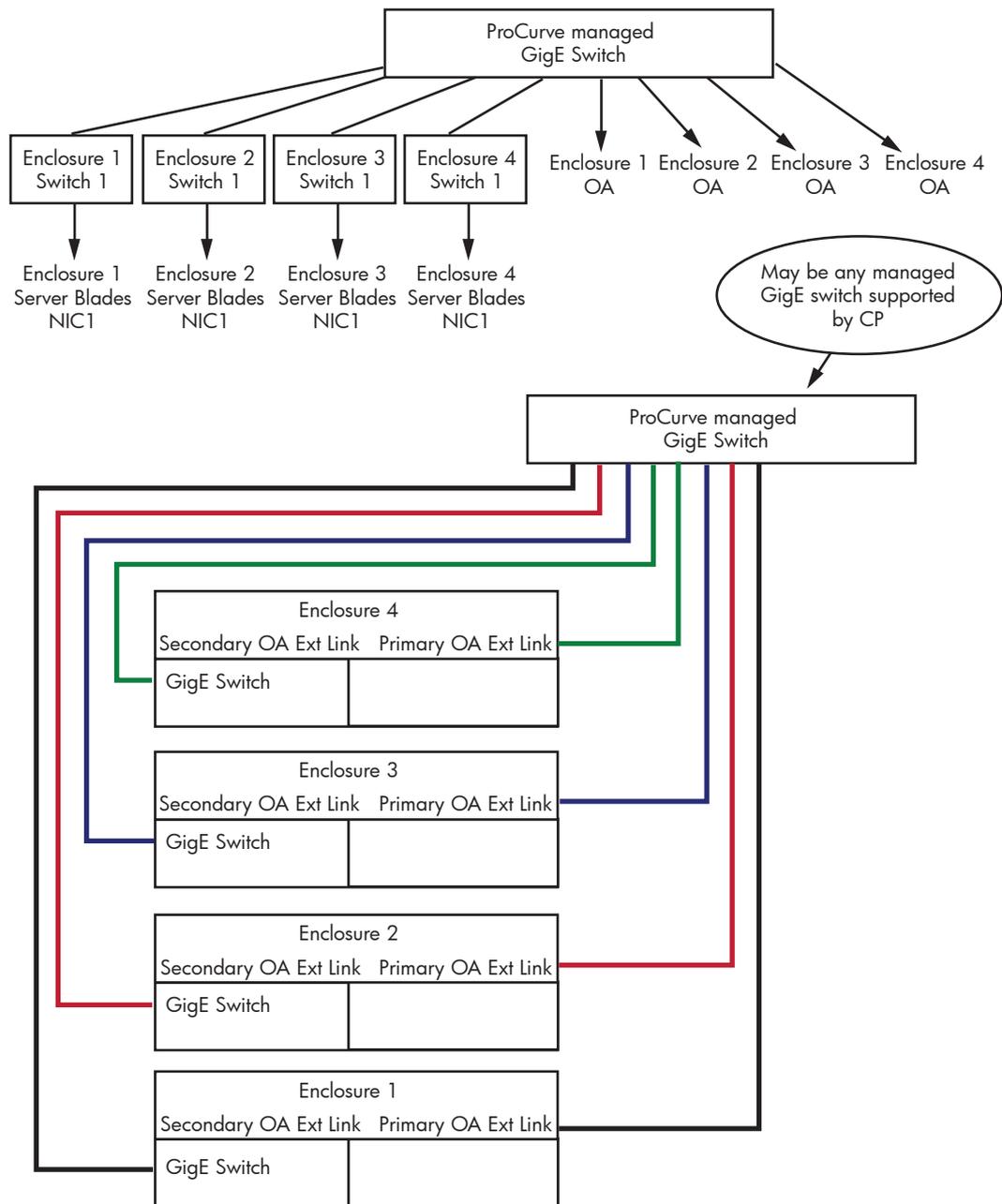
### **Small HP XC Cluster of Server Blades**

Figure 2-1 (page 35) provides two illustrations of a small HP XC cluster of four enclosures and a maximum of 64 nodes.

The top portion shows a Gigabit Ethernet switch with two connections for each of the four enclosures: one connection to the (ProCurve managed) Gigabit Ethernet switch on the enclosure and the other to the Onboard Administrator.

The bottom portion provides some additional detail. It shows the ProCurve managed Gigabit Ethernet switch connected to the Gigabit Ethernet switch in bay 1 of each enclosure and to the Primary Onboard Administrator External Link of each enclosure.

**Figure 2-1 Interconnection Diagram for a Small HP XC Cluster of Server Blades**



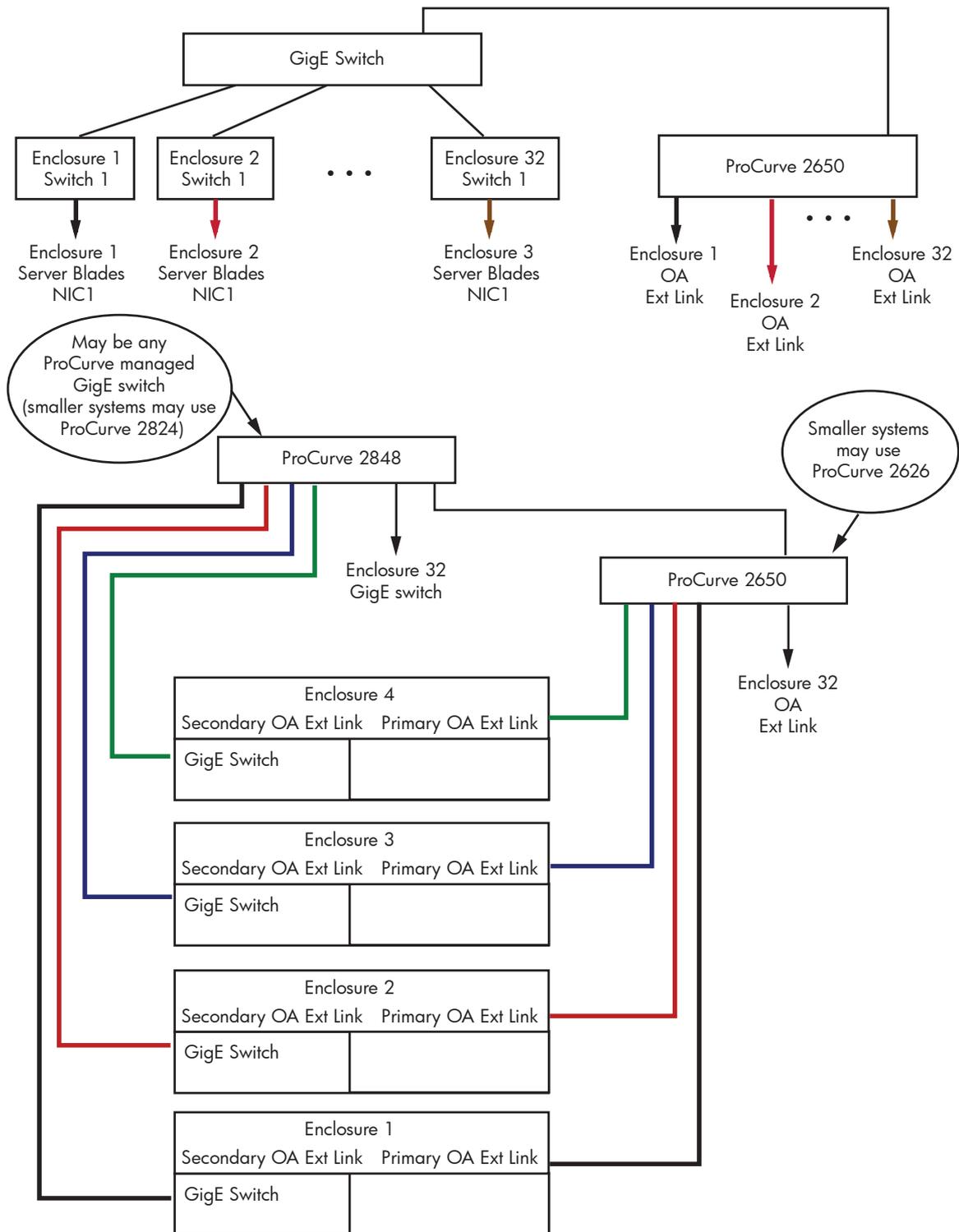
**Medium Sized HP XC Cluster of Server Blades**

Figure 2-2 (page 36) provides two illustrations of a medium sized HP XC cluster of 32 enclosures and a maximum of 512 nodes.

The top portion shows a Gigabit Ethernet switch (a ProCurve 2848) that is connected to the enclosure switch in bay 1 of each enclosure as well as to a ProCurve 2650 switch that connects to the Onboard Administrator external link of each enclosure.

The bottom portion provides some additional detail. It shows the ProCurve managed Gigabit Ethernet switch connected to the Gigabit Ethernet switch of each enclosure and to a ProCurve 2650 switch, which connects the Primary Onboard Administrator External Link of each enclosure.

**Figure 2-2 Interconnection Diagram for a Medium Sized HP XC Cluster of Server Blades**



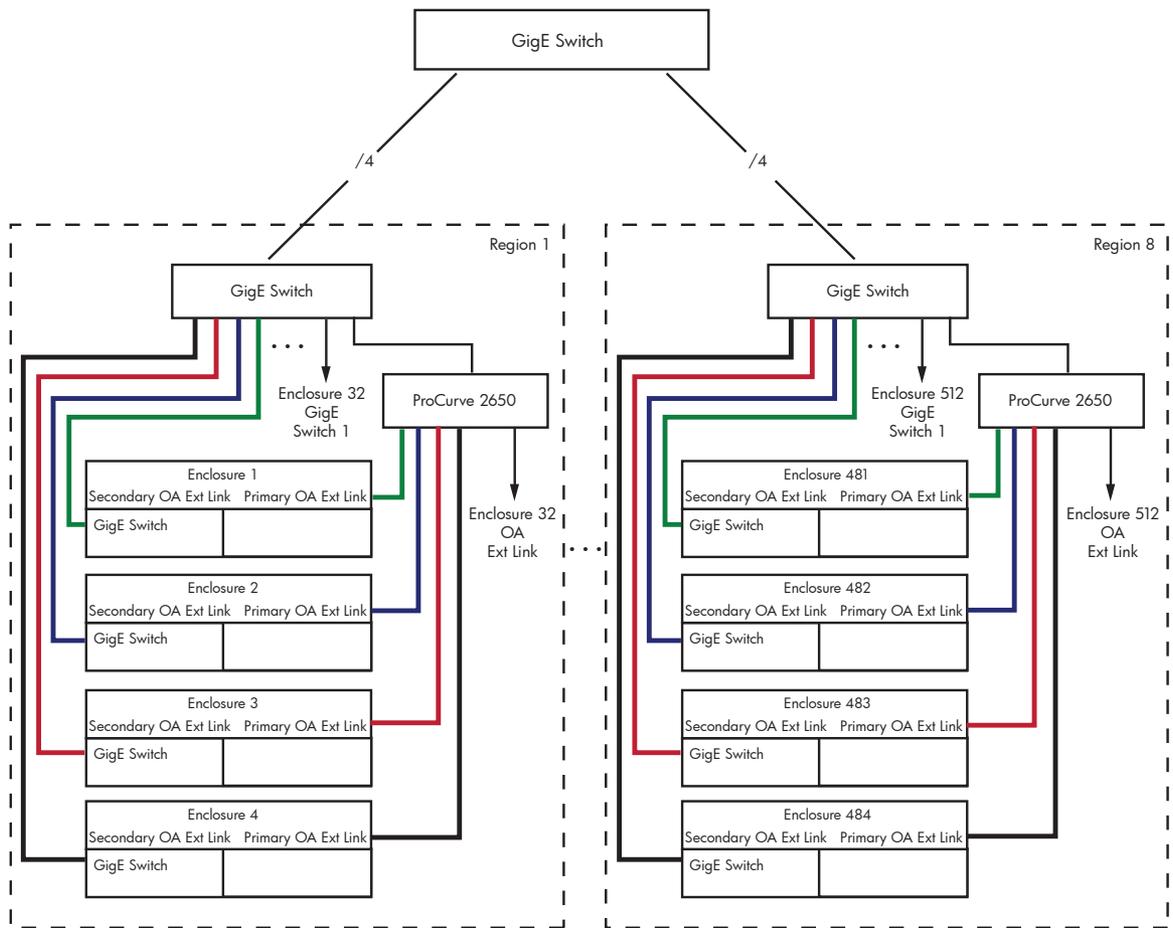
**Large HP XC Cluster of Server Blades**

Figure 2-3 (page 37) illustrates a large HP XC cluster of eight regions, with 32 enclosures per region.

There is a Gigabit Ethernet switch for the HP XC system that is connected to a Gigabit Ethernet switch in each region.

The Gigabit Ethernet switch in a region is connected to each enclosure's Gigabit Ethernet switch in bay 1 and to a ProCurve 2650 switch. The ProCurve 2650 switch is connected to the Primary Onboard Administrator External Link of each enclosure.

Figure 2-3 Interconnection Diagram for a Large HP XC Cluster of Server Blades



## 2.3 Cabling for the Administration Network

For server blades, the administration network is created and connected through ProCurve model 2800 series switches. One switch is designated as the root administration switch and that switch can be connected to multiple branch administration switches, if required.

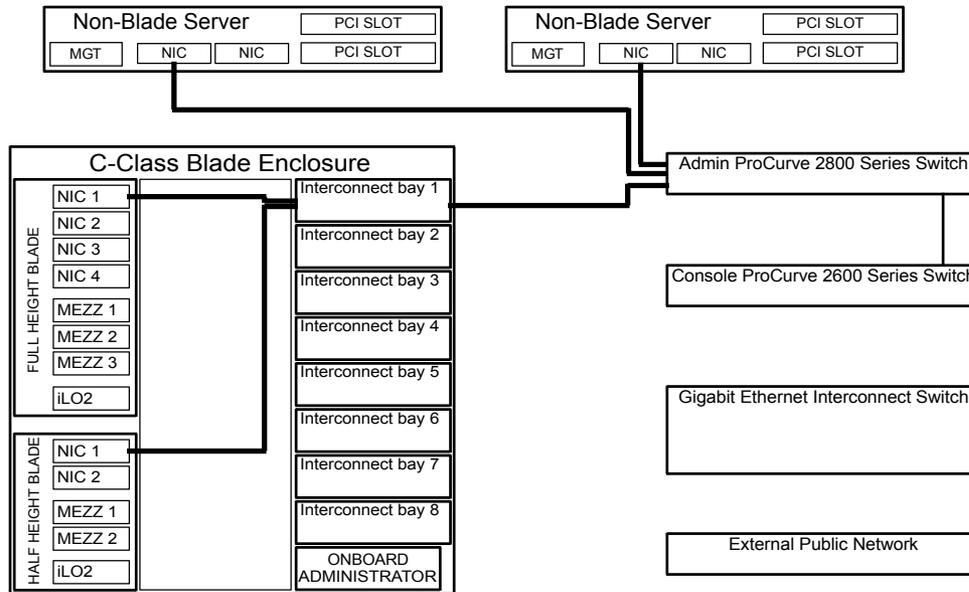
NIC1 on each server blade is dedicated as the connection to the administration network. NIC1 of all server blades connects to interconnect bay 1 on the enclosure.

The entire administration network is formed by connecting the device (either a switch or a pass-thru module) in interconnect bay 1 of each enclosure to one of the ProCurve administration network switches.

Non-blade server nodes must also be connected to the administration network. See Chapter 3 (page 45) to determine which port on the node is used for the administration network; the port you use depends on your particular hardware model.

Figure 2-4 illustrates the connections that form the administration network.

Figure 2-4 Administration Network Connections



## 2.4 Cabling for the Console Network

The console network is part of the private administration network within an HP XC system, and it is used primarily for managing and monitoring the node consoles.

On a small cluster, the console management devices can share a single top-level ProCurve 2800 root administration switch. On larger hardware configurations that require more ports, the console network is formed with separate ProCurve model 2600 series switches.

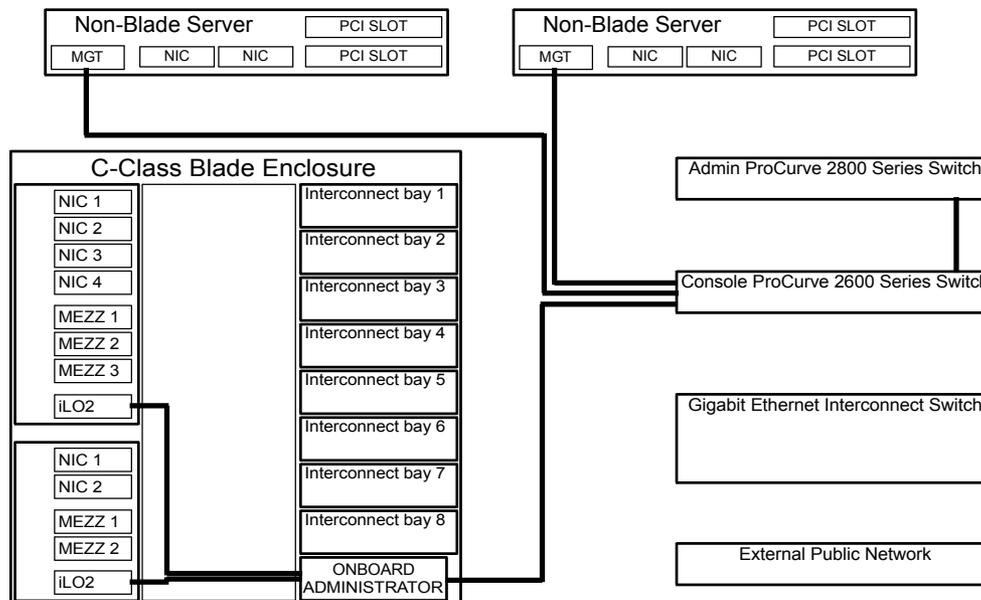
You arrange these switches in a hierarchy similar to the administration network. One switch is designated as the root console switch and that switch can be connected to multiple branch console switches. The top-level root console switch is then connected to the root administration switch.

HP server blades use iLO2 as the console management device. Each iLO2 in an enclosure connects to the Onboard Administrator. To form the console network, connect the Onboard Administrator of each enclosure to one of the ProCurve console switches.

Non-blade server nodes must also be connected to the console network. See [Chapter 3 \(page 45\)](#) to determine which port on the node is used for the console network; the port you use depends on your particular hardware model.

Figure 2-5 illustrates the connections that form the console network.

Figure 2-5 Console Network Connections



## 2.5 Cabling for the Interconnect Network

The interconnect network is a private network within an HP XC system. Typically, every node in an HP XC system is connected to the interconnect. The interconnect network provides a high-speed communications path used primarily for user file service and for communications within applications that are distributed among nodes in the cluster.

Gigabit Ethernet and InfiniBand are supported as the interconnect types for HP XC hardware configurations with server blades and enclosures. The procedure to configure the interconnect network depends upon the type of interconnect in use.

- “Configuring a Gigabit Ethernet Interconnect” (page 39)
- “Configuring an InfiniBand Interconnect” (page 40)
- “Configuring the Interconnect Network Over the Administration Network” (page 41)

### 2.5.1 Configuring a Gigabit Ethernet Interconnect

A Gigabit Ethernet interconnect requires one or more external Ethernet switches to act as the interconnect between the enclosures that make up the HP XC system.

On systems using a Gigabit Ethernet interconnect, one NIC on each server blade is dedicated as the connection to the interconnect network. On a server blade, NIC2 is used for this purpose. NIC2 of all server blades connects to interconnect bay 2 on the enclosure.

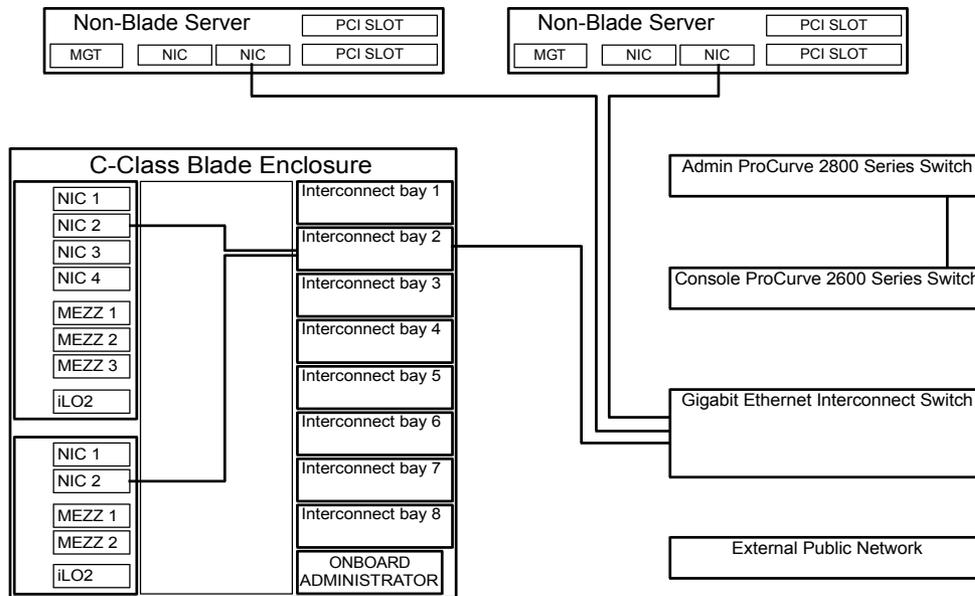
The entire interconnect network is formed by connecting the device (either a switch or a pass-thru module) in interconnect bay 2 of each enclosure to one of the Gigabit Ethernet interconnect switches.

If the device is a switch, the Gigabit uplink to the higher level ProCurve switch can be a single wire or a trunked connection of 2, 4, or 8 wires. If the device is a pass-thru module, there must be one uplink connection for each server blade in the enclosure.

Non-blade server nodes must also be connected to the interconnect network. See Chapter 3 (page 45) to determine which port on the node is used for the interconnect network; the port you use depends on your particular hardware model.

Figure 2-6 illustrates the connections for a Gigabit Ethernet interconnect.

**Figure 2-6 Gigabit Ethernet Interconnect Connections**



### 2.5.2 Configuring an InfiniBand Interconnect

An InfiniBand interconnect requires one or more external InfiniBand switches with at least one managed switch to manage the fabric.

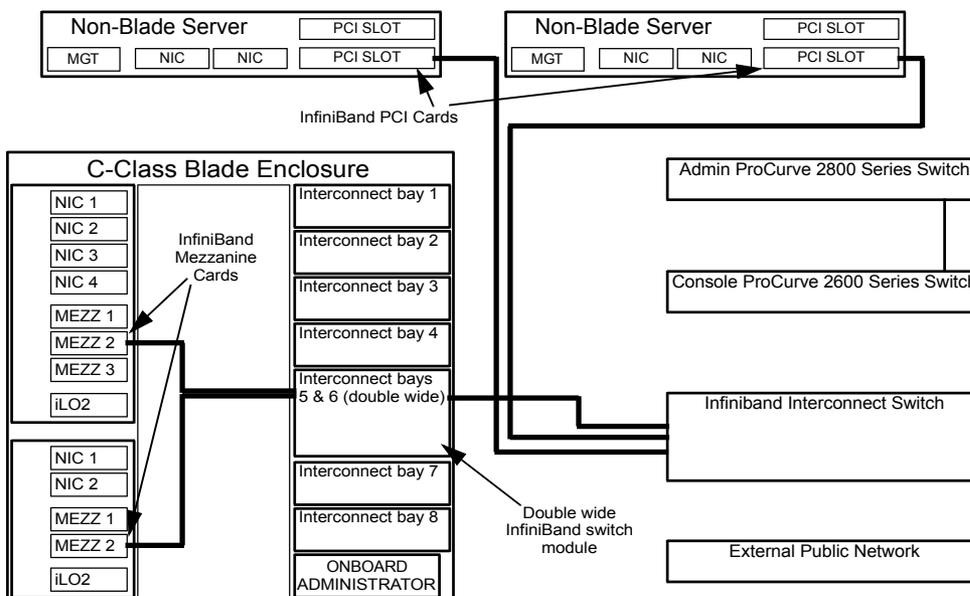
Systems using an InfiniBand interconnect require you to install an InfiniBand mezzanine card into mezzanine bay 2 of each server blade to provide a connection to the InfiniBand interconnect network. The InfiniBand card in mezzanine bay 2 connects to the double-wide InfiniBand switch in interconnect bays 5 and 6 on the enclosure.

The entire interconnect network is formed by connecting the InfiniBand switches in interconnect bays 5 and 6 of each enclosure to one of the InfiniBand interconnect switches.

Non-blade server nodes also require InfiniBand cards and must also be connected to the interconnect network.

Figure 2-7 illustrates the connections for an InfiniBand interconnect.

**Figure 2-7 InfiniBand Interconnect Connections**



## 2.5.3 Configuring the Interconnect Network Over the Administration Network

In cases where an additional Gigabit Ethernet port or switch may not be available, the HP XC System Software enables you to configure the interconnect on the administration network. When the interconnect is configured on the administration network, only a single LAN is used.

To configure the interconnect on the administration network, include the `--ic=AdminNet` option on the `discover` command line, which is documented in the *HP XC System Software Installation Guide*.

Be aware that configuring the interconnect on the administration network may negatively impact system performance.

## 2.6 Cabling for the External Network

Depending upon the roles you assign to nodes during the cluster configuration process, some nodes might require connections to an external public network. Making these connections requires one or more Ethernet ports in addition to the ports already in use. The ports you use depend upon the hardware configuration and the number of available ports.

On non-blade server nodes, the appropriate port assignments for the external network are shown in Chapter 4 (page 59).

On a server blade, the number of available Ethernet ports is influenced by the type of interconnect and the server blade height:

- Nodes in clusters that use an InfiniBand interconnect have only one NIC in use for the administration network.
- Nodes in clusters that use a Gigabit Ethernet interconnect have two NICs in use; one for the administration network, and one for the interconnect network.
- Half-height server blade models have two built-in NICs.
- Full-height server blade models have four built-in NICs.

You can use the built-in NICs on a server blade if any are available. If the node requires more ports, you must add an Ethernet card to mezzanine bay 1 on the server blade. If you add an Ethernet card to mezzanine bay 1, you must also add an Ethernet interconnect module (either a switch or pass-thru module) to interconnect bay 3 or 4 of the c7000 enclosure.

On full-height server blades, you can avoid having to purchase an additional mezzanine card and interconnect module by creating virtual local area networks (VLANs). On a full-height server blade, NICs 1 and 3 are both connected to interconnect bay 1, and, for the c7000 enclosure, NICs 2 and 4 are both connected to interconnect bay 2. If you are using one of these NICs for the connection to the external network, you might have to create a VLAN on the switch in that bay to separate the external network from other network traffic.

For information about configuring VLANs, see “Creating VLANs” (page 44).

The ports and interconnect bays used for external network connections vary depending on the hardware configuration, the ports that are already being used for the other networks, and the server blade height. For more information about how to configure the external network in these various configurations, see the illustrations in the following sections:

- “Configuring the External Network: Option 1” (page 41)
- “Configuring the External Network: Option 2” (page 42)
- “Configuring the External Network: Option 3 - Non Gigabit Ethernet Interconnect Clusters” (page 43)

### 2.6.1 Configuring the External Network: Option 1

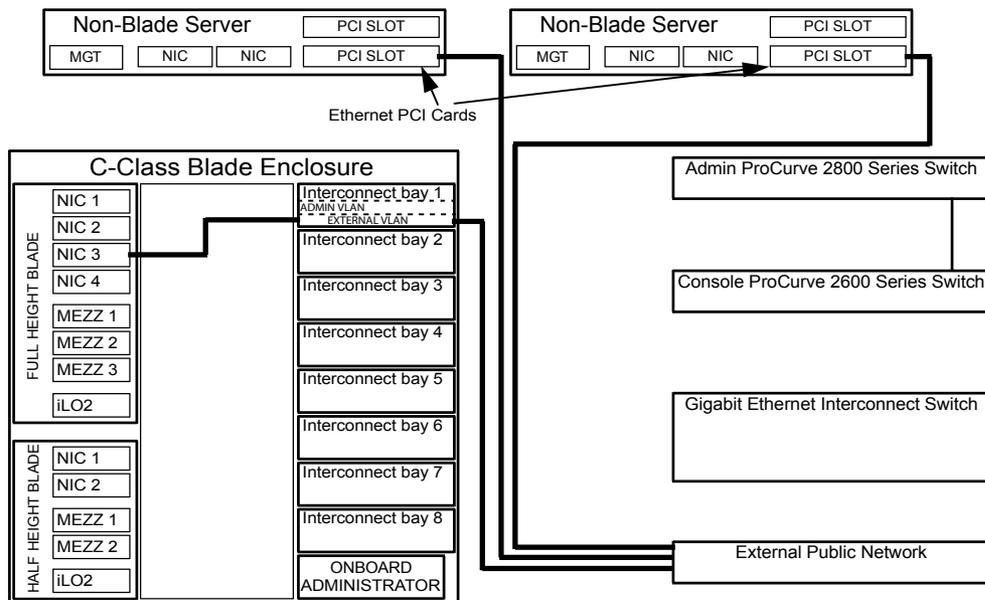
Figure 2-8 (page 42) assumes that NIC1 and NIC2 are already in use for the administration and interconnect networks. This situation requires a third NIC for the external network. Half-height

server blades do not have three NICs, and therefore, half-height server blades are not included in this example

Because NIC1 and NIC3 on a full-height server blade are connected to interconnect bay 1, you must use VLANs on the switch in that bay to separate the external network from the administration network.

Also, in this example, PCI Ethernet cards are used in the non-blade server nodes. If the hardware configuration contains non-blade server nodes, see Chapter 4 (page 59) for information on which port to use for the external network.

**Figure 2-8 External Network Connections: Full-Height Server Blades and NIC1 and NIC2 in Use**

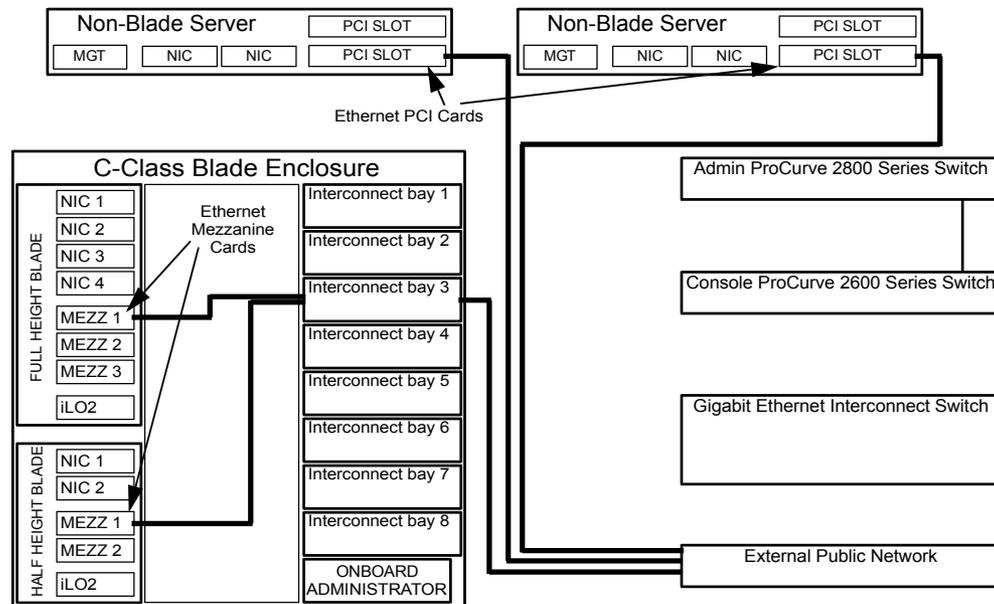


## 2.6.2 Configuring the External Network: Option 2

Figure 2-9 (page 43) assumes that NIC1 and NIC2 are already in use for the administration and interconnect networks. This situation requires a third NIC for the external network, but unlike Figure 2-8 (page 42), this hardware configuration includes half-height server blades. Therefore, to make another Ethernet NIC available, you must add an Ethernet card to mezzanine bay 1 on each server blade that requires an external connection. You must also install an Ethernet interconnect module in interconnect bay 3 for these cards.

In addition, PCI Ethernet Cards are used in the non-blade server nodes. If the hardware configuration contains non-blade server nodes, see Chapter 4 (page 59) for information on which port to use for the external network.

Figure 2-9 External Network Connections: Half-Height Server Blades and NIC1 and NIC2 in Use



### 2.6.3 Configuring the External Network: Option 3 - Non Gigabit Ethernet Interconnect Clusters

The administration network requires only one network interface, NIC1, on clusters that do not use Gigabit Ethernet as the interconnect (that is, they use InfiniBand or the interconnect on the administration network).

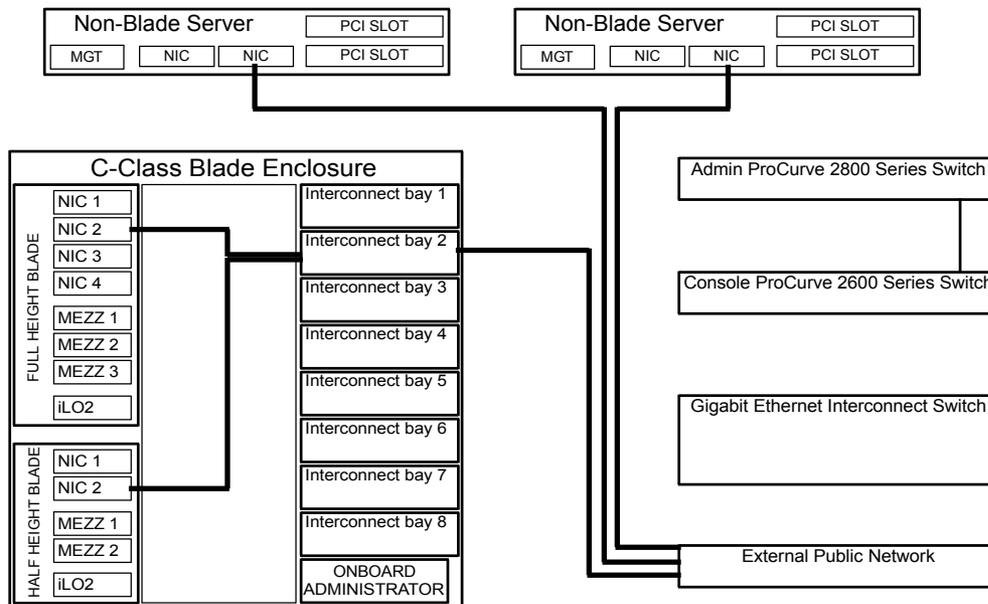
On these non Gigabit Ethernet interconnect clusters, you have two configuration methods to configure an external network connection, and the option you choose depends on whether the collection of nodes requiring external connections includes half-height server blades.

- If only full height server blades require external connections, you can use NIC3 for the external network. This is similar to the way the external connection is configured in Figure 2-8 (page 42), and it saves the cost of an additional interconnect device in bay 2.
- If half-height server blades require external connections, you cannot use NIC3 because half height server blades do not have a third NIC. In this case, you must use NIC2 as the external connection as shown in Figure 2-8 (page 42). This configuration requires an Ethernet interconnect module to be present in bay 2.

Figure 2-8 (page 42) also shows the use of built-in NICs in the non-blade server nodes for the external connection, but this varies by hardware model.

If the hardware configuration contains non-blade server nodes, see Chapter 4 (page 59) for information about which port to use for the external network.

**Figure 2-10 External Network Connections: Half and Full-Height Server Blades and NIC1 in Use**



## 2.6.4 Creating VLANs

Use the following procedure on GbE2c (Nortel) switches if you need to configure a VLAN to separate the external network from other network traffic.

1. See the illustrations of interconnect bay port mapping connections in the *HP BladeSystem Onboard Administrator User Guide* to determine which ports on the switch to connect to each of the two virtual networks. Remember to include at least one of the externally accessible ports in each VLAN.
2. Connect a serial device to the serial console port of the GbE2c switch.
3. Press the **Enter** key.
4. When you are prompted for a password, enter **admin**, which is the default password.
5. Enter the following commands to access the VLAN configuration:
  - a. **cfg**
  - b. **12** (the letter **1** as in **1**ayer, not the number one)
  - c. **vlan 2** (be sure to enter a space between **vlan** and the vlan number)
6. Specify a name for the VLAN; choose any name you want.

```
# name your_name
```
7. Enable the VLAN:

```
# ena
```
8. Add each port to the VLAN one at a time. If you see a message that the port is in another VLAN, answer **yes** to move it. This example adds ports 1, 3, and 21 to the VLAN.

```
# add 1
# add 3
# add 21
```

If you need more information about creating VLANs, see the GbE2c documentation.
9. When you have completed adding ports, enter **apply** to activate your changes and enter **save** to save them.

# 3 Making Node and Switch Connections

This chapter provides information about the connections between nodes and switches that are required for an HP XC system.

The following topics are addressed:

- “Cabinets” (page 45)
- “Trunking and Switch Choices” (page 45)
- “Switches” (page 46)
- “Interconnect Connections” (page 56)



**IMPORTANT:** The specific node and switch port connections documented in this chapter do not apply to hardware configurations containing HP server blades and enclosures. For information on cabling server blades, see Chapter 2 (page 33).

## 3.1 Cabinets

Cabinets are used as a packaging medium. The HP XC system hardware is contained in two types of cabinets:

- Application cabinets

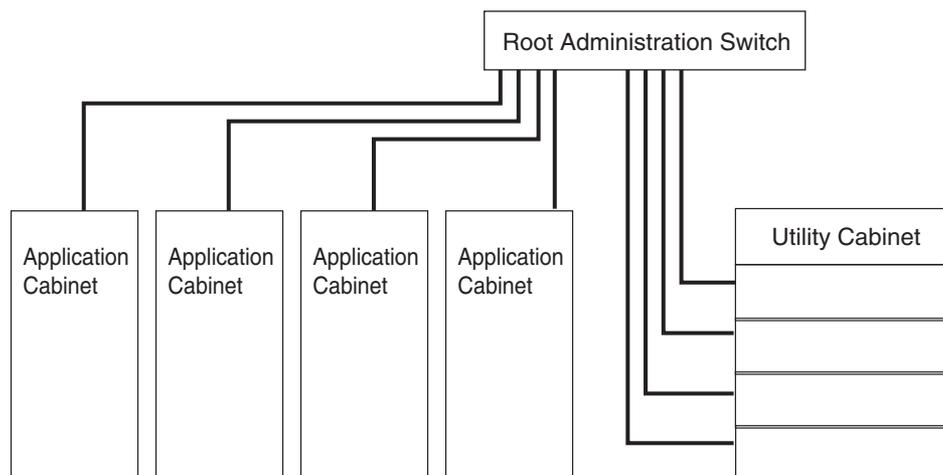
The application cabinets contain the compute nodes and are optimized to meet power, heat, and density requirements. All nodes in an application cabinet are connected to the local branch switch.

- Utility cabinets

The utility cabinet is intended to fill a more flexible need. In all configurations, at a minimum, the utility cabinet contains the head node. Nodes with external storage and nodes that are providing services to the cluster (called service nodes or utility nodes) are also contained in the utility cabinet. All nodes in the utility cabinet are connected to the root switches (administration and console).

Figure 3-1 illustrates the relationship between application cabinets, utility cabinets, and the Root Administration Switch. For more information, see “Root Administration Switch” (page 50) .

**Figure 3-1 Application and Utility Cabinets**



## 3.2 Trunking and Switch Choices

The HP XC System Software supports the use of port trunking (that is, the use of multiple network ports in parallel to increase link speed faster than any one single port) on the ProCurve switches

to create a higher bandwidth connection between the Root Administration Switches and the Branch Administration Switches.

For physically small hardware models (such as a 1U HP ProLiant DL145 server), a large number of servers (more than 30) can be placed in a single cabinet, and are all attached to a single branch switch. The branch switch is a ProCurve Switch 2848, and two-port trunking is used for the connection between the Branch Administration Switch and the Root Administration Switch.

For physically larger hardware models (2U and larger) such the HP Integrity rx2600 and HP ProLiant DL585 servers, a smaller number of servers can be placed in a single cabinet. In this case, the branch switch is a ProCurve Switch 2824, which is sufficient to support up to 19 nodes.

In this release, the HP XC System Software supports the use of multiwire connections or trunks between switches in the system. In a large-scale system (one that has regions and uses a super root switch), you can use a one-wire to four-wire trunk between the super root switch and the root administration switch for each of the HP XC regions. On a smaller-scale HP XC system or within a single region, one-wire and two-wire trunks are supported for connection between the root administration switch and the branch administration switches.

You must configure trunks on both switches before plugging the cables in between the switches. Otherwise, a loop is created between the switches, and the network is rendered useless.

Trunking configurations on switches must follow these guidelines:

- Because of the architecture of the ProCurve switch, the HP XC System Software uses only 10 ports of each 12-port segment to ensure maximum bandwidth through the switch; the last two ports are not used.
- Trunk groups must be contiguous.

Thus, by adhering to the trunking guidelines, the following ports are used to configure a ProCurve 2848 Super Root Switch for three regions using four-wire trunks:

- Region 1 - Ports 1, 2, 3, 4
- Region 2 - Ports 5, 6, 7, 8
- Region 3 - Ports 13, 14, 15, 16
- Ports 9, 10, 11, and 12 are not used

## 3.3 Switches

The following topics are addressed in this section:

- “Specialized Switch Use” (page 46)
- “Administrator Passwords on ProCurve Switches” (page 47)
- “Switch Port Connections” (page 47)
- “Switch Connections and HP Workstations” (page 49)
- “Super Root Switch” (page 49)
- “Root Administration Switch” (page 50)
- “Root Console Switches” (page 51)
- “Branch Administration Switches” (page 54)
- “Branch Console Switches” (page 55)

### 3.3.1 Specialized Switch Use

The following describes the specialized uses of switches in an HP XC system.

#### Super Root Switch

This switch is the top level switch in a large-scale system, that is, an HP XC system with more than 512 nodes requiring more than one Root Administration switch. Root Administration switches are connected directly to this switch.

Root Administration Switch	This switch connects directly to Gigabit Ethernet ports of the head node, the Root Console Switch, Branch Administration Switches, and other nodes in the utility cabinet.
Root Console Switch	This switch connects to the Root Administration Switch, Branch Console Switches, and connects to the management console ports of nodes in the utility cabinet.
Branch Administration Switch	This switch connects to the Gigabit Ethernet ports of compute nodes and connects to the Root Administration Switch.
Branch Console Switch	This switch connects to the Root Console Switch and connects to the management console ports of the compute nodes.



**IMPORTANT:** Switch use is not strictly enforced on HP XC systems with HP server blades. For more information about switch use with HP server blades, see Chapter 2 (page 33).

Table 3-1 lists the switch models that are supported for each use.

**Table 3-1 Supported Switch Models**

Switch Use	ProCurve Switch Model
Administration Switch	ProCurve 2848 or 2824
Console Switch	ProCurve 2650 or 2626

### 3.3.2 Administrator Passwords on ProCurve Switches

The documentation that came with the ProCurve switch describes how to optionally set an administrator's password for the switch.

If you define and set a password on a ProCurve switch, you must set the same password on every ProCurve switch that is a component of the HP XC system.

During the hardware discovery phase of the system configuration process, you are prompted to supply the password for the ProCurve switch administrator, and the password on every switch must match.

### 3.3.3 Switch Port Connections

Most HP XC systems have at least one Root Administration Switch and one Root Console Switch. The number of Branch Administration Switches and Branch Console Switches depends upon the total number of nodes in the hardware configuration.

The administration network using the root and branch switches must be parallel to the console network root and branch switches. In other words, if a particular node uses port *N* on the Root Administration Switch, its management console port must be connected to port *N* on the Root Console Switch. If a particular node uses port *N* on the Branch Administration Switch, its management console port must be connected to port *N* on the corresponding Branch Console Switch.

A graphical representation of the logical layout of the switches and nodes is shown in Figure 3-2.

**Figure 3-2 Node and Switch Connections on a Typical System**

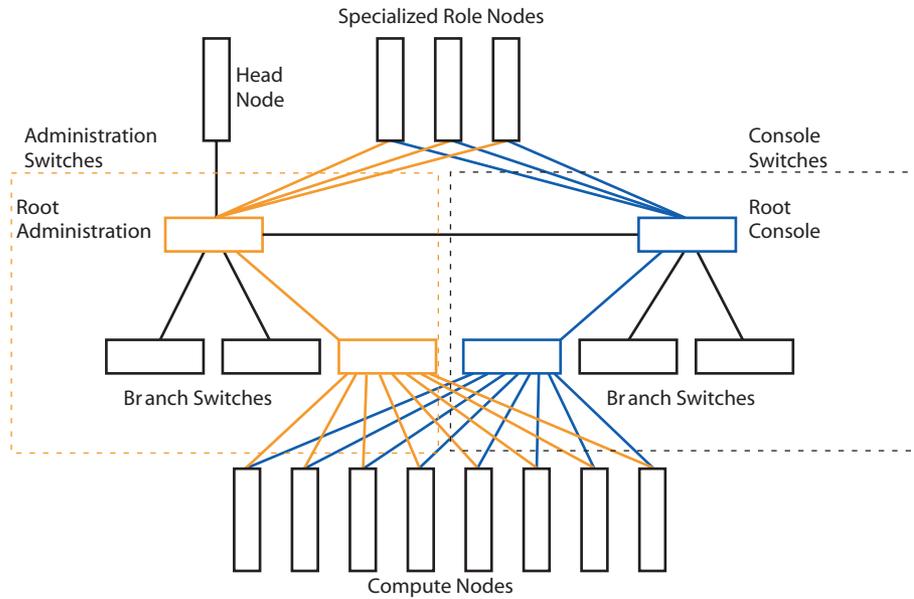
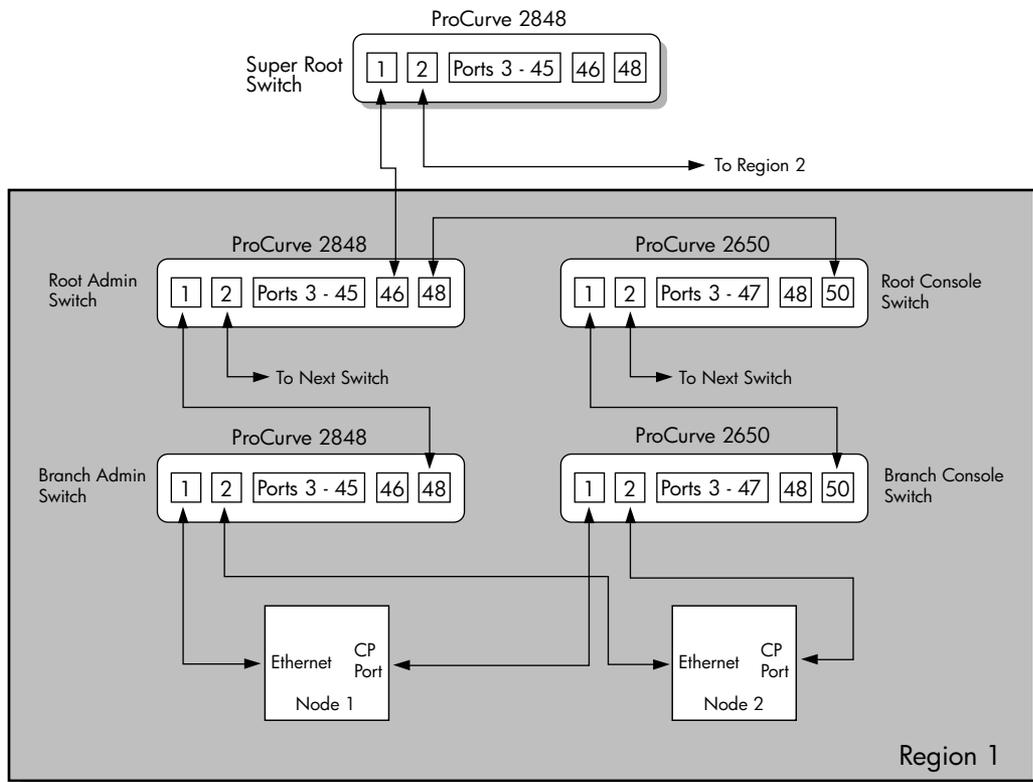


Figure 3-3 shows a graphical representation of the logical layout of the switches and nodes in a large-scale system with a Super Root Switch. The head node connects to Port 42 on the Root Administration Switch in Region 1.

**Figure 3-3 Switch Connections for a Large-Scale System**



### 3.3.3.1 Switch Connections and HP Workstations

HP model xw workstations do not have console ports. Only the Root Administration Switch supports mixing nodes without console management ports with nodes that have console management ports (that is, all other supported server models).

HP workstations connected to the Root Administration Switch must be connected to the next lower-numbered contiguous set of ports immediately below the nodes that have console management ports.

For example, if nodes with console management ports are connected to ports 42 through 36 on the Root Administration Switch, the console ports are connected to ports 42 through 36 on the Console Switch. Workstations must be connected starting at port 35 and lower to the Root Administration Switch; the corresponding ports on the Console Switch are empty.

### 3.3.4 Super Root Switch

Figure 3-4 shows the Super Root Switch, which is a ProCurve 2848. A Super Root switch configuration supports the use of trunking to expand the bandwidth of the connection between the Root Administration Switch and the Super Root Switch. The connection can be as simple as one wire and as complex as four. See “Trunking and Switch Choices” (page 45) for more information about trunking and the Super Root Switch.

You must configure trunks on *both* switches before plugging in the cables between the switches. Otherwise, a loop is created between the two switches.

Figure 3-4 illustrates a ProCurve 2848 Super Root Switch.

**Figure 3-4 ProCurve 2848 Super Root Switch**

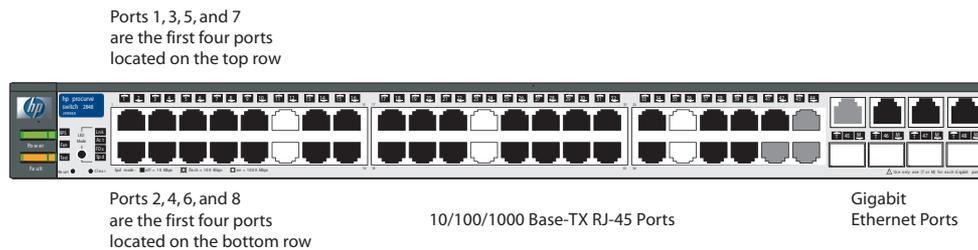


Table 3-2 shows how ports are allocated for large-scale systems with multiple regions.

**Table 3-2 Trunking Port Use on Large-Scale Systems with Multiple Regions**

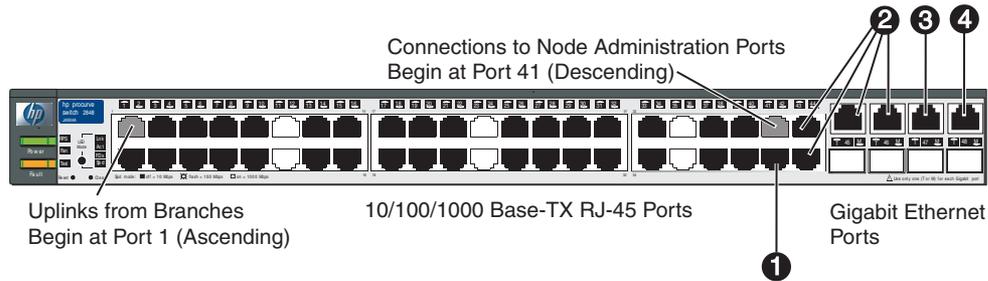
Trunking Type	Ports Used on Super Root Switch	Ports Used on Root Administration Switch
<b>4-wire Trunking:</b>		
Region 1	1 through 4	43 through 46
Region 2	5 through 8	43 through 46
Region 3	13 through 16	43 through 46
<b>2-wire Trunking:</b>		
Region 1	1 and 2	45 and 46
Region 2	3 and 4	45 and 46
Region 3	5 and 6	45 and 46
Region 4	7 and 8	45 and 46
Region 5	9 and 10	45 and 46
Region 6	13 and 14	45 and 46

### 3.3.5 Root Administration Switch

The Root Administration Switch for the administration network of an HP XC system can be either a ProCurve 2848 switch or a ProCurve 2824 switch for small configurations.

If you are using a ProCurve 2848 switch as the switch at the center of the administration network, use Figure 3-5 to make the appropriate port connections. In the figure, white ports should not have connections, black ports can have connections, and ports with numbered callouts are used for specific purposes, described after the figure. Gray-colored ports are reserved for future use.

**Figure 3-5 ProCurve 2848 Root Administration Switch**



The callouts in the figure enumerate the following:

1. Port 42 must be used for the administration port of the head node.
2. Ports 43 through 46 are used for connecting to the Super Root Switch if you are configuring a large-scale system.
3. Port 47 can be one of the following:
  - Connection (or line monitoring card) for the interconnect.
  - Connection to the Interconnect Ethernet Switch (IES), which connects to the management port of multiple interconnect switches.
4. Port 48 is used for the interconnect to the Root Console Switch (ProCurve 2650 or ProCurve 2626).

The ports on this switch must be allocated as follows for maximum performance:

- Ports 1–10, 13–22, 25–34, 37–42
  - Starting with port 1, the ports are used for links from Branch Administration Switches, which includes the use of trunking. Two-port trunking can be used for each Branch Administration Switch.



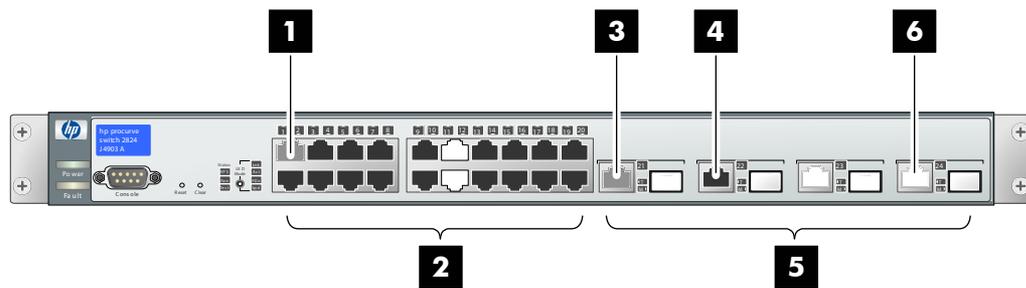
**NOTE:** Trunking is restricted to within the same group of 10 (you cannot trunk with ports 10 and 13). HP recommends that all trunking use consecutive ports within the same group (1–10, 13–22, 25–34, or 37–42).

- Starting with port 41 and in descending order, ports are assigned for use by individual nodes.
- Ports 11, 12, 23, 24, 35, 36 are unused.

For size-limited configurations, the ProCurve 2824 switch is an alternative Root Administration Switch.

If you are using a ProCurve 2824 switch as the switch at the center of the administration network, use Figure 3-6 to make the appropriate port connections. In the figure, white ports should not have connections, black ports can have connections, and ports with numbered callouts are used for specific purposes, described after the figure.

Figure 3-6 ProCurve 2824 Root Administration Switch



The callouts in the figure enumerate the following:

1. Uplinks from branches start at port 1 (ascending).
2. 10/100/1000 Base-TX RJ-45 ports.
3. Connections to node administration ports start at port 21 (descending).
4. Port 22 is used for the administration port of the head node.
5. Dual personality ports.
6. Port 24 is used as the interconnect to the Root Console Switch (a ProCurve 2650 or ProCurve 2626 model switch).

As a result of performance considerations and given the number of ports available in the ProCurve 2824 switch, the allocation order of ports is:

- Ports 1–10, 13–21
    - Starting with port 1, the ports are used for links from Branch Administration Switches which can include the use of trunking. For example, if two port trunking is used, the first Branch Administration Switch uses port 1 and 2 of the Root Administration Switch.
- 
-  **NOTE:** Trunking is restricted to within the same group of 10 (you cannot trunk with ports 10 and 13). HP recommends that all trunking use consecutive ports within the same group (1–10 or 13–21).
- 
- Starting with port 21 and descending, ports are assigned for use by individual root nodes. A root node is a node that is connected directly to the Root Administration Switch.
  - Ports 11 and 12 are unused.
  - Port 23 can be one of the following:
    - Console (or line monitoring card) for the interconnect
    - Connection to the Interconnect Ethernet Switch (IES), which connects to the management port of multiple interconnect switches.
  - Port 24 is used as the interconnect to the Root Console Switch

### 3.3.6 Root Console Switches

The following switches are supported as Root Console Switches for the console branch of the administration network:

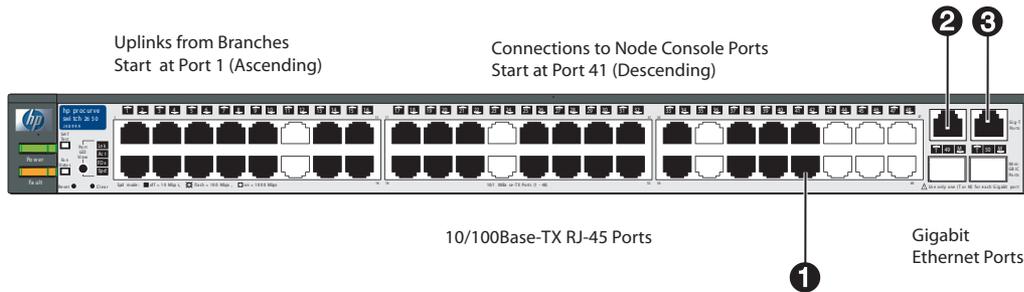
- “ProCurve 2650 Switch” (page 52)
- “ProCurve 2610-48 Switch” (page 52)
- “ProCurve 2626 Switch” (page 53)
- “ProCurve 2610-24 Switch” (page 54)

### 3.3.6.1 ProCurve 2650 Switch

You can use a ProCurve 2650 switch as a Root Console Switch for the console branch of the administration network. The console branch functions at a lower speed (10/100 Mbps) than the rest of the administration network.

The ProCurve 2650 switch is shown in Figure 3-7. In the figure, white ports should not have connections, black ports can have connections, and ports with numbered callouts are used for specific purposes, described after the figure.

**Figure 3-7 ProCurve 2650 Root Console Switch**



The callouts in the figure enumerate the following:

1. Port 42 must be reserved for an optional connection to the console port on the head node.
2. Port 49 is reserved.
3. Port 50 is the Gigabit Ethernet link to the Root Administration Switch.

Allocate the ports on this switch for consistency with the administration switches, as follows:

- Ports 1–10, 13–22, 25–34, 37–41
  - Starting with port 1, the ports are used for links from Branch Console Switches. Trunking is not used.
  - Starting with port 41 and in descending order, ports are assigned for use by individual nodes in the utility cabinet. Nodes in the utility cabinet are connected directly to the Root Administration Switch.



**NOTE:** There must be at least one idle port in this set to indicate the dividing line between branch links and root node administration ports.

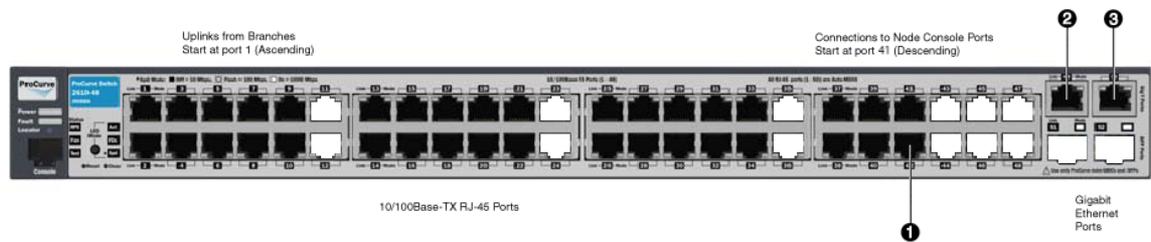
- Ports 11, 12, 23, 24, 35, 36, and 43–48 are unused.

### 3.3.6.2 ProCurve 2610-48 Switch

You can use a ProCurve 2610-48 switch as a Root Console Switch for the console branch of the administration network. The console branch functions at a lower speed (10/100 Mbps) than the rest of the administration network.

The ProCurve 2610-48 switch is shown in Figure 3-8. In the figure, white ports should not have connections, black ports can have connections, and ports with numbered callouts are used for specific purposes, described after the figure.

Figure 3-8 ProCurve 2610-48 Root Console Switch



The callouts in the figure enumerate the following:

1. Port 42 must be reserved for an optional connection to the console port on the head node.
2. Port 49 is reserved.
3. Port 50 is the Gigabit Ethernet link to the Root Administration Switch.

Allocate the ports on this switch for consistency with the administration switches, as follows:

- Ports 1–10, 13–22, 25–34, 37–41
  - Starting with port 1, the ports are used for links from Branch Console Switches. Trunking is not used.
  - Starting with port 41 and in descending order, ports are assigned for use by individual nodes in the utility cabinet. Nodes in the utility cabinet are connected directly to the Root Administration Switch.



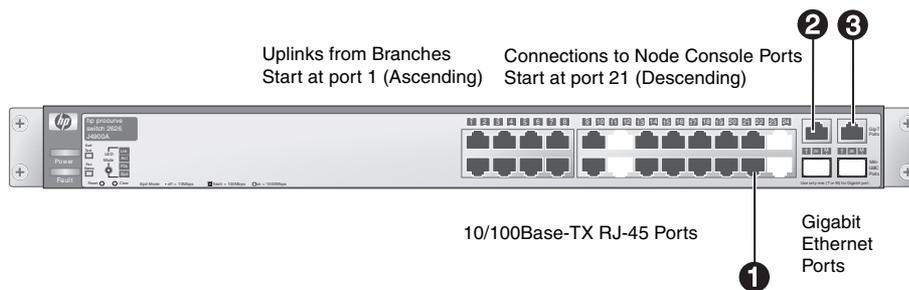
**NOTE:** There must be at least one idle port in this set to indicate the dividing line between branch links and root node administration ports.

- Ports 11, 12, 23, 24, 35, 36, and 43–48 are unused.

### 3.3.6.3 ProCurve 2626 Switch

You can use a ProCurve 2626 switch as a Root Console Switch for the console branch of the administration network. The ProCurve 2626 switch is shown in Figure 3-9. In the figure, white ports should not have connections, black ports can have connections, and ports with numbered callouts are used for specific purposes, described after the figure.

Figure 3-9 ProCurve 2626 Root Console Switch



The callouts in the figure enumerate the following:

1. Port 22 must be reserved for an optional connection to the console port on the head node.
2. Port 25 is reserved.
3. Port 26 is the Gigabit Ethernet link to the Root Administration Switch.

Allocate the ports on this switch for consistency with the administration switches, as follows:

- Ports 1–10, 13–21

- Starting with port 1, the ports are used for links from Branch Console Switches. Trunking is not used.
- Starting with port 21 and in descending order, ports are assigned for use by individual nodes in the utility cabinet. Nodes in the utility cabinet are connected directly to the Root Administration Switch.



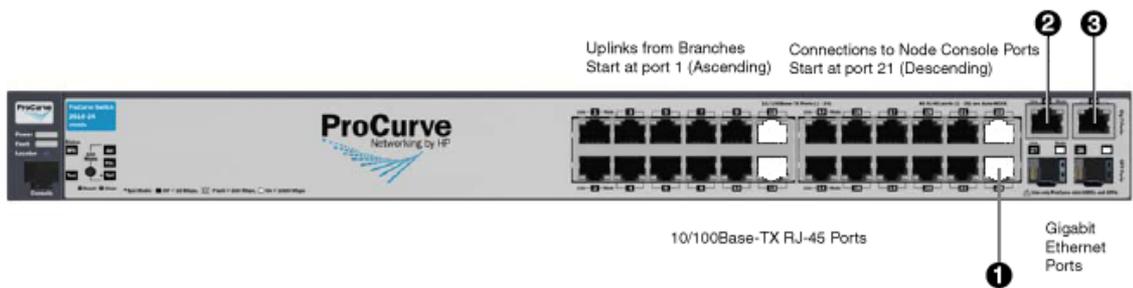
**NOTE:** There must be at least one idle port in this set to indicate the dividing line between branch links and root node administration ports.

- Ports 11, 12, 23, and 24, are unused.

### 3.3.6.4 ProCurve 2610-24 Switch

You can use a ProCurve 2610-24 switch as a Root Console Switch for the console branch of the administration network. The ProCurve 2610 switch is shown in Figure 3-10. In the figure, white ports should not have connections, black ports can have connections, and ports with numbered callouts are used for specific purposes, described after the figure.

**Figure 3-10 ProCurve 2610-24 Root Console Switch**



The callouts in the figure enumerate the following:

1. Port 22 must be reserved for an optional connection to the console port on the head node.
2. Port 25 is reserved.
3. Port 26 is the Gigabit Ethernet link to the Root Administration Switch.

Allocate the ports on this switch for consistency with the administration switches, as follows:

- Ports 1–10, 13–21
  - Starting with port 1, the ports are used for links from Branch Console Switches. Trunking is not used.
  - Starting with port 21 and in descending order, ports are assigned for use by individual nodes in the utility cabinet. Nodes in the utility cabinet are connected directly to the Root Administration Switch.



**NOTE:** There must be at least one idle port in this set to indicate the dividing line between branch links and root node administration ports.

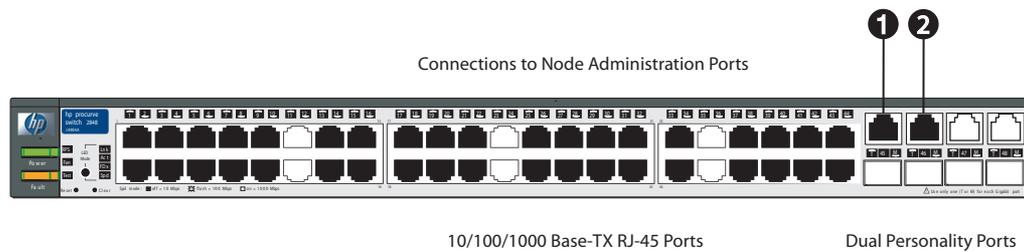
- Ports 11, 12, 23, and 24, are unused.

### 3.3.7 Branch Administration Switches

The Branch Administration Switch of an HP XC system can be either a ProCurve 2848 switch or a ProCurve 2824 switch.

Figure 3-11 shows the ProCurve 2848 switch. In the figure, white ports should not have connections, black ports can have connections, and ports with numbered callouts are used for specific purposes, described after the figure.

**Figure 3-11 ProCurve 2848 Branch Administration Switch**



The callouts in the figure enumerate the following:

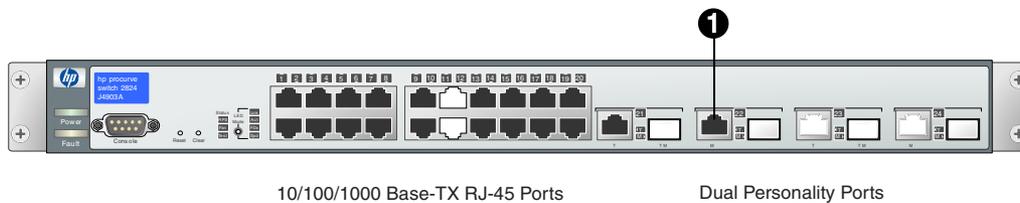
1. Port 45 is used for the trunked link to the Root Administration Switch.
2. Port 46 is used for the trunked link to the Root Administration Switch.

Allocate the ports on this switch for maximum performance, as follows:

- Ports 1–10, 13–22, 25–34, and 37–44 are used for the administration ports for the individual nodes (up to 38 nodes).
- Ports 11, 12, 23, 24, 35, 36, 47, and 48 are unused.

The ProCurve 2824 switch is shown in Figure 3-12. In the figure, white ports should not have connections, black ports can have connections, and ports with numbered callouts are used for a specific purposes, described after the figure.

**Figure 3-12 ProCurve 2824 Branch Administration Switch**



The callout in the figure enumerates the following:

1. Port 22 is used for the link to the Root Administration Switch.

Allocate the ports on this switch for maximum performance, as follows:

- Ports 1–10 and 13–21 are used for the administration ports for the individual nodes (up to 19 nodes).
- Ports 11, 12, 23, and 24 are unused.

### 3.3.8 Branch Console Switches

The Branch Console Switch of an HP XC system is a ProCurve 2650 or ProCurve 2610-48 switch. The connections to the ports must parallel the connections of the corresponding Branch Administration Switch. If a particular node uses port *N* on a Branch Administration Switch, its management console port must be connected to port *N* on the corresponding Branch Console Switch.

Figure 3-13 shows the ProCurve 2650 switch and Figure 3-13 shows the ProCurve 2610-48 switch. In each figure, white ports should not have connections, black ports can have connections, and ports with numbered callouts are used for a specific purpose, described after the figures.

Figure 3-13 ProCurve 2650 Branch Console Switch

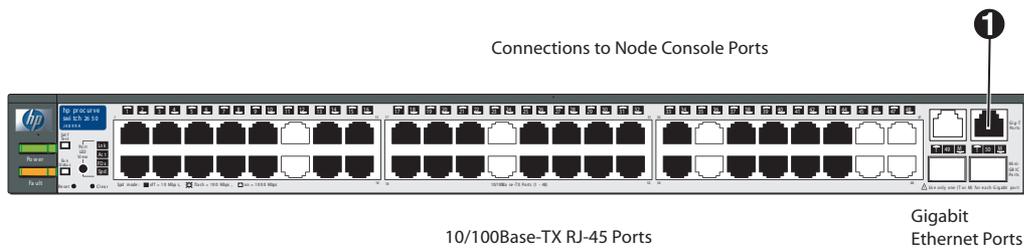
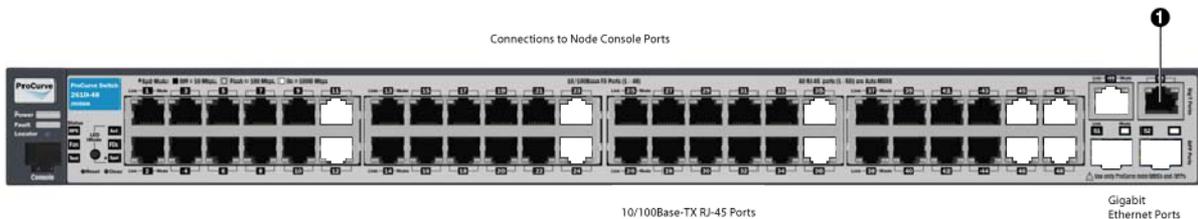


Figure 3-14 ProCurve 2610-48 Branch Console Switch



The callout in these figures enumerates the following:

1. Port 50 is the link to the Root Console Switch.

Allocate the ports on this switch for maximum performance, as follows:

- Ports 1–10, 13–22, 25–34, 37–44 are used for the console ports of individual nodes (up to 38 nodes).
- Ports 11, 12, 23, 24, 35, 36, 45–49 are unused

## 3.4 Interconnect Connections

The high-speed interconnect connects every node in the HP XC system. Each node can have an interconnect card installed in the highest speed PCI slot. Check the hardware documentation to determine which slot this is.

The interconnect switch console port (or monitoring line card) also connects to the Root Administration Switch either directly or indirectly, as described in “Root Administration Switch” (page 50).

You must determine the absolute maximum number of nodes that could possibly be used with the interconnect hardware that you have. This maximum number of ports on the interconnect switch or switches (*max-node*) affects the naming of the nodes in the system. The documentation that came with the interconnect hardware can help you find this number.



**NOTE:** You can choose a number smaller than the absolute maximum number of interconnect ports for *max-node*, but you can not expand the system to a size larger than this number in the future without completely rediscovering the system, thereby renumbering all nodes in the system.

This restriction does not apply to hardware configurations that contain HP server blades and enclosures.

Specific considerations for connections to the interconnect based on interconnect type are discussed in the following sections:

- “QsNet Interconnect Connections” (page 57)
- “Gigabit Ethernet Interconnect Connections” (page 57)
- “Administration Network Interconnect Connections” (page 57)
- “Myrinet Interconnect Connections” (page 58)
- “InfiniBand Interconnect Connections” (page 58)

The method for wiring the administration network and interconnect networks allows expansion of the system within the system's initial interconnect fabric without recabling of any existing nodes. If additional switch chassis or ports are added to the system as part of the expansion, some recabling may be necessary.

### 3.4.1 QsNet Interconnect Connections

For the QsNet<sup>II</sup> interconnect developed by Quadrics, it is important that nodes are connected to the Quadrics switch ports in a specific order. The order is affected by the order of the administration network and console network.

Because the Quadrics port numbers start numbering at 0, the highest port number on the Quadrics switch is port *max-node* minus 1, where *max-node* is the maximum number of nodes possible in the system. This is the port on the Quadrics switch to which the head node must be connected.

The head node in an HP XC system is always the node connected to the highest port number of any node on the Root Administration Switch and the Root Console Switch.



**NOTE:** The head node port is not the highest port number on the Root Administration Switch. Other higher port numbers are used to connect to other switches. If the Root Administration Switch is a ProCurve 2848 switch, the head node is connected to port number 42, as discussed in “Root Administration Switch” (page 50).

If the Root Administration Switch is a ProCurve 2824 switch, the head node is connected to port number 22 on that switch, as discussed in “Root Administration Switch” (page 50). The head node should, however, be connected to the highest port number on the interconnect switch.

The next node connected directly to the root switches (Administration and Console) should have connections to the Quadrics switch at the next highest port number on the Quadrics switch (*max-node* minus 2). All nodes connected to the Root Administration Switch will be connected to the next port in descending order.

Nodes attached to branch switches must be connected starting at the opposite end of the Quadrics switch. The node attached to the first port of the first Branch Administration Switch should be attached to the first port on the Quadrics switch (Port 0).

### 3.4.2 Gigabit Ethernet Interconnect Connections

The HP XC System Software is not concerned with the topology of the Gigabit Ethernet interconnect, but it makes sense to structure it in parallel with the administration network in order to make your connections easy to maintain.

Because the first logical Gigabit Ethernet port on each node is always used for connectivity to the administration network, there must be a second Gigabit Ethernet port on each node if you are using Gigabit Ethernet as the interconnect.

Depending upon the hardware model, the port can be built-in or can be an installed card. Any node with an external interface must also have a third Ethernet connection of any kind to communicate with external networks.

### 3.4.3 Administration Network Interconnect Connections

In cases where an additional Gigabit Ethernet port or switch may not be available, the HP XC System Software allows the interconnect to be configured on the administration network. When the interconnect is configured on the administration network, only a single LAN is used.

However, be aware that configuring the system in this way may negatively impact system performance.

To configure the interconnect on the administration network, you include the `--ic=AdminNet` option on the `discover` command line, which is documented in the *HP XC System Software Installation Guide*.

If you do not specify the `--ic=AdminNet` option, the `discover` command attempts to locate the highest speed interconnect on the system with the default being a Gigabit Ethernet network that is separate from the administration network.

### 3.4.4 Myrinet Interconnect Connections

The supported Myrinet interconnects do not have the ordering requirements of the Quadrics interconnect, but it makes sense to structure it in parallel with the other two networks in order to make the connections easy to maintain and service.

### 3.4.5 InfiniBand Interconnect Connections

The supported InfiniBand interconnects do not have the ordering requirements of the Quadrics interconnect, but it makes sense to structure it in parallel with the other two networks in order to make the connections easy to maintain and service.

If you use a dual-ported InfiniBand host channel adapter (HCA), you must connect the IB cable to the lowest-numbered port on the HCAs; it is labeled either `Port 1` or `P1`. This is necessary so that the OpenFabrics Enterprise Distribution (OFED) driver activates the IP interface called `ib0` instead of `ib1`.

# 4 Preparing Individual Nodes

This chapter describes how to prepare individual nodes in the HP XC hardware configuration. The following topics are addressed:

- “Firmware Requirements and Dependencies” (page 59)
- “Ethernet Port Connections on the Head Node” (page 61)
- “General Hardware Preparations for All Cluster Platforms” (page 61)
- “Setting the Onboard Administrator Password” (page 62)
- “Preparing the Hardware for CP3000 (Intel Xeon with EM64T) Systems” (page 63)
- “Preparing the Hardware for CP3000BL Systems” (page 84)
- “Preparing the Hardware for CP4000 (AMD Opteron) Systems” (page 87)
- “Preparing the Hardware for CP4000BL Systems” (page 119)
- “Preparing the Hardware for CP6000 (Intel Itanium) Systems” (page 122)
- “Preparing the Hardware for CP6000BL Systems” (page 136)

## 4.1 Firmware Requirements and Dependencies

Before installing the HP XC System Software, verify that all hardware components are installed with the minimum firmware versions listed in the master firmware list. You can find this list from the following Web page:

<http://docs.hp.com/en/linuxhpc.html>

Look in the associated hardware documentation for instructions about how to verify or upgrade the firmware for each component.

Table 4-1 lists the firmware dependencies of individual hardware components in an HP XC system.

**Table 4-1 Firmware Dependencies**

Hardware Component	Firmware Dependency
<b>CP3000</b>	
HP ProLiant DL140 G2	Lights-out 100i management (LO-100i), system BIOS
HP ProLiant DL140 G3	LO-100i, system BIOS
HP ProLiant DL160 G5	LO-100i, system BIOS
HP ProLiant DL360 G4	Integrated lights out (iLO), system BIOS
HP ProLiant DL360 G4p	iLO, system BIOS
HP ProLiant DL360 G5	iLO2, system BIOS
HP ProLiant DL380 G4	iLO, system BIOS
HP ProLiant DL380 G5	iLO2, system BIOS
HP ProLiant DL580 G4	iLO2, system BIOS
HP ProLiant DL580 G5	iLO2, system BIOS
<b>CP3000BL</b>	
HP ProLiant BL2x220c G5	iLO2, system BIOS, Onboard Administrator (OA)
HP ProLiant BL260c G5	iLO2, system BIOS, Onboard Administrator (OA)
HP ProLiant BL460c	iLO2, system BIOS, Onboard Administrator (OA)
HP ProLiant BL480c	iLO2, system BIOS, OA

**Table 4-1 Firmware Dependencies** *(continued)*

<b>Hardware Component</b>	<b>Firmware Dependency</b>
HP ProLiant BL680c G5	iLO2, system BIOS, Onboard Administrator (OA)
<b>CP4000</b>	
HP ProLiant DL145	LO-100i, system BIOS
HP ProLiant DL145 G2	LO-100i, system BIOS
HP ProLiant DL145 G3	LO-100i, system BIOS
HP ProLiant DL165 G5	LO-100i, system BIOS
HP ProLiant DL365	iLO2, system BIOS
HP ProLiant DL365 G5	iLO2, system BIOS
HP ProLiant DL385	iLO2, system BIOS
HP ProLiant DL385 G2	iLO2, system BIOS
HP ProLiant DL385 G5	iLO2, system BIOS
HP ProLiant DL585	iLO2, system BIOS
HP ProLiant DL585 G2	iLO2, system BIOS
HP ProLiant DL585 G5	iLO2, system BIOS
HP ProLiant DL785 G5	iLO2, system BIOS
<b>CP4000BL</b>	
HP ProLiant BL465c	iLO2, system BIOS, OA
HP ProLiant BL465c G5	iLO2, system BIOS, OA
HP ProLiant BL685c	iLO2, system BIOS, OA
HP ProLiant BL685c G5	iLO2, system BIOS, OA
<b>CP6000</b>	
HP Integrity rx1620	Management Processor (MP), BMC, Extensible Firmware Interface (EFI)
HP Integrity rx2600	MP, BMC, EFI, system
HP Integrity rx2620	MP, BMC, EFI, system
HP Integrity rx2660	MP, BMC, EFI, system
HP Integrity rx4640	MP, BMC, EFI, system
HP Integrity rx8620	MP, BMC, EFI, system
<b>CP6000BL</b>	
HP Integrity BL860c Server Blade (Full-height)	MP, OA
<b>Switches</b>	
ProCurve 2824 switch	Firmware version
ProCurve 2848 switch	Firmware version
ProCurve 2650 switch	Firmware version
ProCurve 2610 switch	Firmware version
ProCurve 2626 switch	Firmware version
<b>Interconnect</b>	

**Table 4-1 Firmware Dependencies** *(continued)*

Hardware Component	Firmware Dependency
Myrinet	Firmware version
Myrinet interface card	Interface card version
QsNet <sup>II</sup>	Firmware version
InfiniBand	Firmware version

## 4.2 Ethernet Port Connections on the Head Node

Table 4-2 lists the Ethernet port connections on the head node based on the type of interconnect in use. Use this information to determine the appropriate connections for the external network connection on the head node.



**IMPORTANT:** The Ethernet port connections listed in Table 4-2 do not apply to hardware configurations with HP server c-Class blades and enclosures.

**Table 4-2 Ethernet Ports on the Head Node**

Gigabit Ethernet Interconnect	All Other Interconnect Types
<ul style="list-style-type: none"> <li>Physical onboard Port #1 is always the connection to the administration network.</li> <li>Physical onboard Port #2 is the connection to the interconnect.</li> <li>Add-on NIC card #1 is available as an external connection.</li> </ul>	<ul style="list-style-type: none"> <li>Physical onboard Port #1 is always the connection to the administration network.</li> <li>Physical onboard Port #2 is available for an external connection if needed (except if the port is 10/100, then it is unused).</li> <li>Add-on NIC card #1 is available for an external connection if Port #2 is 10/100.</li> </ul>

## 4.3 General Hardware Preparations for All Cluster Platforms

Make the following hardware preparations on all cluster platform types if you have not already done so:

1. The connection of nodes to ProCurve switch ports is important for the automatic discovery process. Ensure that all nodes are connected as described in “Making Node and Switch Connections” (page 45).
2. When possible, ensure that switches are configured to obtain IP addresses using DHCP. For more information on how to do this, see the documents that came with the ProCurve hardware. ProCurve documents are also available at the following Web page:

<http://www.hp.com/go/hpprocurve>



**IMPORTANT:** Some HP Integrity hardware models must be configured with static addresses, not DHCP. For HP XC systems with one or more of these hardware models, you must configure all the nodes with static IP addresses rather than with DHCP. The automatic discovery process requires that all nodes be configured with DHCP or with static IP addresses, but not a combination of both methods.

3. Ensure that any nodes connected to a Lustre® file system server are on their own Gigabit Ethernet switch.
4. Ensure that all hardware components are running the correct firmware version and that all nodes in the system are at the same firmware version. See “Firmware Requirements and Dependencies” (page 59) for more information.
5. Nagios is a component of the HP XC system that monitors sensor data and system event logs. Ensure that the console port of the head node is connected to the external network so

that it is accessible to Nagios during system operation. For more information on Nagios, see the *HP XC System Software Administration Guide*.

6. Review the documentation that came with the hardware and have it available, if needed.
7. If your hardware configuration contains server blades and enclosures, proceed to “Setting the Onboard Administrator Password” (page 62).

Depending upon the type of cluster platform, proceed to one of the following sections to prepare individual nodes:

- “Preparing the Hardware for CP3000 (Intel Xeon with EM64T) Systems” (page 63)
- “Preparing the Hardware for CP4000 (AMD Opteron) Systems” (page 87)
- “Preparing the Hardware for CP6000 (Intel Itanium) Systems” (page 122)

## 4.4 Setting the Onboard Administrator Password

If the hardware configuration contains server blades and enclosures, you must define and set the user name and password for the Onboard Administrator on every enclosure in the hardware configuration.



**IMPORTANT:** You cannot set the Onboard Administrator password until the head node is installed and the switches are discovered. For more information on installing the head node and discovering switches, see the *HP XC System Software Installation Guide*.

The Onboard Administrator user name and password must match the user name and password you plan to use for the iLO2 console management devices. The default user name is `Administrator`, and HP recommends that you delete the predefined `Administrator` user for security purposes.

If you are using the default user name `Administrator`, set the password to be the same as the iLO2. If you create a new user name and password for the iLO2 devices, you must make the same settings on all Onboard Administrators.

Follow this procedure to configure a common password for each active Onboard Administrator:

1. Use a network cable to plug in your PC or laptop to the administration network ProCurve switch.
2. Make sure the laptop or PC is set for a DHCP network.
3. Gather the following information:
  - a. Look at the Insight Display panel on each enclosure, and record the IP address of the Onboard Administrator.
  - b. Look at the tag affixed to each enclosure, and record the default Onboard Administrator password shown on the tag.
4. On your PC or laptop, use the information gathered in the previous step to browse to the Onboard Administrator for every enclosure, and set a common user name and password for each one. This password must match the administrator password you will later set on the ProCurve switches. Do not use any special characters as part of the password.

After you set the Onboard Administrator password, prepare the nodes as described in the appropriate section for all the server blade nodes in the enclosure:

- “Preparing the Hardware for CP3000BL Systems” (page 84)
- “Preparing the Hardware for CP4000BL Systems” (page 119)
- “Preparing the Hardware for CP6000BL Systems” (page 136)

## 4.5 Preparing the Hardware for CP3000 (Intel Xeon with EM64T) Systems

Follow the procedures in this section to prepare each node before installing and configuring the HP XC System Software. Proceed to the following sections, depending on the hardware model:

- “Preparing HP ProLiant DL140 G2 and G3 Nodes” (page 63)
- “Preparing HP ProLiant DL160 G5 Nodes” (page 66)
- “Preparing HP ProLiant DL360 G4 Nodes” (page 68)
- “Preparing HP ProLiant DL360 G5 Nodes” (page 70)
- “Preparing HP ProLiant DL380 G4 and G5 Nodes” (page 72)
- “Preparing HP ProLiant DL580 G4 Nodes” (page 75)
- “Preparing HP ProLiant DL580 G5 Nodes” (page 78)
- “Preparing HP xw8200 and xw8400 Workstations” (page 80)
- “Preparing HP xw8600 Workstations” (page 82)

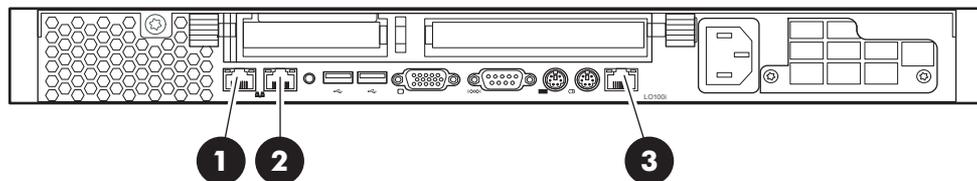
### 4.5.1 Preparing HP ProLiant DL140 G2 and G3 Nodes

Use the BIOS Setup Utility to configure the appropriate settings for an HP XC system on HP ProLiant DL140 G2 and DL140 G3 servers.

For these hardware models you cannot set or modify the default console port password through the BIOS Setup Utility, as you can for other hardware models. The *HP XC System Software Installation Guide* describes how to modify the console port password. You are instructed to perform the task just after the `discover` command discovers the IP addresses of the console ports.

Figure 4-1 shows the rear view of the HP ProLiant DL140 G2 server and the appropriate port assignments for an HP XC system.

**Figure 4-1 HP ProLiant DL140 G2 and DL140 G3 Server Rear View**



HPTC-0144

The callouts in the figure enumerate the following:

1. This port is used for the connection to the Administration Switch (branch or root). On the back of the node, this port is marked with the number 1 (NIC1).
2. If a Gigabit Ethernet (GigE) interconnect is configured, this port is used for the interconnect connection. Otherwise, it is used for an external connection. On the back of the node, this port is marked with the number 2 (NIC2).
3. This port is used for the connection to the Console Switch. On the back of the node, this port is marked with L0100i.

#### Setup Procedure

Perform the following procedure for each HP ProLiant DL140 G2 and DL140 G3 node in the hardware configuration. Change only the values described in this procedure; do not change any other factory-set values unless you are instructed to do so. Follow all steps in the sequence shown:

1. Use the instructions in the accompanying HP ProLiant hardware documentation to connect a monitor, mouse, and keyboard to the node.

- Turn on power to the node. Watch the screen carefully during the power-on, self-test, and press the **F10** key when prompted to access the BIOS Setup Utility. The Lights-Out 100i (LO-100i) console management device is configured through the BIOS Setup Utility.

The BIOS Setup Utility displays the following information about the node:

```

BIOS ROM ID:
BIOS Version:
BIOS Build Date:

```

Record this information for future reference.

- For each node, make the following BIOS settings from the **Main** window. The settings differ depending upon the generation of hardware model:
  - BIOS settings for HP ProLiant DL140 G2 nodes are listed in Table 4-3.
  - BIOS settings for HP ProLiant DL140 G3 nodes are listed in Table 4-4.

**Table 4-3 BIOS Settings for HP ProLiant DL140 G2 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value	
<b>Main</b>	<b>Boot Features</b>	<b>Numlock</b>	<b>Disabled</b>	
<b>Advanced</b>	<b>PCI Device Configuration/Ethernet on Board (for Ethernet 1,2)</b>	<b>Device</b>	<b>Enabled</b>	
		<b>Option ROM Scan</b>	<b>Enabled</b>	
		<b>Latency Timer</b>	<b>40h</b>	
	<b>Advanced Processor Options</b>	<b>Hyperthreading</b>	<b>Disabled</b>	
	<b>I/O Device Configuration</b>	<b>Serial Port</b>	<b>BMC COM Port</b>	
		<b>SIO COM Port</b>	<b>Disabled</b>	
		<b>Mouse controller</b>	<b>Auto Detect</b>	
		<b>Console Redirection</b>	<b>Console Redirection</b>	<b>Enabled</b>
		<b>EMS Console</b>	<b>Enabled</b>	
	<b>IPMI/LAN Setting</b>	<b>Baud Rate</b>	<b>115.2K</b>	
		<b>Flow Control</b>	<b>None</b>	
		<b>Redirection After BIOS Post</b>	<b>On</b>	
		<b>IP Address Assignment</b>	<b>DHCP</b>	
		<b>BMC Telnet Service</b>	<b>Enabled</b>	
		<b>BMC Ping Response</b>	<b>Enabled</b>	
		<b>BMC HTTP Service</b>	<b>Enabled</b>	
	<b>Power</b>		<b>Wake On Modem Ring</b>	<b>Disabled</b>

**Table 4-3 BIOS Settings for HP ProLiant DL140 G2 Nodes** *(continued)*

Menu Name	Submenu Name	Option Name	Set to This Value
		Wake On LAN	Disabled
<b>Boot</b>			<p>Set the following boot order on <b>all nodes except the head node</b>:</p> <ol style="list-style-type: none"> <li>1. CD-ROM</li> <li>2. Removable Devices</li> <li>3. PXE MBA V7.7.2 Slot 0200</li> <li>4. Hard Drive</li> <li>5. ! PXE MBA V7.7.2 Slot 0300 (! means disabled)</li> </ol> <p>Set the following boot order on the <b>head node</b>:</p> <ol style="list-style-type: none"> <li>1. CD-ROM</li> <li>2. Removable Devices</li> <li>3. Hard Drive</li> <li>4. PXE MBA v7.7.2 SLot 0200</li> <li>5. PXE MBA v7.7.2 SSlot 0300</li> </ol>

Table 4-4 lists the BIOS settings for HP ProLiant DL140 G3 nodes.

**Table 4-4 BIOS Settings for HP ProLiant DL140 G3 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
<b>Main</b>	<b>Boot Features</b>	<b>Numlock</b>	Disabled
<b>Advanced</b>		<b>8042 Emulation Support</b>	Disabled
	<b>I/O Device Configuration</b>	<b>Serial Port</b>	BMC
	<b>Console Redirection</b>	<b>Console Redirection</b>	Enabled
		<b>EMS Console</b>	Enabled
		<b>Baud Rate</b>	115.2K
		<b>Continue C.R. after POST</b>	Enabled
	<b>IPMI/LAN Settings</b>	<b>IP Address Assignment</b>	DHCP
		<b>BMC Telnet Service</b>	Enabled
		<b>BMC Ping Response</b>	Enabled
		<b>BMC HTTP Service</b>	Enabled
		<b>BMC HTTPS Service</b>	Enabled
<b>Boot</b>			<p>Set the following boot order <b>on the head node</b>:</p> <ol style="list-style-type: none"> <li>1. CD-ROM</li> <li>2. Removable Devices</li> <li>3. Hard Drive</li> <li>4. Embedded NIC1</li> <li>5. Embedded NIC2</li> </ol>

**Table 4-4 BIOS Settings for HP ProLiant DL140 G3 Nodes** *(continued)*

Menu Name	Submenu Name	Option Name	Set to This Value
			Set the following boot order on <b>all nodes except the head node</b> :
			1. CD-ROM
			2. Removable Devices
			3. Embedded NIC1
			4. Hard Drive
			5. Embedded NIC2
		<b>Embedded NIC1 PXE</b>	<b>Enabled</b>
		<b>Embedded NIC2 PXE</b>	<b>Disabled</b>
<b>Power</b>		<b>Resume On Modem Ring</b>	<b>Off</b>
		<b>Wake On LAN</b>	<b>Disabled</b>

- From the **Main** window, select **Exit**→**Save Changes and Exit** to exit the utility.
- If the DL140 G3 node uses SATA disks, you must disable the parallel ATA option; otherwise, the disk might not be recognized and imaged.

Use the following menus to disable this option:

BIOS Menu Name	Submenu Name	Option Name	Set to This Value
<b>Advanced</b>	<b>Advanced Chipset Control</b>	<b>Parallel ATA</b>	<b>Disabled</b>

- Repeat this procedure for each HP ProLiant DL140 G2 and G3 node in the HP XC system.

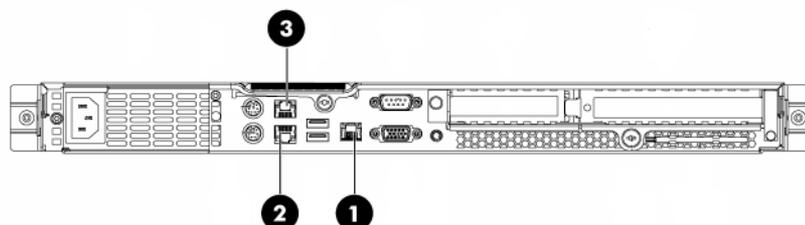
## 4.5.2 Preparing HP ProLiant DL160 G5 Nodes

Use the BIOS Setup Utility to configure the appropriate settings for an HP XC system on HP ProLiant DL160 G5 servers.

For this hardware model, you cannot set or modify the default console port password through the BIOS Setup Utility, as you can for other hardware models. The *HP XC System Software Installation Guide* describes how to modify the console port password. You are instructed to perform the task just after the `discover` command discovers the IP addresses of the console ports.

Figure 4-2 shows the rear view of the HP ProLiant DL160 G5 server and the appropriate port assignments for an HP XC system.

**Figure 4-2 HP ProLiant DL160 G5 Server Rear View**



The callouts in the figure enumerate the following:

1. This port is used for the connection to the Console Switch. On the back of the node, this port is marked with LO100i.
2. This port is used for the connection to the Administration Switch (branch or root). On the back of the node, this port is marked with the number 1 (NIC1).
3. If a Gigabit Ethernet (GigE) interconnect is configured, this port is used for the interconnect connection. Otherwise, it is used for an external connection. On the back of the node, this port is marked with the number 2 (NIC2).

### Setup Procedure

Perform the following procedure for each HP ProLiant DL160 G5 node in the hardware configuration. Change only the values described in this procedure; do not change any other factory-set values unless you are instructed to do so. Follow all steps in the sequence shown:

1. Use the instructions in the accompanying HP ProLiant hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on, self-test, and press the **F10** key when prompted to access the BIOS Setup Utility. The Lights-Out 100i (LO-100i) console management device is configured through the BIOS Setup Utility.

The BIOS Setup Utility displays the following information about the node:

```
BIOS ROM ID:
BIOS Version:
BIOS Build Date:
```

Record this information for future reference.

3. For each node, make the following BIOS settings from the **Main** window. The BIOS settings for HP ProLiant DL160 G5 nodes are listed in Table 4-5.

**Table 4-5 BIOS Settings for HP ProLiant DL160 G5 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
<b>Main</b>	<b>Boot Features</b>	<b>Numlock</b>	<b>Disabled</b>
<b>Advanced</b>		<b>8042 Emulation Support</b>	<b>Disabled</b>
	<b>Remote Access Configuration</b>	<b>Remote Access</b>	<b>Enabled</b>
		<b>EMS Support (SPCR)</b>	<b>Enabled</b>
		<b>Serial Port Mode</b>	<b>11520 8,n,1</b>
		<b>Redirection after BIOS POST</b>	<b>Always</b>
		<b>Terminal Type</b>	<b>VT100</b>
	<b>IPMI Configuration</b>	<b>LAN Configuration</b>	
		<b>Share NIC Mode</b>	<b>Disabled</b>
		<b>DHCP IP Source</b>	<b>Enabled</b>
<b>Boot</b>	<b>Boot Device Priority</b>	<b>1st Boot Device</b>	If this node is the head node, set this value to: <b>Hard Drive</b> For all other nodes, set this value to: <b>Embedded NIC1</b>

**Table 4-5 BIOS Settings for HP ProLiant DL160 G5 Nodes** (continued)

Menu Name	Submenu Name	Option Name	Set to This Value
		<b>2nd Boot Device</b>	If this node is the head node, set this value to: <b>Embedded NIC1</b> Otherwise, set this value to: <b>Hard Drive</b>
		<b>Embedded NIC1 PXE</b>	<b>Enabled</b>
		<b>Embedded NIC2 PXE</b>	<b>Disabled</b>

4. From the **Main** window, select **Exit**→**Save Changes and Exit** to exit the utility.
5. Repeat this procedure for each HP ProLiant DL160 G5 node in the HP XC system.

### 4.5.3 Preparing HP ProLiant DL360 G4 Nodes

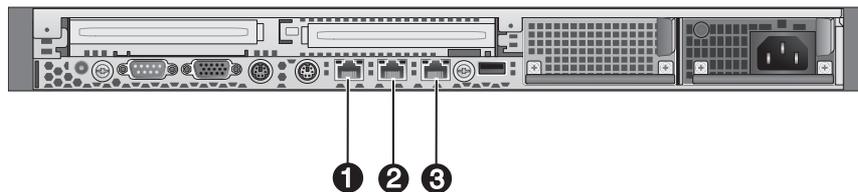
Use the following tools to configure the appropriate settings for HP ProLiant DL360 G4 (including DL360 G4p) servers:

- Integrated Lights Out (iLO) Setup Utility
- ROM-Based Setup Utility (RBSU)

HP ProLiant DL360 G4 servers use the iLO utility; thus, they need certain settings that you cannot make until the iLO has an IP address. The *HP XC System Software Installation Guide* provides instructions for using a browser to connect to the iLO to enable telnet access.

Figure 4-3 shows a rear view of the HP ProLiant DL360 G4 server and the appropriate port assignments for an HP XC system.

**Figure 4-3 HP ProLiant DL360 G4 Server Rear View**



The callouts in the figure enumerate the following:

1. The iLO Ethernet is the port used as the connection to the Console Switch.
2. NIC1 is used for the connection to the Administration Switch (branch or root).
3. NIC2 is used for the external connection.

#### Setup Procedure

Perform the following procedure from the iLO Setup Utility for each HP ProLiant DL360 G4 node in the HP XC system:

1. Use the instructions in the accompanying HP ProLiant hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F8** key when prompted to access the Integrated Lights Out Setup Utility.
3. For each node, make the iLO settings listed in Table 4-6.
4. Select **File**→**Exit** to exit the Integrated Lights Out Setup Utility and resume the power-on self-test.

5. Watch the screen carefully, and press the **F9** key when prompted to access the ROM-Based Setup Utility (RBSU).

**Table 4-6 iLO Settings for HP ProLiant DL360 G4 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
<b>User</b>		<b>Add</b>	Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.  The user Administrator is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the Administrator user.  You must use this user name and password to access the console port.
<b>Network</b>	<b>DNS/DHCP</b>	<b>DHCP Enable</b>	<b>On</b>
<b>Settings</b>	<b>CLI</b>	<b>Serial CLI Speed (bits/seconds)</b>	115200 (Press the <b>F10</b> key to save the setting.)

Perform the following procedure from the RBSU for each node in the hardware configuration:

1. Make the following settings from the **Main** menu.

BIOS settings for HP ProLiant DL360 G4 nodes are listed in Table 4-7.

**Table 4-7 BIOS Settings for HP ProLiant DL360 G4 Nodes**

Menu Name	Option Name	Set to This Value
<b>Standard Boot Order IPL</b>		Set the following boot order on <b>all nodes except the head node</b> ; CD-ROM does not have to be first in the list, but it must be listed before the hard disk:  <ol style="list-style-type: none"> <li>1. <b>CD-ROM</b></li> <li>2. <b>NIC1</b></li> <li>3. <b>Hard Disk</b></li> </ol> On the <b>head node</b> , set the boot order so that the CD-ROM is listed before the hard disk.
<b>Advanced Options</b>	<b>Processor Hyper_threading</b>	<b>Disable</b>
<b>System Options</b>	<b>Embedded Serial Port</b>	<b>COM2</b>
	<b>Virtual Serial Port</b>	<b>COM1</b>  Press the <b>Esc</b> key to return to the main menu.
<b>BIOS Serial Console &amp; EMS</b>	<b>BIOS Serial Console Port</b>	<b>COM1</b>
	<b>BIOS Serial Console Baud Rate</b>	<b>115200</b>
	<b>EMS Console</b>	<b>Disable</b>
	<b>BIOS Interface Mode</b>	<b>Command-Line</b>  Press the <b>Esc</b> key to return to the main menu.

2. Press the **Esc** key to exit the RBSU. Press the **F10** key to confirm your choice and restart the boot sequence.
3. Repeat this procedure for each HP ProLiant DL360 G4 node in the HP XC system.

## Configuring Smart Arrays

On the HP ProLiant DL360 G4 with smart array cards, you must add the disks to the smart array before attempting to image the node.

To do so, watch the screen carefully during the power-on self-test phase of the node, and press the **F8** key when prompted to configure the disks into the smart array.

Specific instructions are outside the scope of the HP XC documentation. See the documentation that came with the HP ProLiant server for more information.

## 4.5.4 Preparing HP ProLiant DL360 G5 Nodes

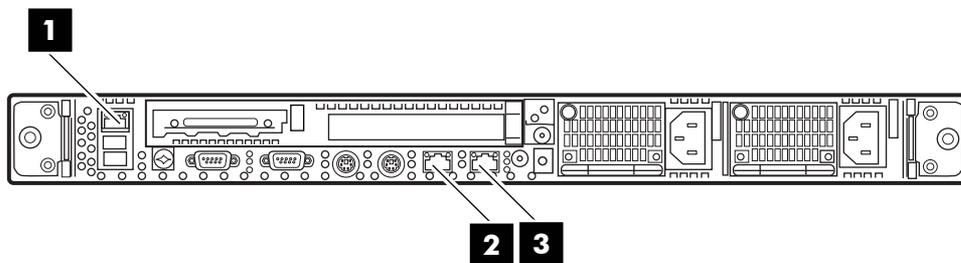
Use the following tools to configure the appropriate settings for HP ProLiant DL360 G5 servers:

- Integrated Lights Out (iLO) Setup Utility
- ROM-Based Setup Utility (RBSU)

HP ProLiant DL360 G5 servers use the iLO utility; thus, they need certain settings that you cannot make until the iLO has an IP address. The *HP XC System Software Installation Guide* provides instructions for using a browser to connect to the iLO to enable `telnet` access.

Figure 4-4 shows a rear view of the HP ProLiant DL360 G5 server and the appropriate port assignments for an HP XC system.

**Figure 4-4 HP ProLiant DL360 G5 Server Rear View**



The callouts in the figure enumerate the following:

1. This port is used for the connection to the Console Switch.
2. This port, NIC1, is used for the connection to the Administration Switch (branch or root).
3. The second onboard NIC is used for the Gigabit Ethernet interconnect or for the connection to the external network.

### Setup Procedure

Perform the following procedure from the iLO Setup Utility for each HP ProLiant DL360 G5 node in the HP XC system:

1. Use the instructions in the accompanying HP ProLiant hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F8** key when prompted to access the Integrated Lights Out Setup Utility.
3. For each node, make the iLO settings listed in Table 4-8.
4. Select **File**→**Exit** to exit the Integrated Lights Out Setup Utility and resume the power-on self-test.
5. Watch the screen carefully, and press the **F9** key when prompted to access the ROM-Based Setup Utility (RBSU).

**Table 4-8 iLO Settings for HP ProLiant DL360 G5 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
<b>User</b>		<b>Add</b>	<p>Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.</p> <p>The user <code>Administrator</code> is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the <code>Administrator</code> user.</p> <p>You must use this user name and password to access the console port.</p>
<b>Network</b>	<b>DNS/DHCP</b>	<b>DHCP Enable</b>	<b>On</b>
<b>Settings</b>	<b>CLI</b>	<b>Serial CLI Speed (bits/seconds)</b>	<b>115200</b> (Press the <b>F10</b> key to save the setting.)

Perform the following procedure from the RBSU for each node in the hardware configuration:

1. Make the following settings from the **Main** menu. Table 4-9 lists the BIOS settings for HP ProLiant DL360 G5 Nodes.

**Table 4-9 BIOS Settings for HP ProLiant DL360 G5 Nodes**

Menu Name	Option Name	Set to This Value
<b>System Options</b>	<b>Embedded Serial Port</b>	<b>COM2; IRQ3; IO: 2F8h - 2FFh</b>
	<b>Virtual Serial Port</b>	<b>COM1; IRQ4; IO: 3F8h - 3FFh</b>
<b>Standard Boot Order IPL</b>		<p>Set the following boot order on <b>all nodes except the head node</b>; CD-ROM does not have to be first in the list, but it must be listed before the hard disk:</p> <ol style="list-style-type: none"> <li>1. <b>CD-ROM</b></li> <li>2. <b>Floppy Drive (A:)</b></li> <li>3. <b>USB DriveKey (C:)</b></li> <li>4. <b>PCI Embedded HP NC373i Multifunction Gigabit Adapter</b></li> <li>5. <b>Hard Drive C: (see Boot Controller Order)</b></li> </ol> <p>On the <b>head node</b>, set the boot order so that the CD-ROM is listed before the hard disk.</p>
<b>BIOS Serial Console &amp; EMS</b>	<b>BIOS Serial Console Port</b>	<b>COM1; IRQ4; IO: 3F8h - 3FFh</b>
	<b>BIOS Serial Console Baud Rate</b>	<b>115200</b>
	<b>EMS Console</b>	<b>Disabled</b>
	<b>BIOS Interface Mode</b>	<b>Command-Line</b>
		Press the <b>Esc</b> key to return to the main menu.

2. Press the **Esc** key to exit the RBSU. Press the **F10** key to confirm your choice and restart the boot sequence.
3. Repeat this procedure for each HP ProLiant DL360 G5 node in the HP XC system.

## Configuring Smart Arrays

On the HP ProLiant DL360 G5 nodes with smart array cards, you must add the disks to the smart array before attempting to image the node.

To do so, watch the screen carefully during the power-on self-test phase of the node, and press the **F8** key when prompted to configure the disks into the smart array.

Specific instructions are outside the scope of the HP XC documentation. See the documentation that came with the HP ProLiant server for more information.

## 4.5.5 Preparing HP ProLiant DL380 G4 and G5 Nodes

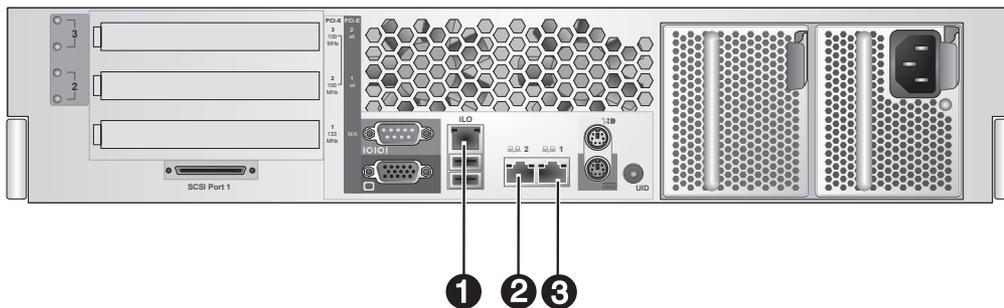
Use the following tools to configure the appropriate settings on HP ProLiant DL380 G4 and G5 servers:

- Integrated Lights Out (iLO) Setup Utility
- ROM-Based Setup Utility (RBSU)

HP ProLiant DL380 G4 and G5 servers use the iLO utility; thus, they need certain settings that you cannot make until the iLO has an IP address. The *HP XC System Software Installation Guide* provides instructions for using a browser to connect to the iLO to enable `telnet` access.

Figure 4-5 shows a rear view of the HP ProLiant DL380 G4 server and the appropriate port assignments for an HP XC system.

**Figure 4-5 HP ProLiant DL380 G4 Server Rear View**

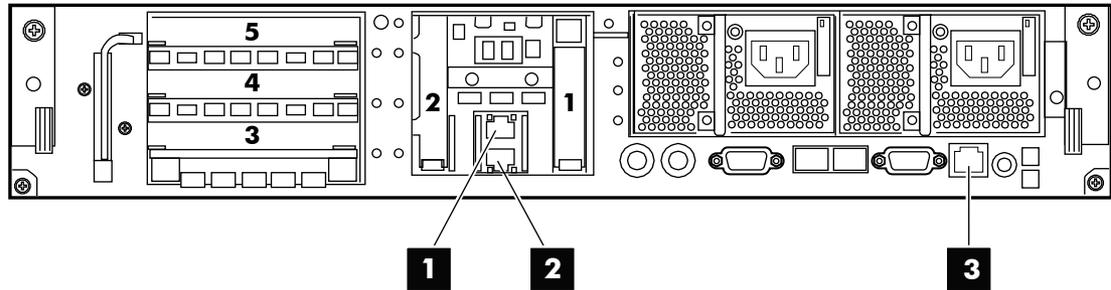


The callouts in the figure enumerate the following:

1. The iLO Ethernet port is used for the connection to the Console Switch.
2. NIC2 is used for the connection to the external network.
3. NIC1 is used for the connection to the Administration Switch (branch or root).

Figure 4-6 shows a rear view of the HP ProLiant DL380 G5 server and the appropriate port assignments for an HP XC system.

Figure 4-6 HP ProLiant DL380 G5 Server Rear View



The callouts in the figure enumerate the following:

1. This port is used for the connection to the external network.
2. This port is used for the connection to the Administration Switch (branch or root).
3. The iLO Ethernet port is used for the connection to the Console Switch.

### Setup Procedure

Perform the following procedure from the iLO Setup Utility for each HP ProLiant DL380 node in the HP XC system:

1. Use the instructions in the accompanying HP ProLiant hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F8** key when prompted to access the Integrated Lights Out Setup Utility.
3. Make the iLO settings listed in Table 4-10 for each node in the hardware configuration.

Table 4-10 iLO Settings for HP ProLiant DL380 G4 and G5 Nodes

Name	Menu Name	Submenu Name	Option Name	Set to This Value
Administration	User		New	Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.  The user Administrator is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the Administrator user.  You must use this user name and password to access the console port.
	Network	DNS/DHCP	DHCP Enable	On
	Settings	CLI	Serial CLI Speed (bits/seconds)	115200 (Press the <b>F10</b> key to save the setting.)

4. Select **File**→**Exit** to exit the Integrated Lights Out Setup Utility and resume the power-on self-test.
5. Watch the screen carefully, and press the **F9** key when prompted to access the ROM-Based Setup Utility (RBSU).

Perform the following procedure from the RBSU for each HP ProLiant DL380 node in the HP XC system:

1. Make the following settings from the **Main** menu. The BIOS settings differ depending upon the hardware model generation:
  - BIOS settings for HP ProLiant DL380 G4 nodes are listed in Table 4-11 .
  - BIOS settings for HP ProLiant DL380 G5 nodes are listed in Table 4-12.

**Table 4-11 BIOS Settings for HP ProLiant DL380 G4 Nodes**

Menu Name	Option Name	Set to This Value
<b>Standard Boot Order IPL</b>		<p>Set the following boot order on <b>all nodes except the head node</b>; CD-ROM does not have to be first in the list, but it must be listed before the hard disk:</p> <ol style="list-style-type: none"> <li>1. CD-ROM</li> <li>2. NIC1</li> <li>3. Hard Disk</li> </ol> <p>On the <b>head node</b>, set the boot order so that the CD-ROM is listed before the hard disk.</p>
<b>Advanced Options</b>	<b>Processor Hyper_threading</b>	<b>Disable</b>
<b>System Options</b>	<b>Embedded Serial Port</b>	<b>COM2</b>
	<b>Virtual Serial Port</b>	<b>COM1</b> Press the <b>Esc</b> key to return to the main menu.
<b>BIOS Serial Console &amp; EMS</b>	<b>BIOS Serial Console Port</b>	<b>COM1</b>
	<b>BIOS Serial Console Baud Rate</b>	<b>115200</b>
	<b>EMS Console</b>	<b>Disable</b>
	<b>BIOS Interface Mode</b>	<b>Command-Line</b> Press the <b>Esc</b> key to return to the main menu.

Table 4-12 lists the BIOS settings for HP ProLiant DL380 G5 BIOS nodes.

**Table 4-12 BIOS Settings for HP ProLiant DL380 G5 Nodes**

Menu Name	Option Name	Set to This Value
<b>System Options</b>	<b>Virtual Serial Port</b>	<b>COM1; IRQ4; IO: 3F8h - 3FFh</b> Press the <b>Esc</b> key to return to the main menu.
	<b>Embedded Serial Port</b>	<b>COM2; IRQ3; IO: 2F8h - 2FFh</b>
<b>Standard Boot Order IPL</b>		<p>Set the following boot order on <b>all nodes except the head node</b>; CD-ROM does not have to be first in the list, but it must be listed before the hard disk:</p> <ol style="list-style-type: none"> <li>1. CD-ROM</li> <li>2. Floppy Drive (A:)</li> <li>3. USB DriveKey (C:)</li> <li>4. PCI Embedded HP NC373i Multifunction Gigabit Adapter</li> <li>5. Hard Disk C: (see Boot Controller Order)</li> </ol> <p>On the <b>head node</b>, set the boot order so that the CD-ROM is listed before the hard disk.</p>

**Table 4-12 BIOS Settings for HP ProLiant DL380 G5 Nodes** *(continued)*

Menu Name	Option Name	Set to This Value
Advanced Options	Processor Hyper_threading	Disable
BIOS Serial Console & EMS	BIOS Serial Console Port	COM1; IRQ4; IO: 3F8h - 3FFh
	BIOS Serial Console Baud Rate	115200
	EMS Console	Disabled
	BIOS Interface Mode	Command-Line Press the <b>Esc</b> key to return to the main menu.

2. Press the **Esc** key to exit the RBSU. Press the **F10** key to confirm your choice and restart the boot sequence.
3. Repeat this procedure for each HP ProLiant DL380 G4 and G5 node in the hardware configuration.

### Configuring Smart Arrays

On such hardware models as the HP ProLiant DL380 with smart array cards, you must add the disks to the smart array before attempting to image the node.

To do so, watch the screen carefully during the power-on self-test phase of the node, and press the **F8** key when prompted to configure the disks into the smart array.

Specific instructions are outside the scope of the HP XC documentation. See the documentation that came with the HP ProLiant server for more information.

## 4.5.6 Preparing HP ProLiant DL580 G4 Nodes

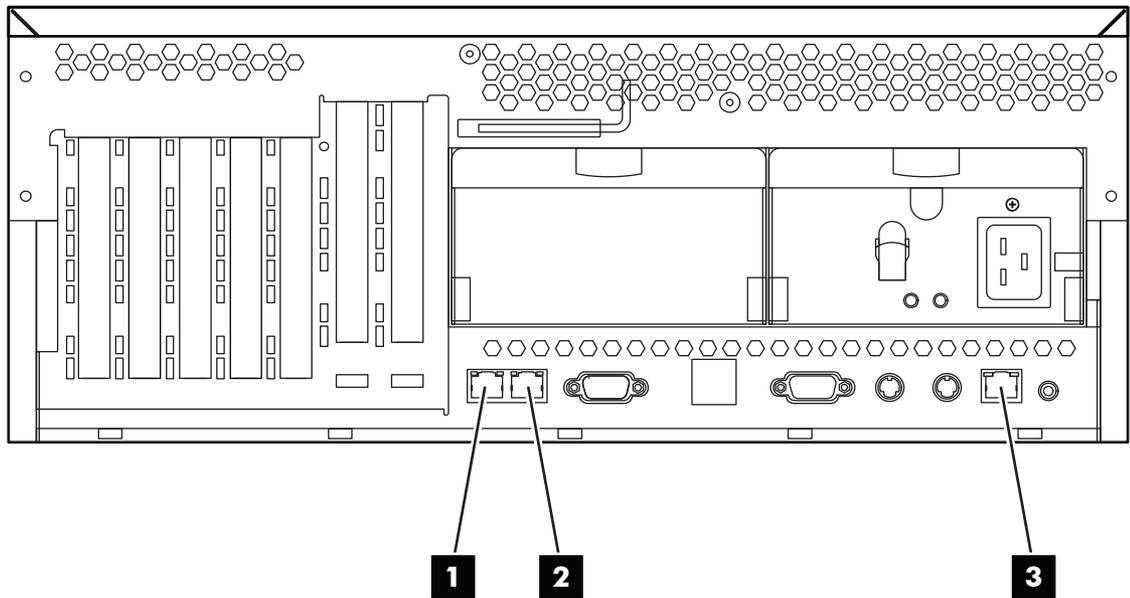
Use the following tools to configure the appropriate settings on HP ProLiant DL580 G4 servers:

- Integrated Lights Out (iLO) Setup Utility
- ROM-Based Setup Utility (RBSU)

HP ProLiant DL580 G4 servers use the iLO utility; thus, they need certain settings that you cannot make until the iLO has an IP address. The *HP XC System Software Installation Guide* provides instructions for using a browser to connect to the iLO to enable telnet access.

Figure 4-7 shows a rear view of the HP ProLiant DL580 G4 server and the appropriate port assignments for an HP XC system.

Figure 4-7 HP ProLiant DL580 G4 Server Rear View



The callouts in the figure enumerate the following:

1. NIC1 is used for the connection to the Administration Switch (branch or root).
2. NIC2 is used for the connection to the external network.
3. The iLO Ethernet port is used for the connection to the Console Switch.

#### Setup Procedure

Perform the following procedure from the iLO Setup Utility for each HP ProLiant DL580 G4 node in the HP XC system:

1. Use the instructions in the accompanying HP ProLiant hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F8** key when prompted to access the Integrated Lights Out Setup Utility.
3. Make the iLO settings listed in Table 4-13 for each node in the hardware configuration.

**Table 4-13 iLO Settings for HP ProLiant DL580 G4 Nodes**

Name	Menu Name	Submenu Name	Option Name	Set to This Value
Administration	User		New	<p>Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.</p> <p>The user Administrator is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the Administrator user.</p> <p>You must use this user name and password to access the console port.</p>
	Network	DNS/DHCP	DHCP Enable	On
	Settings	CLI	Serial CLI Speed (bits/seconds)	115200 (Press the <b>F10</b> key to save the setting.)

4. Select **File**→**Exit** to exit the Integrated Lights Out Setup Utility and resume the power-on self-test.
5. Watch the screen carefully, and press the **F9** key when prompted to access the ROM-Based Setup Utility (RBSU).

Perform the following procedure from the RBSU for each HP ProLiant DL580 G4 node in the HP XC system:

1. Make the following settings from the **Main** menu. The BIOS settings for HP ProLiant DL580 G4 nodes are listed in Table 4-14.

**Table 4-14 BIOS Settings for HP ProLiant DL580 G4 Nodes**

Menu Name	Option Name	Set to This Value
<b>Standard Boot Order IPL</b>		Set the following boot order on <b>all nodes except the head node</b> ; CD-ROM does not have to be first in the list, but it must be listed before the hard disk: <ol style="list-style-type: none"> <li>1. <b>CD-ROM</b></li> <li>2. <b>NIC1</b></li> <li>3. <b>Hard Disk</b></li> </ol> On the <b>head node</b> , set the boot order so that the CD-ROM is listed before the hard disk.
<b>Advanced Options</b>	<b>Processor Hyper_threading</b>	<b>Disable</b>
<b>System Options</b>	<b>Embedded Serial Port</b>	<b>COM2</b>
	<b>Virtual Serial Port</b>	<b>COM1</b> Press the <b>Esc</b> key to return to the main menu.
<b>BIOS Serial Console &amp; EMS</b>	<b>BIOS Serial Console Port</b>	<b>COM1</b>
	<b>BIOS Serial Console Baud Rate</b>	<b>115200</b>
	<b>EMS Console</b>	<b>Disable</b>
	<b>BIOS Interface Mode</b>	<b>Command-Line</b> Press the <b>Esc</b> key to return to the main menu.

2. Press the **Esc** key to exit the RBSU. Press the **F10** key to confirm your choice and restart the boot sequence.
3. Repeat this procedure for each HP ProLiant DL580 G4 node in the hardware configuration.

### Configuring Smart Arrays

On such hardware models as the HP ProLiant DL580 G4 with smart array cards, you must add the disks to the smart array before attempting to image the node.

To do so, watch the screen carefully during the power-on self-test phase of the node, and press the **F8** key when prompted to configure the disks into the smart array.

Specific instructions are outside the scope of the HP XC documentation. See the documentation that came with the HP ProLiant server for more information.

## 4.5.7 Preparing HP ProLiant DL580 G5 Nodes

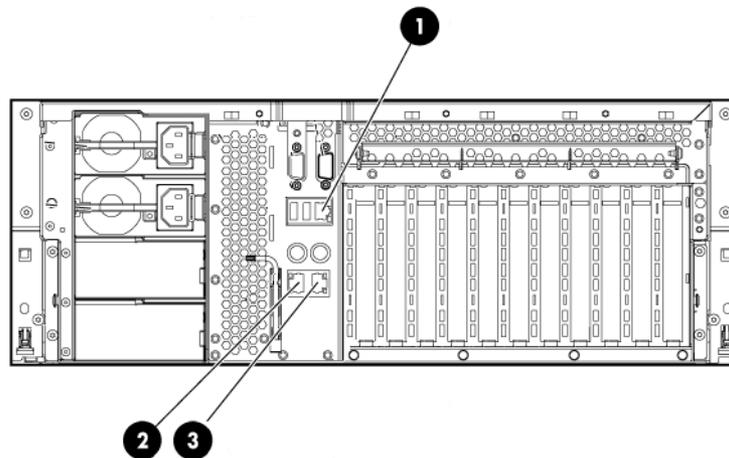
Use the following tools to configure the appropriate settings on HP ProLiant DL580 G5 servers:

- Integrated Lights Out (iLO) Setup Utility
- ROM-Based Setup Utility (RBSU)

HP ProLiant DL580 G5 servers use the iLO utility; thus, they need certain settings that you cannot make until the iLO has an IP address. The *HP XC System Software Installation Guide* provides instructions for using a browser to connect to the iLO to enable telnet access.

Figure 4-8 shows a rear view of the HP ProLiant DL580 G5 server and the appropriate port assignments for an HP XC system.

Figure 4-8 HP ProLiant DL580 G5 Server Rear View



The callouts in the figure enumerate the following:

1. The iLO Ethernet port is used for the connection to the Console Switch.
2. NIC1 is used for the connection to the Administration Switch (branch or root).
3. NIC2 is used for the connection to the external network.

### Setup Procedure

Perform the following procedure from the iLO Setup Utility for each HP ProLiant DL580 G5 node in the HP XC system:

1. Use the instructions in the accompanying HP ProLiant hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F8** key when prompted to access the Integrated Lights Out Setup Utility.
3. Make the iLO settings listed in Table 4-15 for each node in the hardware configuration.

Table 4-15 iLO Settings for HP ProLiant DL580 G5 Nodes

Name	Menu Name	Submenu Name	Option Name	Set to This Value
Administration	User		New	Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.  The user Administrator is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the Administrator user.  You must use this user name and password to access the console port.
	Network	DNS/DHCP	DHCP Enable	On
	Settings	CLI	Serial CLI Speed (bits/seconds)	115200 (Press the <b>F10</b> key to save the setting.)

4. Select **File**→**Exit** to exit the Integrated Lights Out Setup Utility and resume the power-on self-test.

5. Watch the screen carefully, and press the **F9** key when prompted to access the ROM-Based Setup Utility (RBSU).

Perform the following procedure from the RBSU for each HP ProLiant DL580 G5 node in the HP XC system:

1. Make the following settings from the **Main** menu. The BIOS settings for HP ProLiant DL580 G5 nodes are listed in Table 4-14.

**Table 4-16 BIOS Settings for HP ProLiant DL580 G5 Nodes**

Menu Name	Option Name	Set to This Value
<b>Standard Boot Order IPL</b>		Set the following boot order on <b>all nodes except the head node</b> ; CD-ROM does not have to be first in the list, but it must be listed before the hard disk: <ol style="list-style-type: none"> <li>1. <b>CD-ROM</b></li> <li>2. <b>NIC1</b></li> <li>3. <b>Hard Disk</b></li> </ol>
		On the <b>head node</b> , set the boot order so that the CD-ROM is listed before the hard disk.
<b>System Options</b>	<b>Embedded Serial Port</b>	<b>COM2</b>
	<b>Virtual Serial Port</b>	<b>COM1</b> Press the <b>Esc</b> key to return to the main menu.
<b>BIOS Serial Console &amp; EMS</b>	<b>BIOS Serial Console Port</b>	<b>COM1</b>
	<b>BIOS Serial Console Baud Rate</b>	<b>115200</b>
	<b>EMS Console</b>	<b>Disable</b>
	<b>BIOS Interface Mode</b>	<b>Command-Line</b> Press the <b>Esc</b> key to return to the main menu.

2. Press the **Esc** key to exit the RBSU. Press the **F10** key to confirm your choice and restart the boot sequence.
3. Repeat this procedure for each HP ProLiant DL580 G5 node in the hardware configuration.

### Configuring Smart Arrays

On such hardware models as the HP ProLiant DL580 G5 with smart array cards, you must add the disks to the smart array before attempting to image the node.

To do so, watch the screen carefully during the power-on self-test phase of the node, and press the **F8** key when prompted to configure the disks into the smart array.

Specific instructions are outside the scope of the HP XC documentation. See the documentation that came with the HP ProLiant server for more information.

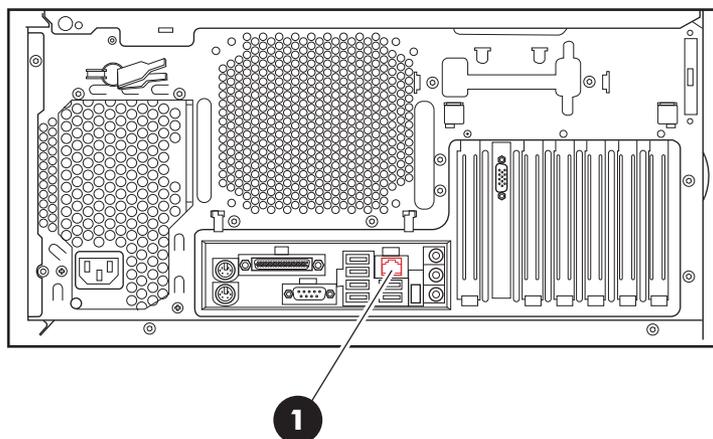
## 4.5.8 Preparing HP xw8200 and xw8400 Workstations

You can integrate HP xw8200 and xw8400 workstations into an HP XC system as a head node, service node, or compute node.

Follow the procedures in this section to prepare each workstation before installing and configuring the HP XC System Software.

Figure 4-9 shows a rear view of an HP xw8200 and xw8400 workstation and the appropriate port connections for an HP XC system.

Figure 4-9 HP xw8200 and xw8400 Workstation Rear View



The callout in the figure enumerates the following:

1. This port is used for the connection to the administration network.

### Setup Procedure

Use the Setup Utility to configure the appropriate settings for an HP XC system.

Perform the following procedure for each workstation in the hardware configuration. Change only the values that are described in this procedure; do not change any other factory-set values unless you are instructed to do so:

1. Establish a connection to the console by connecting a monitor and keyboard to the node.
2. Turn on power to the workstation.
3. When the node is powering on, press the **F10** key to access the Setup Utility.
4. When prompted, press any key to continue.
5. Select English as the language.
6. Make the following BIOS settings for each workstation in the hardware configuration; BIOS settings differ depending upon the workstation model:
  - BIOS settings for HP xw8200 workstations are listed in Table 4-17.
  - BIOS settings for HP xw8400 workstations are listed in Table 4-18.

Table 4-17 BIOS Settings for xw8200 Workstations

Menu Name	Submenu Name	Option Name	Set to This Value
Storage		Boot Order	Set the following boot order on <b>all nodes except the head node</b> ; CD-ROM does not have to be first in the list, but it must be listed before the hard disk: <ol style="list-style-type: none"> <li>1. CD-ROM</li> <li>2. Network Controller</li> <li>3. Hard Disk</li> </ol> On the <b>head node</b> , set the boot order so that the CD-ROM is listed before the hard disk.
Advanced	Processors	Hyper-Threading	Disable

Table 4-18 lists the BIOS settings for HP xw8400 workstations.

**Table 4-18 BIOS Settings for xw8400 Workstations**

Menu Name	Submenu Name	Option Name	Set to This Value
Storage	Storage Options	SATA Emulation	Separate IDE Controller After you make this setting, make sure the <b>Primary SATA Controller</b> and <b>Secondary SATA Controller</b> settings are set to <b>Enabled</b> .
		Boot Order	Set the following boot order on <b>all nodes except the head node</b> : <ol style="list-style-type: none"><li>1. Optical Drive</li><li>2. USB device</li><li>3. Broadcom Ethernet controller</li><li>4. Hard Drive</li><li>5. Intel Ethernet controller</li></ol> On the <b>head node</b> , set the boot order so that the Optical Drive is listed before the hard disk.

7. Select **File**→**Save Changes & Exit** to exit the Setup Utility.
8. Repeat this procedure for each workstation in the hardware configuration.
9. Turn off power to all nodes except the head node.
10. Follow the software installation instructions in the *HP XC System Software Installation Guide* to install the HP XC System Software.

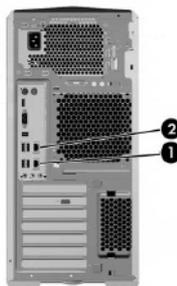
### 4.5.9 Preparing HP xw8600 Workstations

You can integrate HP xw8600 workstations into an HP XC system as a head node, service node, or compute node.

Follow the procedures in this section to prepare each workstation before installing and configuring the HP XC System Software.

Figure 4-10 shows a rear view of an HP xw8600 workstation and the appropriate port connections for an HP XC system.

**Figure 4-10 HP xw8600 Workstation Rear View**



The callouts in the figure enumerate the following:

1. This port is used for the connection to the administration network.
2. This port is used for connecting the workstation to an external network.

#### Setup Procedure

Use the Setup Utility to configure the appropriate settings for an HP XC system.

Perform the following procedure for each workstation in the hardware configuration. Change only the values that are described in this procedure; do not change any other factory-set values unless you are instructed to do so:

1. Establish a connection to the console by connecting a monitor and keyboard to the node.
2. Turn on power to the workstation.
3. When the node is powering on, press the **F10** key to access the Setup Utility.
4. When prompted, press any key to continue.
5. Select English as the language.
6. Make the following BIOS settings for each workstation in the hardware configuration as shown in Table 4-19

**Table 4-19 BIOS Settings for xw8600 Workstations**

Menu Name	Submenu Name	Option Name	Set to This Value
Storage	Storage Options	SATA Emulation	Separate IDE Controller After you make this setting, make sure the <b>Primary SATA Controller</b> and <b>Secondary SATA Controller</b> settings are set to <b>Enabled</b> .
		Boot Order	Set the following boot order on <b>all nodes except the head node</b> : <ol style="list-style-type: none"> <li>1. Optical Drive</li> <li>2. USB device</li> <li>3. Broadcom Ethernet controller</li> <li>4. Hard Drive</li> <li>5. Broadcom Ethernet controller</li> </ol> On the <b>head node</b> , set the boot order so that the Optical Drive is listed before the hard disk.

7. Select **File**→**Save Changes & Exit** to exit the Setup Utility.
8. Repeat this procedure for each workstation in the hardware configuration.
9. Turn off power to all nodes except the head node.
10. Follow the software installation instructions in the *HP XC System Software Installation Guide* to install the HP XC System Software.

## 4.6 Preparing the Hardware for CP3000BL Systems

Perform the following tasks on each server blade in the hardware configuration after the head node is installed and the switches are discovered:

- Set the boot order
- Create an iLO2 user name and password
- Set the power regulator
- Configure smart array devices

Use the Onboard Administrator, the iLO2 web interface, and virtual media to make the appropriate settings on HP ProLiant Server Blades.



**NOTE:** The following setup procedure continues from the procedure in “Setting the Onboard Administrator Password” (page 62), in which you used a browser to log in to the Onboard Administrator for the enclosure.

### Setup Procedure

Use the following procedure to prepare the CP3000BL server blades:

1. In the left frame of the HP Onboard Administrator browser window, click the plus sign (+) next to **Device Bays** to display the list of nodes contained in the enclosure.
2. Click the link to the first hardware model in the list. Wait a few seconds until the frame to the right is populated with node-specific information.
3. Click the **Boot Options** tab.
  - a. Select a boot device, and use the up and down arrows on the screen to position the device so that it matches the boot order listed in Table 4-20.

**Table 4-20 Boot Order for HP ProLiant Server Blades**

Head Node	All Other Nodes
Set the following boot order on the head node: <ol style="list-style-type: none"><li>1. USB</li><li>2. Floppy</li><li>3. CD</li><li>4. Hard Disk</li><li>5. PXE NIC1</li></ol>	Set the following boot order on all nodes except the head node: <ol style="list-style-type: none"><li>1. USB</li><li>2. Floppy</li><li>3. CD</li><li>4. PXE NIC 1</li><li>5. Hard Disk</li></ol>

- b. Click the **Apply** button.
4. In the left frame, do the following to create a new iLO2 user name and password on this node:
    - a. Under the hardware model, click **iLO**.
    - b. In the body of the main window, click the **Web Administration** link to open the Integrated Lights-Out 2 utility in a new window. You might have to turn off popup blocking for this window to open.
    - c. In the new window, click the **Administration** tab.
    - d. In the left frame, click the **User Administration** link.
    - e. Click the **New** button, and create a new iLO2 user name and password, which must match the user name and password you set on the Onboard Administrator. Do not use any special characters as part of the password.

You use this user name and password whenever you need to access the console port with the `telnet cp-nodename` command.

- f. The Onboard Administrator automatically creates user accounts for itself (prefixed with the letters OA) to provide single sign-on capabilities. Do not remove these accounts.
5. Enable **telnet** access:
  - a. In the left frame, click **Access**.
  - b. Click the control to enable **Telnet Access**.
  - c. Click the **Apply** button to save the settings.
6. Click the **Virtual Devices** tab and make the following settings:
  - a. For every node except the head node, select **No** to **Automatically Power On Server** because you do not want to automatically turn on power to the node.
  - b. Click the **Submit** button.
  - c. In the left frame, click on the **Power Regulator** link.
  - d. Select **Enable HP Static High Performance Mode**.
  - e. Click the **Apply** button to save the settings.
7. Configure disks into the smart array from the remote graphics console.

All server blades have smart array cards, you must add the disk or disks to the smart array before attempting to image the node.

To set up the smart array device, click the **Remote Console** tab on the virtual console page of the iLO2 Web Administration Utility, and then do one of the following depending on the browser type.

#### Internet Explorer

If you are using Internet Explorer as your browser, do the following:

- a. Click the **Integrated Remote Console** link to open a remote console window which provides access to the graphics console virtual media and power functions.
- b. In the remote console window, click the **Power** button.
- c. Click the **Momentary Press** button.
- d. Wait a few seconds for the power up phase to begin. Click the MB1 mouse button in the remote console window to put the pointer focus in this window so that your keyboard strokes are recognized.
- e. Proceed to Step 8.

#### Mozilla Firefox

If you are using Mozilla Firefox as your browser, do the following:

- a. Click the **Remote Console** link to open a virtual console window.
  - b. Go back to the iLO2 utility Web page and click the **Virtual Devices** tab.
  - c. Click the **Momentary Press** button.
  - d. Go back to the remote console window. Wait a few seconds for the power up phase to begin. Click the MB1 mouse button in this window to put the pointer focus in the remote console window so that your keyboard strokes are recognized in this window.
  - e. Proceed to Step 8.
8. Watch the screen carefully during the power-on self-test phase, and press the **F8** key when you are prompted to configure the disks into the smart array. Select **View Logical Drives** to determine if a logical drives exists. If a logical drive is not present, create one.

If you create a logical drive, exit the SmartArray utility and power off the node. Do not let it try to boot up.

Specific smart array configuration instructions are outside the scope of this document. See the documentation that came with your model of HP ProLiant server for more information.
  9. Use the virtual power functions to turn off power to the server blade.

10. Close the iLO2 utility Web page.
11. Repeat this procedure from every active Onboard Administrator and make the same settings for each server blade in each enclosure.

After preparing all the nodes in all the enclosures, return to the *HP XC System Software Installation Guide* to discover all the nodes and enclosures in the HP XC system.

## 4.7 Preparing the Hardware for CP4000 (AMD Opteron) Systems

Follow the procedures in this section to prepare each node before installing and configuring the HP XC System Software. See the following sections depending on the hardware model:

- “Preparing HP ProLiant DL145 Nodes” (page 87)
- “Preparing HP ProLiant DL145 G2 and DL145 G3 Nodes” (page 89)
- “Preparing HP ProLiant DL165 G5 Nodes” (page 93)
- “Preparing HP ProLiant DL365 Nodes” (page 94)
- “Preparing HP ProLiant DL365 G5 Nodes” (page 97)
- “Preparing HP ProLiant DL385 and DL385 G2 Nodes” (page 100)
- “Preparing HP ProLiant DL385 G5 Nodes” (page 104)
- “Preparing HP ProLiant DL585 and DL585 G2 Nodes” (page 106)
- “Preparing HP ProLiant DL585 G5 Nodes” (page 110)
- “Preparing HP ProLiant DL785 G5 Nodes” (page 113)
- “Preparing HP xw9300 and xw9400 Workstations” (page 116)

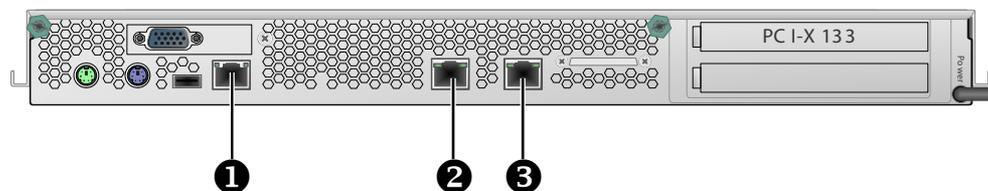
### 4.7.1 Preparing HP ProLiant DL145 Nodes

On an HP ProLiant DL145 server, use the following tools to configure the appropriate settings for an HP XC system:

- BIOS Setup Utility
- Intelligent Platform Management Interface (IPMI) Utility

Figure 4-11 shows the rear view of the HP ProLiant DL145 server and the appropriate port assignments for an HP XC system.

**Figure 4-11 HP ProLiant DL145 Server Rear View**



The callouts in the figure enumerate the following:

1. The console Ethernet port is the connection to the Console Switch (branch or root).
2. If a Gigabit Ethernet (GigE) interconnect is configured, this port is used for the interconnect connection. Otherwise, it is used for an external connection.
3. NIC1 is the connection to the Administration Switch (branch or root). It corresponds to `eth0` in Linux if there are no additional optional Ethernet ports installed in expansion slots. On the HP ProLiant DL145 server, NIC1 is the port on the right labeled with the number 1.

#### Setup Procedure

Perform the following procedure from the BIOS Setup Utility for each HP ProLiant DL145 node in the hardware configuration:

1. Use the instructions in the accompanying hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F10** key when prompted to access the BIOS Setup Utility.

- For each node, make the BIOS settings listed in Table 4-21.

**Table 4-21 BIOS Settings for HP ProLiant DL145 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
Boot	Boot Settings Configuration (for NIC1)	Onboard NIC PXE Option ROM	Enabled (for all nodes except the head node)
	Boot Settings Configuration (for NIC1)	Onboard NIC PXE Option ROM	Disabled (for the head node)
Advanced	Management Processor Configuration	Set Serial Port Sharing	Shared
	BIOS Serial Console Configuration	Redirection After BIOS Post	Enabled
Boot		Boot Device Priority <sup>1</sup>	<p>Maintain the following boot order on <b>all nodes except the head node</b>; CD-ROM does not have to be first in the list, but it must be listed before the hard disk:</p> <ol style="list-style-type: none"> <li>CD-ROM</li> <li>NIC1</li> <li>Hard Disk</li> </ol> <p>Set the <b>head node</b> to boot from <b>CD-ROM</b> first; the hard disk must be listed after CD-ROM.</p>

<sup>1</sup> The NIC1 interface is named `Broadcom MBA`, and it is the second choice with this name from the **Boot Screen Menu**→**Boot Device Priority**.

For each HP ProLiant DL145 node, log in to the IPMI utility and invoke the Terminal mode:

- Establish a connection to the server by using one of the following methods:
  - A serial port connection to the console port
  - A `telnet` session to the IP address of the Management NIC



**NOTE:** For more information about how to establish these connections, see “Establishing a Connection Through a Serial Port” (page 141) or the documentation that came with the HP ProLiant server.

- Press the **Esc** key and then press **Shift+9** to display the IPMI setup utility.
- Enter the administrator's user name at the `login:` prompt (the default is `admin`).
- Enter the administrator's password at the `password:` prompt (the default is `admin`).
- Use the **C[hange Password]** option to change the console port management device password. The factory default password is `admin`; change it to the password of your choice. This password must be the same on every node in the hardware configuration.

```
ProLiant> ChangePassword
Type the current password> admin
Type the new password (max 16 characters)> your_password
Retype the new password (max 16 characters)> your_password
New password confirmed.
```

6. Ensure that all machines are requesting IP addresses through the Dynamic Host Control Protocol (DHCP). Do the following to determine if DHCP is enabled:
  - a. At the ProLiant> prompt, enter the following:
 

```
ProLiant> net
```
  - b. At the INET> prompt, enter the following:
 

```
INET> state
```

```
iface...ipsrc.....IP addr.....subnet.....gateway
1-et1  dhcp  0.0.0.0 255.0.0.0 0.0.0.0
```

```
current tick count 2433
ping delay time: 280 ms.
ping host: 0.0.0.0
Task wakeups:netmain: 93
nettick: 4814
telnetrv: 401
```
  - c. If the value for ipsrc is nvmem, enter **dhcp** at the INET> prompt:
 

```
INET> dhcp
```

 Configuring for the enabling of DHCP.
 

Note: Configuration change has been made, but changes will not take effect until the processor has been rebooted.

Do you wish to reboot the processor now, may take 10 seconds (y or n)?
  - d. Enter **y** to reboot the processor.
7. If you did not change the DHCP setting, press **Shift+Esc+Q**, or enter **quit** at the ProLiant> prompt to exit the Management Processor CLI and invoke the Console mode.

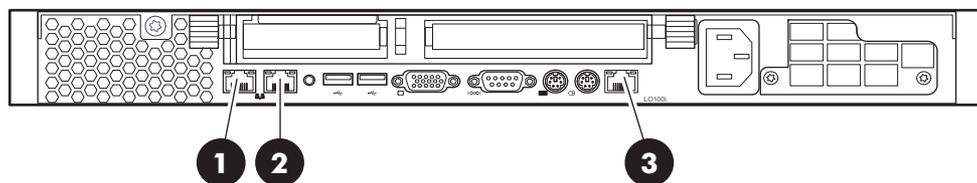
## 4.7.2 Preparing HP ProLiant DL145 G2 and DL145 G3 Nodes

Use the BIOS Setup utility on HP ProLiant DL145 G2 and DL145 G3 servers to configure the appropriate settings for an HP XC system.

For these hardware models, you cannot set or modify the default console port password through the BIOS Setup Utility the way you can for other hardware models. The *HP XC System Software Installation Guide* documents the procedure to modify the console port password. You are instructed to perform the task just after the `discover` command discovers the IP addresses of the console ports.

Figure 4-12 shows a rear view of the HP ProLiant DL145 G2 server and the appropriate port assignments for an HP XC system.

**Figure 4-12 HP ProLiant DL145 G2 Server Rear View**



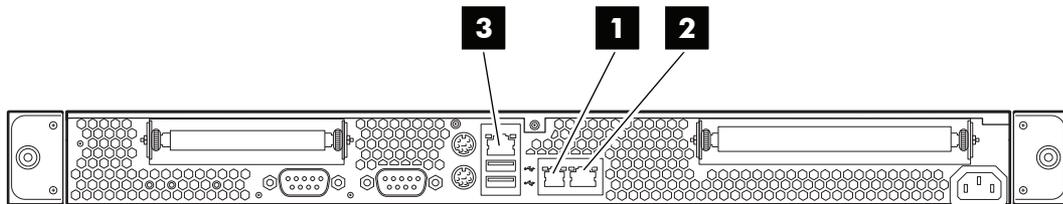
HPTC-0144

The callouts in the figure enumerate the following:

1. This port is used for the connection to the Administration Switch (branch or root). On the rear of the node, this port is marked with the number 1 (NIC1).
2. If a Gigabit Ethernet (GigE) interconnect is configured, this port is used for the interconnect connection. Otherwise, it is used for an external connection. On the rear of the node, this port is marked with the number 2 (NIC2).
3. The port labeled LO100i is used for the connection to the Console Switch.

Figure 4-13 shows a rear view of the HP ProLiant DL145 G3 server and the appropriate port assignments for an HP XC system.

**Figure 4-13 HP ProLiant DL145 G3 Server Rear View**



The callouts in the figure enumerate the following:

1. This port is used for the connection to the Administration Switch (branch or root). On the rear of the node, this port is marked as NIC1.
2. If a Gigabit Ethernet (GigE) interconnect is configured, this port is used for the interconnect connection. Otherwise, it is used for an external connection. On the rear of the node, this port is marked as NIC2.
3. The port labeled LO100i is used for the connection to the Console Switch.

### Setup Procedure

Perform the following procedure for each HP ProLiant DL145 G2 and DL145 G3 node in the HP XC system. Change only the values that are described in this procedure; do not change any factory-set values unless you are instructed to do so.

1. Use the instructions in the accompanying hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F10** key when prompted to access the BIOS Setup Utility. You configure the Lights-Out 100i (LO-100i) console management device using this utility.

The BIOS Setup Utility displays the following information about the node:

```
BIOS ROM ID:
BIOS Version:
BIOS Build Date:
```

Record this information for future reference.

3. Make the following BIOS settings for each node depending on hardware model:
  - Table 4-22 provides the BIOS settings for ProLiant DL145 G2 nodes.
  - Table 4-23 provides the BIOS settings for ProLiant DL145 G3 nodes.

**Table 4-22 BIOS Settings for HP ProLiant DL145 G2 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
Main	Boot Options	Numlock	Off
Advanced		MCFG Table	Disabled
		NIC Option	Dedicated NIC

**Table 4-22 BIOS Settings for HP ProLiant DL145 G2 Nodes** *(continued)*

Menu Name	Submenu Name	Option Name	Set to This Value
	<b>Hammer Configuration</b>	<b>Disable Jitter bit</b>	<b>Enabled</b>
		<b>page Directory Cache</b>	<b>Disabled</b>
	<b>PCI Configuration/Ethernet On Board</b> (for Ethernet 1 and 2)	<b>Device</b>	<b>Enabled</b>
		<b>Option ROM Scan</b>	<b>Enabled</b>
		<b>Latency timer</b>	<b>40h</b>
	<b>I/O Device Configuration</b>	<b>Serial Port</b>	<b>BMC COM Port</b>
		<b>SIO COM Port</b>	<b>Disabled</b>
		<b>PS/2 Mouse</b>	<b>Enabled</b>
	<b>Console Redirection</b>	<b>Console Redirection</b>	<b>Enabled</b>
		<b>EMS Console</b>	<b>Enabled</b>
		<b>Baud Rate</b>	<b>115.2K</b>
		<b>Flow Control</b>	<b>None</b>
		<b>Redirection after BIOS POST</b>	<b>On</b>
	<b>IPMI/LAN Setting</b>	<b>IP Address Assignment</b>	<b>DHCP</b>
		<b>BMC Telnet Service</b>	<b>Enabled</b>
		<b>BMC Ping Response</b>	<b>Enabled</b>
		<b>BMC HTTP Service</b>	<b>Enabled</b>
	<b>IPMI</b>	<b>BIOS POST Watchdog</b>	<b>Disabled</b>
<b>Boot</b>			<p>Set the following boot order on <b>all nodes except the head node</b>:</p> <ol style="list-style-type: none"> <li>1. CD-ROM</li> <li>2. Removable Devices</li> <li>3. PXE MBA V7.7.2 Slot 0300</li> <li>4. Hard Drive</li> <li>5. ! PXE MBA V7.7.2 Slot 0200 (! means disabled)</li> </ol> <p>Set the following boot order on the <b>head node</b>:</p> <ol style="list-style-type: none"> <li>1. CD-ROM</li> <li>2. Removable Devices</li> <li>3. Hard Drive</li> <li>4. PXE MBA V7.7.2 Slot 0200</li> <li>5. PXE MBA V7.7.2 Slot 0300</li> </ol>
<b>Power</b>		<b>Wake On Modem Ring</b>	<b>Disabled</b>
		<b>Wake On LAN</b>	<b>Disabled</b>

Table 4-23 provides the BIOS settings for ProLiant DL145 G3 nodes

**Table 4-23 BIOS Settings for HP ProLiant DL145 G3 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value	
Main	Boot Options	NumLock	Off	
Advanced	I/O Device Configuration	Serial Port Mode	BMC	
		Serial port A:	Enabled	
		Base I/O address:	3F8	
		Interrupt:	IRQ 4	
	Memory Controller Options	DRAM Bank Interleave	AUTO	
		Node Interleave	Disabled	
		32-Bit Memory Hole	Enabled	
	Serial ATA	Embedded SATA	Enabled	
		SATA Mode	SATA	
		Enabled/Disable Int13 support	Enabled	
		Option ROM Scan	Enabled	
		Enable Master	Enabled	
		Latency Timer	0040h	
		Console Redirection	Com Port Address	On-board COM A
	Baud Rate		115.2K	
	Console Type		ANSI	
	Flow Control		None	
	Console connection		Direct	
	Continue C.R. after POST		On	
	# of video pages to support		1	
	IPMI/LAN Setting	IP Address Assignment	DHCP	
		LAN Controller:	NIC	
		HPET Timer	Disabled	
		8042 Emulation Support	Disabled	
		Factory Boot Mode	Disabled	
	<b>Boot</b>			<p>Set the following boot order on <b>all nodes except the head node</b>:</p> <ol style="list-style-type: none"> <li>1. Removable Devices</li> <li>2. CD-ROM Drive</li> <li>3. MBA v9.0.6 Slot 0820</li> <li>4. Hard Drive</li> <li>5. MBA v9.0.6 Slot 0821</li> </ol> <p>Set the following boot order on the <b>head node</b>:</p> <ol style="list-style-type: none"> <li>1. Removable Devices</li> <li>2. CD-ROM Drive</li> <li>3. Hard Drive</li> </ol>

4. Select **Exit**→**Saving Changes** to exit the BIOS Setup Utility.
5. Repeat this procedure for each HP ProLiant DL145 G2 and DL145 G3 node in the hardware configuration.

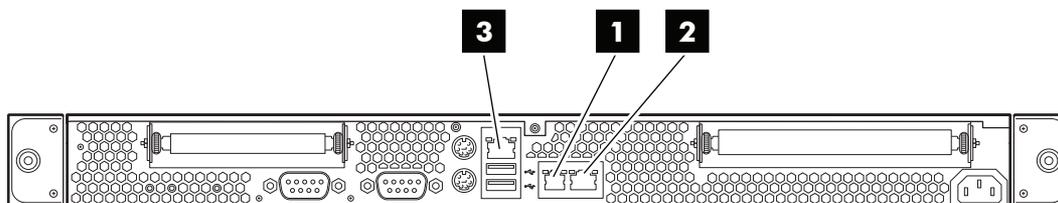
### 4.7.3 Preparing HP ProLiant DL165 G5 Nodes

Use the BIOS Setup utility on HP ProLiant DL165 G5 servers to configure the appropriate settings for an HP XC system.

For this hardware model, you cannot set or modify the default console port password through the BIOS Setup Utility the way you can for other hardware models. The *HP XC System Software Installation Guide* documents the procedure to modify the console port password. You are instructed to perform the task just after the `discover` command discovers the IP addresses of the console ports.

Figure 4-14 shows a rear view of the HP ProLiant DL165 G5 server and the appropriate port assignments for an HP XC system.

**Figure 4-14 HP ProLiant DL165 G5 Server Rear View**



The callouts in the figure enumerate the following:

1. This port is used for the connection to the Administration Switch (branch or root). On the rear of the node, this port is marked as NIC1.
2. If a Gigabit Ethernet (GigE) interconnect is configured, this port is used for the interconnect connection. Otherwise, it is used for an external connection. On the rear of the node, this port is marked as NIC2.
3. The port labeled LO100i is used for the connection to the Console Switch.

#### Setup Procedure

Perform the following procedure for each HP ProLiant DL165 G5 node in the HP XC system. Change only the values that are described in this procedure; do not change any factory-set values unless you are instructed to do so.

1. Use the instructions in the accompanying hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F10** key when prompted to access the BIOS Setup Utility. You configure the Lights-Out 100i (LO-100i) console management device using this utility.

The BIOS Setup Utility displays the following information about the node:

```
BIOS ROM ID:
BIOS Version:
BIOS Build Date:
```

Record this information for future reference.

3. Make the following BIOS settings as provided in Table 4-24.

**Table 4-24 BIOS Settings for HP ProLiant DL165 G5 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
Main	Boot Settings Configuration	Bootup Num-Lock	Disabled
Advanced	I/O Device Configuration	Embedded Serial Port IRQ:	3F8
		Interrupt:	IRQ 4
	S-ATA Configuration	S-ATA Mode	S-ATA
		INT13 support	Enabled
		Remote Access Configuration	Base Address
	IPMI Configuration	Serial Port Mode	115200 8,n,1
		Redirection of BIOS POST	Always
		Terminal Type	ANSI
		LAN Configuration:	
		Share NIC Mode	Disabled
		DHCP IP Source	Enabled
Boot			Set the following boot order on <b>all nodes except the head node</b> : <ol style="list-style-type: none"> <li>1. Removable Devices</li> <li>2. CD-ROM Drive</li> <li>3. MBA v9.0.6 Slot 0820</li> <li>4. Hard Drive</li> <li>5. MBA v9.0.6 Slot 0821</li> </ol> Set the following boot order on the <b>head node</b> : <ol style="list-style-type: none"> <li>1. Removable Devices</li> <li>2. CD-ROM Drive</li> <li>3. Hard Drive</li> </ol>

4. Select **Exit**→**Saving Changes** to exit the BIOS Setup Utility.
5. Repeat this procedure for each HP ProLiant DL165 G5 node in the hardware configuration.

#### 4.7.4 Preparing HP ProLiant DL365 Nodes

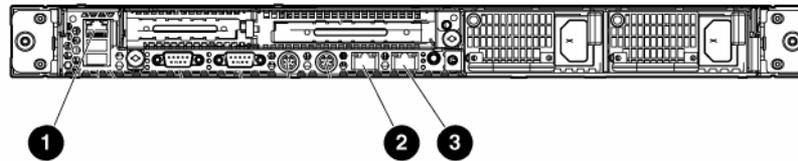
On HP ProLiant DL365 servers, use the following tools to configure the appropriate settings for an HP XC system:

- Integrated Lights Out (iLO) Setup Utility
- ROM-Based Setup Utility (RBSU)

HP ProLiant DL365 servers use the iLO utility; thus, they need certain settings that you cannot make until the iLO has an IP address. The *HP XC System Software Installation Guide* provides instructions for using a browser to connect to the iLO to enable telnet access.

Figure 4-15 shows a rear view of the HP ProLiant DL365 server and the appropriate port assignments for an HP XC system.

**Figure 4-15 HP ProLiant DL365 Server Rear View**



The callouts in the figure enumerate the following:

1. This port is the Ethernet connection to the Console Switch. On the back of the node, this port is marked with the acronym iLO.
2. This port is the connection to the Administration Switch (branch or root). On the back of the node, this port is marked with the number 1.
3. If a Gigabit Ethernet (GigE) interconnect is configured, this port is used for the interconnect connection. Otherwise, it is used for an external connection. On the back of the node, this port is marked with the number 2.

### Setup Procedure

Perform the following procedure from the iLO Setup Utility for each HP ProLiant DL365 node in the hardware configuration:

1. Use the instructions in the accompanying hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F8** key when prompted to access the Integrated Lights Out Setup Utility.
3. Make the following iLO settings for ProLiant DL365 nodes, as shown in Table 4-25:

**Table 4-25 iLO Settings for HP ProLiant DL365 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
User		Add	<p>Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.</p> <p>The user Administrator is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the Administrator user.</p> <p>You must use this user name and password to access the console port.</p>
Network	DNS/DHCP	DHCP Enable	On

4. Select **File**→**Exit** to exit the Integrated Lights Out Setup Utility and resume the power-on self-test.
5. Watch the screen carefully, and press the **F9** key when prompted to access the ROM-Based Setup Utility (RBSU).

Perform the following procedure from the RBSU for each HP ProLiant DL365 node in the hardware configuration:

1. Make the RBSU settings for the HP ProLiant DL365 nodes, as indicated in Table 4-26. Use the navigation aids shown at the bottom of the screen to move through the menus and make selections.

**Table 4-26 RBSU Settings for HP ProLiant DL365 Nodes**

Menu Name	Option Name	Set to This Value
<b>System Options</b>	<b>Embedded NIC Port PXE Support</b>	On all nodes except the head node, set this value to <b>Enable NIC1 PXE</b> <sup>1</sup> . On the head node only, set this value to <b>Embedded NIC PXE Disabled</b>
	<b>Embedded Serial Port</b>	Disabled
	<b>Virtual Serial Port</b>	COM1; IRQ4; IO:3F8h-3FFh
	<b>Embedded NIC Port 1 PXE Support</b>	Enabled (all nodes except the head node)
	<b>Embedded NIC Port 1 PXE Support</b>	Disabled (head node only)
	<b>Power Regulator for ProLiant</b>	Disabled
<b>Standard Boot Order (IPL)</b>		Set the following boot order on all nodes except the head node: <ol style="list-style-type: none"> <li>1. CD-ROM</li> <li>2. NIC1</li> <li>3. Hard Disk</li> </ol> On the head node, set the boot order so that the CD-ROM is listed before the hard disk.
	<b>IPL1</b>	CD-ROM
	<b>IPL2</b>	Floppy Drive (A:)
	<b>IPL3</b>	PCI Embedded HP NC7782 Gigabit Server Adapter Port 1
	<b>IPL4</b>	Hard Drive (C:)
<b>BIOS Serial Console and EMS</b>	<b>BIOS Serial Console Port</b>	COM1; IRQ4; IO:3F8h-3FFh
	<b>BIOS Serial Console Baud Rate</b>	115200
	<b>EMS Console</b>	Disabled
	<b>BIOS Interface Mode</b>	Command Line

<sup>1</sup> A small blue dialog box near the bottom left side of the screen indicates the current setting. You can make only one setting per node.

2. Press the **Esc** key to exit the RBSU. Press the **F10** key to confirm your choice and restart the boot sequence.
3. Repeat this procedure for each HP ProLiant DL365 node in the hardware configuration.

### Configuring Smart Arrays

On such hardware models as the HP ProLiant DL365 with smart array cards, you must add the disks to the smart array before attempting to image the node.

To do so, watch the screen carefully during the power-on self-test phase of the node, and press the **F8** key when prompted to configure the disks into the smart array.

Specific instructions are outside the scope of the HP XC documentation. See the documentation that came with the HP ProLiant server for more information.

## 4.7.5 Preparing HP ProLiant DL365 G5 Nodes

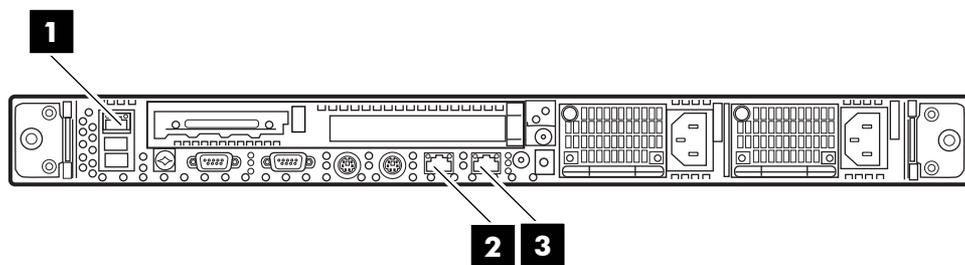
On HP ProLiant DL365 G5 servers, use the following tools to configure the appropriate settings for an HP XC system:

- Integrated Lights Out (iLO) Setup Utility
- ROM-Based Setup Utility (RBSU)

HP ProLiant DL365 G5 servers use the iLO utility; thus, they need certain settings that you cannot make until the iLO has an IP address. The *HP XC System Software Installation Guide* provides instructions for using a browser to connect to the iLO to enable `telnet` access.

Figure 4-16 shows a rear view of the HP ProLiant DL365 G5 server and the appropriate port assignments for an HP XC system.

**Figure 4-16 HP ProLiant DL365 G5 Server Rear View**



The callouts in the figure enumerate the following:

1. If a Gigabit Ethernet (GigE) interconnect is configured, this port is used for the interconnect connection. Otherwise, it is used for an external connection. On the back of the node, this port is marked with the number 2.
2. This port is the connection to the Administration Switch (branch or root). On the back of the node, this port is marked with the number 1.
3. This port is the Ethernet connection to the Console Switch. On the back of the node, this port is marked with the acronym iLO.

### Setup Procedure

Perform the following procedure from the iLO Setup Utility for each HP ProLiant DL365 G5 node in the hardware configuration:

1. Use the instructions in the accompanying hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F8** key when prompted to access the Integrated Lights Out Setup Utility.
3. Make the following iLO settings for ProLiant DL365 G5 nodes, as shown in Table 4-27:

**Table 4-27 iLO Settings for HP ProLiant DL365 G5 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
User		Add	<p>Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.</p> <p>The user Administrator is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the Administrator user.</p> <p>You must use this user name and password to access the console port.</p>
Network	DNS/DHCP	DHCP Enable	On

4. Select **File**→**Exit** to exit the Integrated Lights Out Setup Utility and resume the power-on self-test.
5. Watch the screen carefully, and press the **F9** key when prompted to access the ROM-Based Setup Utility (RBSU).

Perform the following procedure from the RBSU for each HP ProLiant DL365 G5 node in the hardware configuration:

1. Make the RBSU settings for the HP ProLiant DL365 G5 nodes, as indicated in Table 4-28. Use the navigation aids shown at the bottom of the screen to move through the menus and make selections.

**Table 4-28 RBSU Settings for HP ProLiant DL365 G5 Nodes**

Menu Name	Option Name	Set to This Value
<b>System Options</b>	<b>Embedded NIC Port PXE Support</b>	On all nodes except the head node, set this value to <b>Enable NIC1 PXE</b> <sup>1</sup> . On the head node only, set this value to <b>Embedded NIC PXE Disabled</b> .
	<b>Embedded Serial Port</b>	Disabled
	<b>Virtual Serial Port</b>	COM1; IRQ4; IO:3F8h-3FFh
	<b>Embedded NIC Port 1 PXE Support</b>	Enabled (all nodes except the head node)
	<b>Embedded NIC Port 1 PXE Support</b>	Disabled (head node only)
	<b>Power Regulator for ProLiant</b>	Disabled
<b>Standard Boot Order (IPL)</b>		Set the following boot order on all nodes except the head node: <ol style="list-style-type: none"> <li>1. CD-ROM</li> <li>2. NIC1</li> <li>3. Hard Disk</li> </ol> On the head node, set the boot order so that the CD-ROM is listed before the hard disk.
	<b>IPL1</b>	CD-ROM
	<b>IPL2</b>	Floppy Drive (A:)
	<b>IPL3</b>	PCI Embedded HP NC7782 Gigabit Server Adapter Port 1
	<b>IPL4</b>	Hard Drive (C:)
<b>BIOS Serial Console and EMS</b>	<b>BIOS Serial Console Port</b>	COM1; IRQ4; IO:3F8h-3FFh
	<b>BIOS Serial Console Baud Rate</b>	115200
	<b>EMS Console</b>	Disabled
	<b>BIOS Interface Mode</b>	Command Line

<sup>1</sup> A small blue dialog box near the bottom left side of the screen indicates the current setting. You can make only one setting per node.

2. Press the **Esc** key to exit the RBSU. Press the **F10** key to confirm your choice and restart the boot sequence.
3. Repeat this procedure for each HP ProLiant DL365 G5 node in the hardware configuration.

### Configuring Smart Arrays

On such hardware models as the HP ProLiant DL365 with smart array cards, you must add the disks to the smart array before attempting to image the node.

To do so, watch the screen carefully during the power-on self-test phase of the node, and press the **F8** key when prompted to configure the disks into the smart array.

Specific instructions are outside the scope of the HP XC documentation. See the documentation that came with the HP ProLiant server for more information.

## 4.7.6 Preparing HP ProLiant DL385 and DL385 G2 Nodes

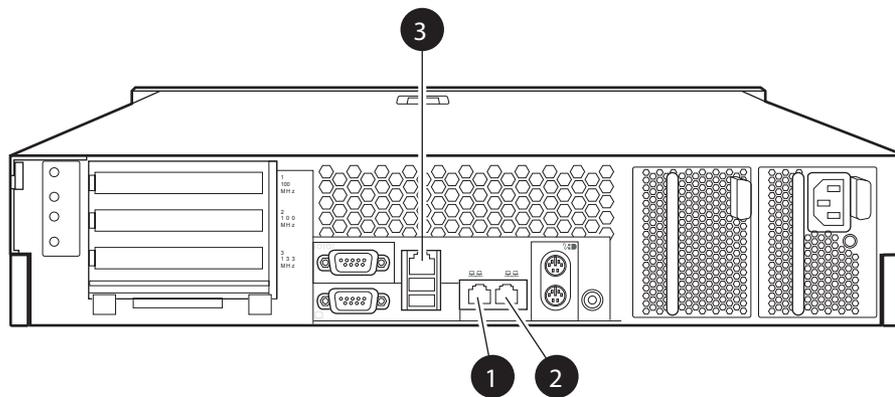
On HP ProLiant DL385 and DL385 G2 servers, use the following tools to configure the appropriate settings for an HP XC system:

- Integrated Lights Out (iLO) Setup Utility
- ROM-Based Setup Utility (RBSU)

HP ProLiant DL385 and DL385 G2 servers use the iLO utility; thus, they need certain settings that you cannot make until the iLO has an IP address. The *HP XC System Software Installation Guide* provides instructions for using a browser to connect to the iLO to enable `telnet` access.

Figure 4-17 shows a rear view of the HP ProLiant DL385 server and the appropriate port assignments for an HP XC system.

**Figure 4-17 HP ProLiant DL385 Server Rear View**



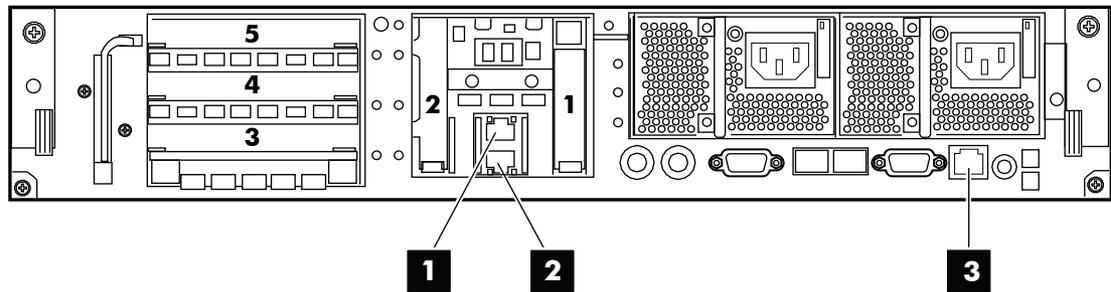
HPTC-0145

The callouts in the figure enumerate the following:

1. If a Gigabit Ethernet (GigE) interconnect is configured, this port is used for the interconnect connection. Otherwise, it is used for an external connection. On the back of the node, this port is marked with the number 2.
2. This port is the connection to the Administration Switch (branch or root). On the back of the node, this port is marked with the number 1.
3. This port is the Ethernet connection to the Console Switch. On the back of the node, this port is marked with the acronym iLO.

Figure 4-18 shows a rear view of the HP ProLiant DL385 G2 server and the appropriate port assignments for an HP XC system.

Figure 4-18 HP ProLiant DL385 G2 Server Rear View



The callouts in the figure enumerate the following:

1. If a Gigabit Ethernet (GigE) interconnect is configured, this port is used for the interconnect connection. Otherwise, it is used for an external connection. On the back of the node, this port is marked with the number 2.
2. This port is the connection to the Administration Switch (branch or root). On the back of the node, this port is marked with the number 1.
3. This port is the Ethernet connection to the Console Switch. On the back of the node, this port is marked with the acronym iLO.

### Setup Procedure

Perform the following procedure from the iLO Setup Utility for each HP ProLiant DL385 and DL385 G2 node in the hardware configuration:

1. Use the instructions in the accompanying hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F8** key when prompted to access the Integrated Lights Out Setup Utility.
3. Make the following iLO settings for each node depending on hardware model:
  - Table 4-29 provides the iLO settings for ProLiant DL385 nodes.
  - Table 4-30 provides the iLO settings for ProLiant DL385 G2 nodes.

Table 4-29 iLO Settings for HP ProLiant DL385 Nodes

Menu Name	Submenu Name	Option Name	Set to This Value
User		Add	<p>Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.</p> <p>The user Administrator is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the Administrator user.</p> <p>You must use this user name and password to access the console port.</p>
Network	DNS/DHCP	DHCP Enable	On

Table 4-30 lists the iLO settings for ProLiant DL385 G2 nodes.

**Table 4-30 iLO Settings for HP ProLiant DL385 G2 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
<b>User</b>		<b>Add</b>	<p>Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.</p> <p>The user <code>Administrator</code> is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the <code>Administrator</code> user.</p> <p>You must use this user name and password to access the console port.</p>
<b>Network</b>	<b>DNS/DHCP</b>	<b>DHCP Enable</b>	<b>On</b>
<b>Settings</b>	<b>CLI</b>	<b>Serial CLI Speed (bits/seconds)</b>	<b>115200</b> (Press the <b>F10</b> key to save the setting.)

4. Select **File**→**Exit** to exit the Integrated Lights Out Setup Utility and resume the power-on self-test.
5. Watch the screen carefully, and press the **F9** key when prompted to access the ROM-Based Setup Utility (RBSU).

Perform the following procedure from the RBSU for each HP ProLiant DL385 G2 node in the hardware configuration:

1. Make the RBSU settings accordingly. The settings differ depending on the hardware model generation:

- Table 4-31 provides the RBSU settings for the HP ProLiant DL385 nodes.
- Table 4-32 provides the RBSU settings for the HP ProLiant DL385 G2 nodes.

Use the navigation aids shown at the bottom of the screen to move through the menus and make selections.

**Table 4-31 RBSU Settings for HP ProLiant DL385 Nodes**

Menu Name	Option Name	Set to This Value
<b>System Options</b>	<b>Embedded NIC Port PXE Support</b>	On all nodes except the head node, set this value to <b>Enable NIC1 PXE</b> <sup>1</sup> On the <b>head node</b> only, set this value to <b>Embedded NIC PXE Disabled</b>
	<b>Embedded Serial Port</b>	Disabled
	<b>Virtual Serial Port</b>	COM1; IRQ4; IO:3F8h-3FFh
	<b>Embedded NIC Port 1 PXE Support</b>	Enabled (all nodes except the head node)
	<b>Embedded NIC Port 1 PXE Support</b>	Disabled (head node only)
	<b>Power Regulator for ProLiant</b>	Disabled
<b>Standard Boot Order (IPL)</b>		Set the following boot order on <b>all nodes except the head node</b> : <ol style="list-style-type: none"> <li>1. CD-ROM</li> <li>2. NIC1</li> <li>3. Hard Disk</li> </ol> On the <b>head node</b> , set the boot order so that the CD-ROM is listed before the hard disk.
	<b>IPL1</b>	CD-ROM
	<b>IPL2</b>	Floppy Drive (A:)
	<b>IPL3</b>	PCI Embedded HP NC7782 Gigabit Server Adapter Port 1
	<b>IPL4</b>	Hard Drive (C:)
<b>BIOS Serial Console and EMS</b>	<b>BIOS Serial Console Port</b>	COM1; IRQ4; IO:3F8h-3FFh
	<b>BIOS Serial Console Baud Rate</b>	115200
	<b>EMS Console</b>	Disabled
	<b>BIOS Interface Mode</b>	Command Line
<b>Advanced Options</b>	<b>page Directory Cache (PDC)</b>	Disabled

<sup>1</sup> A small blue dialog box near the bottom left side of the screen indicates the current setting. You can make only one setting per node.

Table 4-32 lists the RBSU settings for the HP ProLiant DL385 G2 nodes.

**Table 4-32 RBSU Settings for HP ProLiant DL385 G2 Nodes**

Menu Name	Option Name	Set to This Value
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**Table 4-32 RBSU Settings for HP ProLiant DL385 G2 Nodes** *(continued)*

Menu Name	Option Name	Set to This Value
System Options	Embedded Serial Port	COM2
	Virtual Serial Port	COM1
Standard Boot Order (IPL)		<p>Set the following boot order on <b>all nodes except the head node</b>; CD-ROM does not have to be first in the list, but it must be listed before the hard disk:</p> <ol style="list-style-type: none"> <li>1. CD-ROM</li> <li>2. Floppy Drive (A:)</li> <li>3. USB DriveKey (C:)</li> <li>4. PCI Embedded HP NC373i Multifunction Gigabit Adapter</li> <li>5. Hard Disk (C:) (see Boot Controller Order)</li> </ol> <p>On the <b>head node</b>, set the boot order so that the CD-ROM is listed before the hard disk.</p>
BIOS Serial Console and EMS	BIOS Serial Console Port	COM1
	BIOS Serial Console Baud Rate	115200
	EMS Console	Disabled
	BIOS Interface Mode	Command Line
Press the <b>Esc</b> key to return to the main menu.		

2. Press the **Esc** key to exit the RBSU. Press the **F10** key to confirm your choice and restart the boot sequence.
3. Repeat this procedure for each HP ProLiant DL385 and DL385 G2 node in the hardware configuration.

### Configuring Smart Arrays

On such hardware models as the HP ProLiant DL385 and DL385 G2 with smart array cards, you must add the disks to the smart array before attempting to image the node.

To do so, watch the screen carefully during the power-on self-test phase of the node, and press the **F8** key when prompted to configure the disks into the smart array.

Specific instructions are outside the scope of the HP XC documentation. See the documentation that came with the HP ProLiant server for more information.

## 4.7.7 Preparing HP ProLiant DL385 G5 Nodes

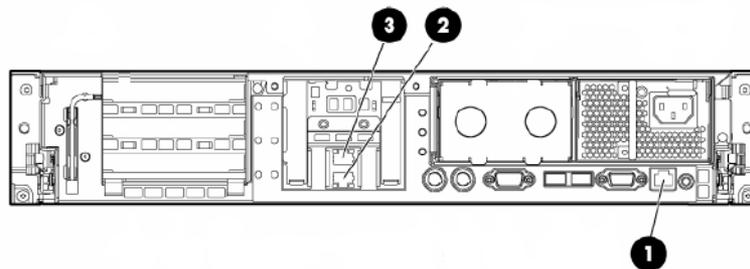
On HP ProLiant DL385 G5 servers, use the following tools to configure the appropriate settings for an HP XC system:

- Integrated Lights Out (iLO) Setup Utility
- ROM-Based Setup Utility (RBSU)

HP ProLiant DL385 G5 servers use the iLO utility; thus, they need certain settings that you cannot make until the iLO has an IP address. The *HP XC System Software Installation Guide* provides instructions for using a browser to connect to the iLO to enable telnet access.

Figure 4-19 shows a rear view of the HP ProLiant DL385 G5 server and the appropriate port assignments for an HP XC system.

Figure 4-19 HP ProLiant DL385 G5 Server Rear View



The callouts in the figure enumerate the following:

1. This port is the Ethernet connection to the Console Switch. On the back of the node, this port is marked with the acronym iLO.
2. This port is the connection to the Administration Switch (branch or root). On the back of the node, this port is marked with the number 1.
3. If a Gigabit Ethernet (GigE) interconnect is configured, this port is used for the interconnect connection. Otherwise, it is used for an external connection. On the back of the node, this port is marked with the number 2.

### Setup Procedure

Perform the following procedure from the iLO Setup Utility for each HP ProLiant DL385 G5 node in the hardware configuration:

1. Use the instructions in the accompanying hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F8** key when prompted to access the Integrated Lights Out Setup Utility.
3. Make the following iLO settings for each DL385 G5 node, as shown in Table 4-33:

Table 4-33 iLO Settings for HP ProLiant DL385 G2 Nodes

Menu Name	Submenu Name	Option Name	Set to This Value
<b>User</b>		<b>Add</b>	Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.  The user <code>Administrator</code> is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the <code>Administrator</code> user.  You must use this user name and password to access the console port.
<b>Network</b>	<b>DNS/DHCP</b>	<b>DHCP Enable</b>	<b>On</b>
<b>Settings</b>	<b>CLI</b>	<b>Serial CLI Speed (bits/seconds)</b>	<b>115200</b> (Press the <b>F10</b> key to save the setting.)

4. Select **File**→**Exit** to exit the Integrated Lights Out Setup Utility and resume the power-on self-test.
5. Watch the screen carefully, and press the **F9** key when prompted to access the ROM-Based Setup Utility (RBSU).



1. NIC1 is the connection to the Administration Switch (branch or root).
2. If a Gigabit Ethernet (GigE) interconnect is configured, this port (labeled NIC2) is used for the interconnect connection. Otherwise, it is used for an external connection.
3. The iLO2 Ethernet port is the connection to the Console Switch.

### Setup Procedure

Perform the following procedure from the iLO Setup Utility for each HP ProLiant DL585 and DL585 G2 node in the hardware configuration:

1. Use the instructions in the accompanying HP ProLiant hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F8** key when prompted to access the Integrated Lights Out Setup Utility.
3. Make the following iLO settings for each node depending on hardware model:
  - Table 4-34 provides the iLO settings for ProLiant DL585 nodes.
  - Table 4-35 provides the iLO settings for ProLiant DL585 G2 nodes.

**Table 4-34 iLO Settings for HP ProLiant DL585 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
<b>User</b>		<b>Add</b>	<p>Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.</p> <p>The user <code>Administrator</code> is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the <code>Administrator</code> user.</p> <p>You must use this user name and password to access the console port.</p>
<b>Network</b>	<b>DNS/DHCP</b>	<b>DHCP Enable</b>	<b>On</b>

Table 4-35 lists the iLO settings for ProLiant DL585 G2 nodes.

**Table 4-35 iLO Settings for HP ProLiant DL585 G2 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
<b>User</b>		<b>Add</b>	<p>Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.</p> <p>The user <code>Administrator</code> is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the <code>Administrator</code> user.</p> <p>You must use this user name and password to access the console port.</p>
<b>Network</b>	<b>DNS/DHCP</b>	<b>DHCP Enable</b>	<b>On</b>
<b>Settings</b>	<b>CLI</b>	<b>Serial CLI Speed (bits/seconds)</b>	<b>115200</b> (Press the <b>F10</b> key to save the setting.)

4. Select **File**→**Exit** to exit the Integrated Lights Out Setup Utility and resume the power-on self-test.
5. Watch the screen carefully, and press the **F9** key when prompted to access the ROM-Based Setup Utility (RBSU).

Perform the following procedure for each HP ProLiant DL585 and DL585 G2 node in the hardware configuration:

1. Make the RBSU settings accordingly for each node. The settings differ depending on the hardware model generation:
  - Table 4-36 provides the RBSU settings for the HP ProLiant DL585 nodes.
  - Table 4-37 provides the RBSU settings for the HP ProLiant DL585 G2 nodes.

**Table 4-36 RBSU Settings for HP ProLiant DL585 Nodes**

Menu Name	Option Name	Set to This Value
<b>System Options</b>	<b>Embedded Serial Port</b>	Disabled
	<b>Virtual Serial Port</b>	COM1; IRQ4; IO:3F8h-3FFh
	<b>Embedded NIC Port 1 PXE Support</b>	Enabled (all nodes except the head node)
	<b>Embedded NIC Port 1 PXE Support</b>	Disabled (head node only)
	<b>Power Regulator for ProLiant</b>	Disabled
<b>Standard Boot Order (IPL)</b>		Set the following boot order on <b>all nodes except the head node</b> ; the CD-ROM must be listed before the hard drive.
	<b>IPL1</b>	CD-ROM
	<b>IPL2</b>	Floppy Drive (A:)
	<b>IPL3</b>	PCI Embedded HP NC7782 Gigabit Server Adapter Port 1
	<b>IPL4</b>	Hard Drive (C:)
		On the <b>head node</b> , set the boot order so that the CD-ROM is listed before the hard disk.
<b>BIOS Serial Console and EMS</b>	<b>BIOS Serial Console Port</b>	COM1; IRQ4; IO:3F8h-3FFh
	<b>BIOS Serial Console Baud Rate</b>	115200
	<b>EMS Console</b>	Disabled
	<b>BIOS Interface Mode</b>	Command Line
<b>Advanced Options</b>	<b>page Directory Cache (PDC)</b>	Disabled

Table 4-37 lists the RBSU setting for the DL585 G2 nodes.

**Table 4-37 RBSU Settings for HP ProLiant DL585 G2 Nodes**

Menu Name	Option Name	Set to This Value
<b>System Options</b>	<b>Embedded Serial Port</b>	Disabled
	<b>Virtual Serial Port</b>	COM1
	<b>Embedded NICs/NIC 1 boot Options</b>	On all nodes except the head node, set this value to PXE boot
	<b>Embedded NICs/NIC 2 boot Options</b>	Disabled (head node only)
	<b>Power Regulator for ProLiant</b>	OS Control Mode

**Table 4-37 RBSU Settings for HP ProLiant DL585 G2 Nodes** *(continued)*

Menu Name	Option Name	Set to This Value
<b>Standard Boot Order (IPL)</b>		<p>Set the following boot order on <b>all nodes except the head node</b>; the CD-ROM must be listed before the hard drive:</p> <ul style="list-style-type: none"> <li>• IPL:1 CD-ROM</li> <li>• IPL:2 Floppy Drive (A:)</li> <li>• IPL:3 USB Drive Key (C:)</li> <li>• IPL:4 PCI Embedded HP NC373i Multifunction Gigabit Adapter</li> <li>• IPL:5 Hard Drive C:</li> </ul> <p>Set the following boot order on the <b>head node</b>:</p> <ul style="list-style-type: none"> <li>• IPL:1 CD-ROM</li> <li>• IPL:2 Floppy Drive (A:)</li> <li>• IPL:3 USB Drive Key (C:)</li> <li>• IPL:4 Hard Drive C:</li> </ul>
<b>BIOS Serial Console and EMS</b>	<b>BIOS Serial Console Port</b>	COM1
	<b>BIOS Serial Console Baud Rate</b>	115200
	<b>EMS Console</b>	Disabled
	<b>BIOS Interface Mode</b>	Command Line
<b>Advanced</b>	<b>Linux x86_64 HPET Option</b>	Enabled

2. Press the **Esc** key to exit the RBSU. Press the **F10** key to confirm your choice and restart the boot sequence.
3. Repeat this procedure for each node HP ProLiant DL585 G2 node in the hardware configuration.

### Configuring Smart Arrays

On such hardware models as the HP ProLiant DL585 and DL585 G2 with smart array cards, you must add the disks to the smart array before attempting to image the node.

To do so, watch the screen carefully during the power-on self-test phase of the node, and press the **F8** key when prompted to configure the disks into the smart array.

Specific instructions are outside the scope of the HP XC documentation. See the documentation that came with the HP ProLiant server for more information.

## 4.7.9 Preparing HP ProLiant DL585 G5 Nodes

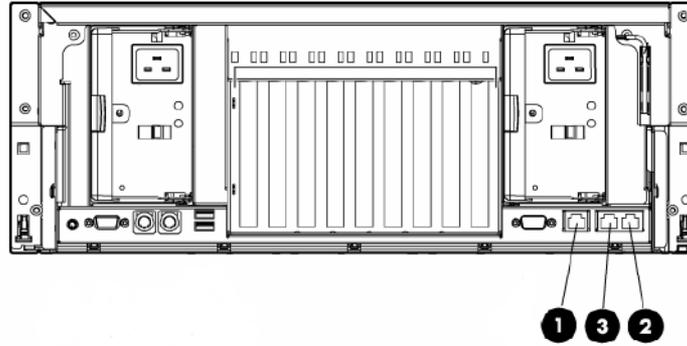
On HP ProLiant DL585 G5 servers, use the following tools to configure the appropriate settings for an HP XC system:

- Integrated Lights Out (iLO) Setup Utility
- ROM-Based Setup Utility (RBSU)

HP ProLiant DL585 G5 servers use the iLO utility; thus, they need certain settings that you cannot make until the iLO has an IP address. The *HP XC System Software Installation Guide* provides instructions for using a browser to connect to the iLO to enable telnet access.

Figure 4-22 shows a rear view of the HP ProLiant DL585 G5 server and the appropriate port assignments for an HP XC system.

Figure 4-22 HP ProLiant DL585 G5 Server Rear View



The callouts in the figure enumerate the following:

1. The iLO2 Ethernet port is the connection to the Console Switch.
2. NIC1 is the connection to the Administration Switch (branch or root).
3. If a Gigabit Ethernet (GigE) interconnect is configured, this port (labeled NIC2) is used for the interconnect connection. Otherwise, it is used for an external connection.

### Setup Procedure

Perform the following procedure from the iLO Setup Utility for each HP ProLiant DL585 G5 node in the hardware configuration:

1. Use the instructions in the accompanying HP ProLiant hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F8** key when prompted to access the Integrated Lights Out Setup Utility.
3. Make the following iLO settings for each DL585 G5 node, as shown in Table 4-38:

Table 4-38 iLO Settings for HP ProLiant DL585 G5 Nodes

Menu Name	Submenu Name	Option Name	Set to This Value
<b>User</b>		<b>Add</b>	Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.  The user <code>Administrator</code> is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the <code>Administrator</code> user.  You must use this user name and password to access the console port.
<b>Network</b>	<b>DNS/DHCP</b>	<b>DHCP Enable</b>	<b>On</b>
<b>Settings</b>	<b>CLI</b>	<b>Serial CLI Speed (bits/seconds)</b>	<b>115200</b> (Press the <b>F10</b> key to save the setting.)

4. Select **File**→**Exit** to exit the Integrated Lights Out Setup Utility and resume the power-on self-test.
5. Watch the screen carefully, and press the **F9** key when prompted to access the ROM-Based Setup Utility (RBSU).

Perform the following procedure for each HP ProLiant DL585 G5 node in the hardware configuration:

1. Make the RBSU settings for each node; Table 4-39 lists the RBSU setting for the DL585 G5 nodes.

**Table 4-39 RBSU Settings for HP ProLiant DL585 G5 Nodes**

Menu Name	Option Name	Set to This Value
<b>System Options</b>	<b>Embedded Serial Port</b>	Disabled
	<b>Virtual Serial Port</b>	COM1
	<b>Embedded NICs/NIC 1 boot Options</b>	On all nodes except the head node, set this value to <b>PXE boot</b>
	<b>Embedded NICs/NIC 2 boot Options</b>	Disabled (head node only)
	<b>Power Regulator for ProLiant</b>	OS Control Mode
<b>Standard Boot Order (IPL)</b>		<p>Set the following boot order on <b>all nodes except the head node</b>; the CD-ROM must be listed before the hard drive:</p> <ul style="list-style-type: none"> <li>• IPL:1 CD-ROM</li> <li>• IPL:2 Floppy Drive (A:)</li> <li>• IPL:3 USB Drive Key (C:)</li> <li>• IPL:4 PCI Embedded HP NC371i Multifunction Gigabit Adapter</li> <li>• IPL:5 Hard Drive C:</li> </ul> <p>Set the following boot order on the <b>head node</b>:</p> <ul style="list-style-type: none"> <li>• IPL:1 CD-ROM</li> <li>• IPL:2 Floppy Drive (A:)</li> <li>• IPL:3 USB Drive Key (C:)</li> <li>• IPL:4 Hard Drive C:</li> </ul>
<b>BIOS Serial Console and EMS</b>	<b>BIOS Serial Console Port</b>	COM1
	<b>BIOS Serial Console Baud Rate</b>	115200
	<b>EMS Console</b>	Disabled
	<b>BIOS Interface Mode</b>	Command Line
<b>Advanced</b>	<b>Linux x86_64 HPET Option</b>	Enabled

2. Press the **Esc** key to exit the RBSU. Press the **F10** key to confirm your choice and restart the boot sequence.
3. Repeat this procedure for each node HP ProLiant DL585 G5 node in the hardware configuration.

### Configuring Smart Arrays

On HP ProLiant DL585 G5 nodes with smart array cards, you must add the disks to the smart array before attempting to image the node.

To do so, watch the screen carefully during the power-on self-test phase of the node, and press the **F8** key when prompted to configure the disks into the smart array.

Specific instructions are outside the scope of the HP XC documentation. For more information, see the documentation that came with the HP ProLiant server.

## 4.7.10 Preparing HP ProLiant DL785 G5 Nodes

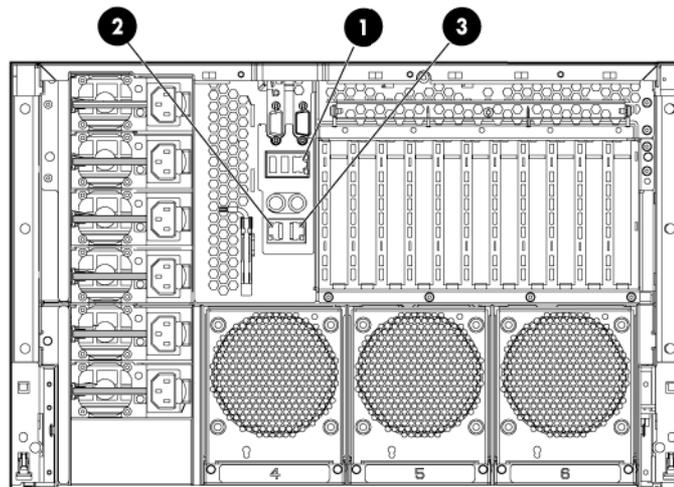
On HP ProLiant DL785 G5 servers, use the following tools to configure the appropriate settings for an HP XC system:

- Integrated Lights Out (iLO) Setup Utility
- ROM-Based Setup Utility (RBSU)

HP ProLiant DL785 G5 servers use the iLO utility; thus, they need certain settings that you cannot make until the iLO has an IP address. The *HP XC System Software Installation Guide* provides instructions for using a browser to connect to the iLO to enable `telnet` access.

Figure 4-23 shows a rear view of the HP ProLiant DL785 G5 server and the appropriate port assignments for an HP XC system.

**Figure 4-23 HP ProLiant DL785 G5 Server Rear View**



The callouts in the figure enumerate the following:

1. The iLO2 Ethernet port is the connection to the Console Switch.
2. NIC1 is the connection to the Administration Switch (branch or root).
3. If a Gigabit Ethernet (GigE) interconnect is configured, this port (labeled NIC2) is used for the interconnect connection. Otherwise, it is used for an external connection.

### Setup Procedure

Perform the following procedure from the iLO Setup Utility for each HP ProLiant DL785 G5 node in the hardware configuration:

1. Use the instructions in the accompanying HP ProLiant hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. Turn on power to the node. Watch the screen carefully during the power-on self-test, and press the **F8** key when prompted to access the Integrated Lights Out Setup Utility.
3. Make the following iLO settings for each DL785 G5 node, as shown in Table 4-40:

**Table 4-40 iLO Settings for HP ProLiant DL785 G5 Nodes**

Menu Name	Submenu Name	Option Name	Set to This Value
<b>User</b>		<b>Add</b>	<p>Create a common iLO user name and password for every node in the hardware configuration. The password must have a minimum of 8 characters by default, but this value is configurable.</p> <p>The user <code>Administrator</code> is predefined by default, but you must create your own user name and password. For security purposes, HP recommends that you delete the <code>Administrator</code> user.</p> <p>You must use this user name and password to access the console port.</p>
<b>Network</b>	<b>DNS/DHCP</b>	<b>DHCP Enable</b>	<b>On</b>
<b>Settings</b>	<b>CLI</b>	<b>Serial CLI Speed (bits/seconds)</b>	<b>115200</b> (Press the <b>F10</b> key to save the setting.)

4. Select **File**→**Exit** to exit the Integrated Lights Out Setup Utility and resume the power-on self-test.
5. Watch the screen carefully, and press the **F9** key when prompted to access the ROM-Based Setup Utility (RBSU).

Perform the following procedure for each HP ProLiant DL785 G5 node in the hardware configuration:

1. Make the RBSU settings for each node; Table 4-41 lists the RBSU setting for the DL785 G5 nodes.

**Table 4-41 RBSU Settings for HP ProLiant DL785 G5 Nodes**

Menu Name	Option Name	Set to This Value
<b>System Options</b>	<b>Embedded Serial Port</b>	Disabled
	<b>Virtual Serial Port</b>	COM1
	<b>Embedded NICs/NIC 1 boot Options</b>	On all nodes except the head node, set this value to <b>PXE boot</b>
	<b>Embedded NICs/NIC 2 boot Options</b>	Disabled (head node only)
	<b>Power Regulator for ProLiant</b>	OS Control Mode
<b>Standard Boot Order (IPL)</b>		<p>Set the following boot order on <b>all nodes except the head node</b>; the CD-ROM must be listed before the hard drive:</p> <ul style="list-style-type: none"> <li>• IPL:1 CD-ROM</li> <li>• IPL:2 Floppy Drive (A:)</li> <li>• IPL:3 USB Drive Key (C:)</li> <li>• IPL:4 PCI Embedded HP NC373i Multifunction Gigabit Adapter</li> <li>• IPL:5 Hard Drive C:</li> </ul> <p>Set the following boot order on the <b>head node</b>:</p> <ul style="list-style-type: none"> <li>• IPL:1 CD-ROM</li> <li>• IPL:2 Floppy Drive (A:)</li> <li>• IPL:3 USB Drive Key (C:)</li> <li>• IPL:4 Hard Drive C:</li> </ul>
<b>BIOS Serial Console and EMS</b>	<b>BIOS Serial Console Port</b>	COM1
	<b>BIOS Serial Console Baud Rate</b>	115200
	<b>EMS Console</b>	Disabled
	<b>BIOS Interface Mode</b>	Command Line

2. Press the **Esc** key to exit the RBSU. Press the **F10** key to confirm your choice and restart the boot sequence.
3. Repeat this procedure for each node HP ProLiant DL785 G5 node in the hardware configuration.

### Configuring Smart Arrays

On HP ProLiant DL785 G5 nodes with smart array cards, you must add the disks to the smart array before attempting to image the node.

To do so, watch the screen carefully during the power-on self-test phase of the node, and press the **F8** key when prompted to configure the disks into the smart array.

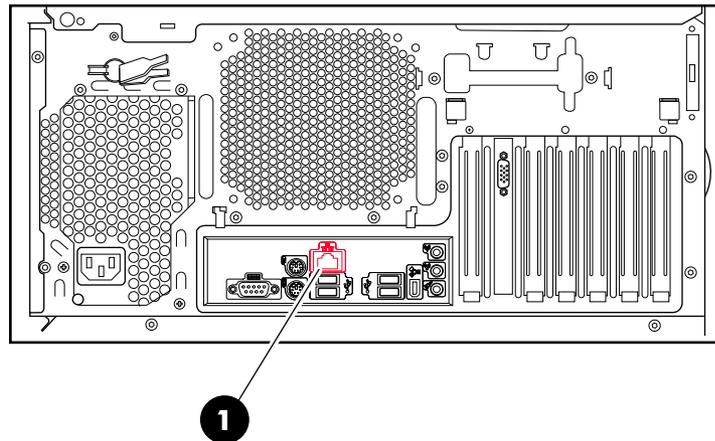
Specific instructions are outside the scope of the HP XC documentation. For more information, see the documentation that came with the HP ProLiant server.

## 4.7.11 Preparing HP xw9300 and xw9400 Workstations

HP xw9300 and xw9400 workstations are typically used when the HP Scalable Visual Array (SVA) software is installed and configured to interoperate on an HP XC system. Configuring an xw9300 or xw9400 workstation as the HP XC head node is supported.

Figure 4-24 shows a rear view of the xw9300 workstation and the appropriate port connections for an HP XC system.

**Figure 4-24 xw9300 Workstation Rear View**

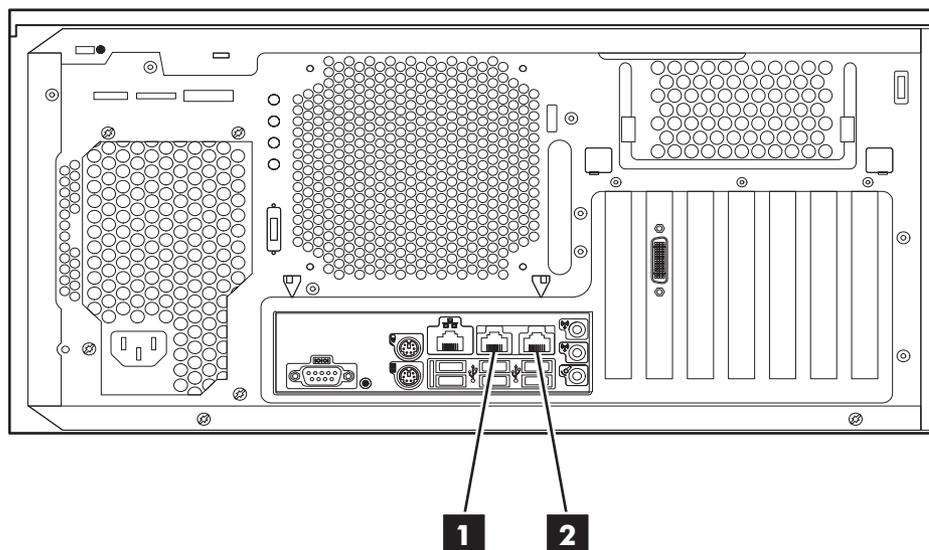


The callout in the figure enumerates the following:

1. This port is used for the connection to the administration network.

Figure 4-25 shows a rear view of the xw9400 workstation and the appropriate port connections for an HP XC system.

**Figure 4-25 xw9400 Workstation Rear View**



The callouts in the figure enumerate the following:

1. If a Gigabit Ethernet (GigE) interconnect is configured, this port is used for the interconnect connection. Otherwise, it is used for an external connection.
2. This port is used for the connection to the administration network.

## Setup Procedure

Use the Setup Utility to configure the appropriate settings for an HP XC system.

Perform the following procedure for each workstation in the hardware configuration. Change only the values described in this procedure; do not change any other factory-set values unless you are instructed to do so:

1. Use the instructions in the accompanying hardware documentation to connect a monitor, mouse, and keyboard to the node and establish a connection to the console.
2. Turn on power to the workstation.
3. When the node is powering up, press the **F10** key to access the Setup Utility.
4. When prompted, press any key to continue.
5. Select English as the language.
6. Make the appropriate settings for the workstation depending on hardware model:
  - Table 4-42 describes the settings for the xw9300 workstation.
  - Table 4-43 describes the settings for the xw9400 workstation.

**Table 4-42 Setup Utility Settings for xw9300 Workstations**

Menu Name	Submenu Name	Option Name	Set to This Value
Storage		Boot Order	Set the following boot order on <b>all nodes except the head node</b> ; CD-ROM does not have to be first in the list, but it must be listed before the hard disk: <ol style="list-style-type: none"><li>1. IDE CD-ROM Drive</li><li>2. USB device</li><li>3. Network Controller</li><li>4. Hard Drive (C:)</li></ol> On the <b>head node</b> , set the boot order so that the CD-ROM is listed before the hard disk.
Advanced	Power/Sleep/Wake	After Power Loss	On

Table 4-43 describes the settings for the xw9400 workstation.

**Table 4-43 Setup Utility Settings for xw9400 Workstations**

Menu Name	Submenu Name	Option Name	Set to This Value
Storage		Boot Order	Set the following boot order on <b>all nodes except the head node</b> ; CD-ROM does not have to be first in the list, but it must be listed before the hard disk: <ol style="list-style-type: none"><li>1. Optical Drive</li><li>2. USB device</li><li>3. nVidia Network Controller 1</li><li>4. Hard Drive (C:)</li><li>5. nVidia Network Controller 2</li></ol> Set the boot order on the <b>head node</b> as follows: <ol style="list-style-type: none"><li>1. Optical Drive</li><li>2. USB device</li><li>3. Hard Drive (C:)</li><li>4. nVidia Network Controller 1</li><li>5. nVidia Network Controller 2</li></ol>
Advanced	Power/Sleep/Wake	After Power Loss	On

7. Select **File**→**Save Changes & Exit** to exit the Setup Utility.
8. Repeat this procedure for each workstation in the hardware configuration.
9. Turn off power to all nodes except the head node.

10. Follow the software installation instructions in the *HP XC System Software Installation Guide* to install the HP XC System Software.

## 4.8 Preparing the Hardware for CP4000BL Systems

Perform the following tasks on each server blade in the hardware configuration after the head node is installed and the switches are discovered:

- Set the boot order
- Create an iLO2 user name and password
- Set the power regulator
- Configure smart array devices

Use the Onboard Administrator, the iLO2 web interface, and virtual media to make the appropriate settings on HP ProLiant Server Blades.



**NOTE:** The following setup procedure continues from the procedure in “Setting the Onboard Administrator Password” (page 62), in which you used a browser to log in to the Onboard Administrator for the enclosure.

### Setup Procedure

Use the following procedure to prepare the CP4000BL server blades:

1. In the left frame of the HP Onboard Administrator browser window, click the plus sign (+) next to **Device Bays** to display the list of nodes contained in the enclosure.
2. Click the link to the first hardware model in the list. Wait a few seconds until the frame to the right is populated with node-specific information.
3. Click the **Boot Options** tab.
  - a. Select a boot device, and use the up and down arrows on the screen to position the device so that it matches the boot order listed in Table 4-44.

**Table 4-44 Boot Order for HP ProLiant Server Blades**

Head Node	All Other Nodes
Set the following boot order on the head node: <ol style="list-style-type: none"><li>1. USB</li><li>2. Floppy</li><li>3. CD</li><li>4. Hard Disk</li><li>5. PXE NIC1</li></ol>	Set the following boot order on all nodes except the head node: <ol style="list-style-type: none"><li>1. USB</li><li>2. Floppy</li><li>3. CD</li><li>4. PXE NIC 1</li><li>5. Hard Disk</li></ol>

- b. Click the **Apply** button.
4. In the left frame, do the following to create a new iLO2 user name and password on this node:
    - a. Under the hardware model, click **iLO**.
    - b. In the body of the main window, click the **Web Administration** link to open the Integrated Lights-Out 2 utility in a new window. You might have to turn off popup blocking for this window to open.
    - c. In the new window, click the **Administration** tab.
    - d. In the left frame, click the **User Administration** link.
    - e. Click the **New** button, and create a new iLO2 user name and password, which must match the user name and password you set on the Onboard Administrator. Do not use any special characters as part of the password.

You use this user name and password whenever you need to access the console port with the `telnet cp-nodename` command.

- f. The Onboard Administrator automatically creates user accounts for itself (prefixed with the letters OA) to provide single sign-on capabilities. Do not remove these accounts.
5. Enable **telnet** access:
  - a. In the left frame, click **Access**.
  - b. Click the control to enable **Telnet Access**.
  - c. Click the **Apply** button to save the settings.
6. Click the **Virtual Devices** tab and make the following settings:
  - a. For every node except the head node, select **No** to **Automatically Power On Server** because you do not want to automatically turn on power to the node.
  - b. Click the **Submit** button.
  - c. In the left frame, click on the **Power Regulator** link.
  - d. Select **Enable OS Control Mode**.
  - e. Click the **Apply** button to save the settings.
7. Configure disks into the smart array from the remote graphics console.

All server blades have smart array cards, you must add the disk or disks to the smart array before attempting to image the node.

To set up the smart array device, click the **Remote Console** tab on the virtual console page of the iLO2 Web Administration Utility, and then do one of the following depending on the browser type.

#### Internet Explorer

If you are using Internet Explorer as your browser, do the following:

- a. Click the **Integrated Remote Console** link to open a remote console window which provides access to the graphics console virtual media and power functions.
- b. In the remote console window, click the **Power** button.
- c. Click the **Momentary Press** button.
- d. Wait a few seconds for the power up phase to begin. Click the MB1 mouse button in the remote console window to put the pointer focus in this window so that your keyboard strokes are recognized.
- e. Proceed to Step 8.

#### Mozilla Firefox

If you are using Mozilla Firefox as your browser, do the following:

- a. Click the **Remote Console** link to open a virtual console window.
  - b. Go back to the iLO2 utility Web page and click the **Virtual Devices** tab.
  - c. Click the **Momentary Press** button.
  - d. Go back to the remote console window. Wait a few seconds for the power up phase to begin. Click the MB1 mouse button in this window to put the pointer focus in the remote console window so that your keyboard strokes are recognized in this window.
  - e. Proceed to Step 8.
8. Watch the screen carefully during the power-on self-test phase, and press the **F8** key when you are prompted to configure the disks into the smart array. Select **View Logical Drives** to determine if a logical drives exists. If a logical drive is not present, create one.

If you create a logical drive, exit the SmartArray utility and power off the node. Do not let it try to boot up.

Specific smart array configuration instructions are outside the scope of this document. See the documentation that came with your model of HP ProLiant server for more information.

9. Perform this step for HP ProLiant BL685c nodes; proceed to the next step for all other hardware models.

On an HP ProLiant BL685c node, watch the screen carefully during the power-on self-test, and press the **F9** key to access the ROM-Based Setup Utility (RBSU) to enable HPET as shown Table 4-45.

**Table 4-45 Additional BIOS Setting for HP ProLiant BL685c Nodes**

Menu Name	Option Name	Set To This Value
Advanced	Linux x86_64 HPET	Enabled

Press the **F10** key to exit the RBSU. The server automatically restarts.

10. Use the virtual power functions to turn off power to the server blade.
11. Close the iLO2 utility Web page.
12. Repeat this procedure from every active Onboard Administrator and make the same settings for each server blade in each enclosure.

After preparing all the nodes in the enclosures, return to the *HP XC System Software Installation Guide* to discover all the nodes and enclosures in the HP XC system.

## 4.9 Preparing the Hardware for CP6000 (Intel Itanium) Systems

Follow the procedures in this section to prepare HP Integrity servers before installing and configuring the HP XC System Software. The following topics, including setup information for specific hardware models, are discussed:

- “Setting Static IP Addresses on Integrity Servers” (page 122)
- “Preparing HP Integrity rx1620 and rx2600 Nodes” (page 122)
- “Preparing HP Integrity rx2620 Nodes” (page 125)
- “Preparing HP Integrity rx2660 Nodes” (page 127)
- “Preparing HP Integrity rx4640 Nodes” (page 129)
- “Preparing HP Integrity rx8620 Nodes” (page 131)



### About the EFI Boot Manager User Interface:

Two user interfaces for the EFI Boot Manager utility are available: the *Enhanced* and *Legacy* interfaces. The setup instructions described here are based on the *Enhanced* interface. To change the user interface on the system, use the **Set User Interface** menu option.

### 4.9.1 Setting Static IP Addresses on Integrity Servers



**IMPORTANT:** Integrity nodes are configured with static addresses, not DHCP. On an HP XC system with one or more such nodes, you must configure the Management Processor (MP) on all nodes for static IP addresses rather than DHCP.

You configure IP addresses from the Command Menu of the Management Processor (MP). The **LC** command configures the IP address, subnet mask, and default gateway address for the HP Integrity MP interfaces; do not configure an IP address for the slave MP.

You must plan the IP addresses ahead of time. The following example illustrates how to plan IP addresses. The information required for a 16–node cluster rx8620 server is as follows:

- Gateway address is 172.21.0.16 (default based on 16 nodes).
- Subnet mask address is 255.0.0.0.
- IP addresses are listed in Table 4-46.

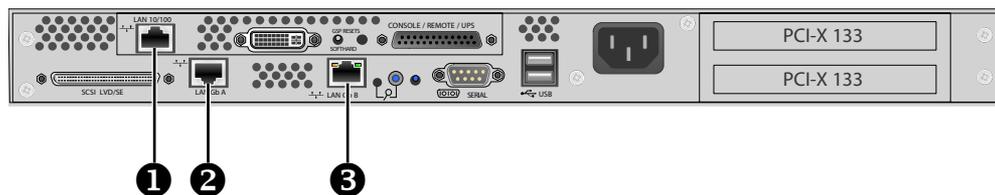
**Table 4-46 Setting Static IP Addresses for MP Power Management Devices**

Node	IP Address	26xx ProCurve Port
First node after the head node is n15	172.21.0.15	
Second node after the head node is n14	172.21.0.14	
Third node after the head node is n13	172.21.0.13	
(. . .)	(. . .)	
First rx8620 master MP	172.21.0.x	n
First rx8620 slave MP	N/A	n-1
Second rx8620 master MP	172.21.0.x-2	n-2
Second rx8620 slave MP	N/A	n-3

### 4.9.2 Preparing HP Integrity rx1620 and rx2600 Nodes

Figure 4-26 shows a rear view of the HP Integrity rx1620 server and the appropriate port assignments for an HP XC system.

Figure 4-26 HP Integrity rx1620 Server Rear View



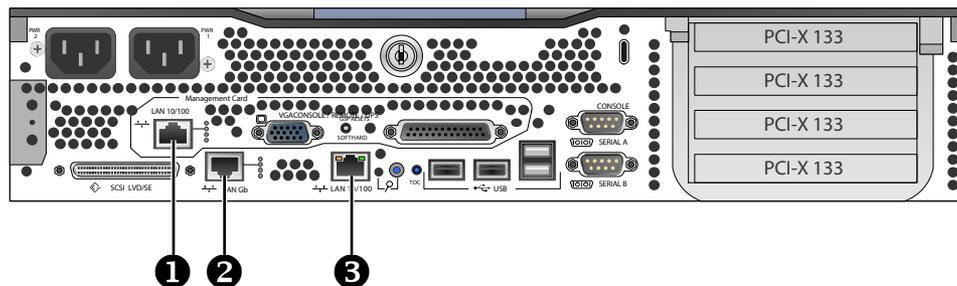
The callouts in the figure enumerate the following:

1. The port labeled LAN 10/100 is the MP connection to the ProCurve Console Switch.
2. The port labeled LAN Gb A connects to the Administration Switch (branch or root).
3. The port labeled LAN Gb B is used for an external connection.

Figure 4-27 shows a rear view of the HP Integrity rx2600 server and the appropriate port assignments for an HP XC system.

The high-speed interconnect card such as an InfiniBand or QsNet<sup>II</sup> card **must be** inserted into the top PCI-X slot. The external connection is made on the Ethernet adapter card.

Figure 4-27 HP Integrity rx2600 Server Rear View



The callouts in the figure enumerate the following:

1. The top port labeled LAN 10/100 is the MP connection to the ProCurve Console Switch.
2. The port labeled LAN Gb connects to the Administration Switch (branch or root).
3. The bottom port labeled LAN 10/100 is unused.

### Setup Procedure

Perform the following procedure on each HP Integrity server model rx1620 and rx2600:

1. Use the instructions in the accompanying hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. For each node in the system, ensure that the power cord is connected but that the is not turned on.
3. Follow this procedure to connect a personal computer to the Management Processor:
  - a. Connect a three-way DB9-25 cable to the MP DB-25 port on the back of the HP Integrity rx2600 server.
  - b. Connect the CONSOLE connector to a null modem cable, and connect the null modem cable to the PC COM1 port.
  - c. Use a terminal emulator, such as HyperTerminal, to open a terminal window.
  - d. Press the **Enter** key to access the MP. If there is no response, press the MP reset pin on the back of the MP and try again.

- e. Log in to the MP using the default user name and password shown on the screen. The **MP Main Menu** appears:

MP MAIN MENU:

```
CO: Console
VFP: Virtual Front Panel
CM: Command Menu
SMCLP: Server Management Command Line Protocol
CL: Console Log
SL: Show Event Logs
HE: Main Help Menu
X: Exit Connection
```

4. Enter **SL** to show event logs. Then, enter **C** to clear all log files and **Y** to confirm.
5. Enter **CM** to display the **Command Menu**.
6. Perform the following steps to ensure that the **IPMI over LAN** option is set. This setting is required for Nagios monitoring.
  - a. Enter **LC**.
  - b. Verify the **IPMI over LAN** option is enabled.
  - c. Enable this option if it is disabled.
  - d. Return to the **Command Menu**.
7. Enter **UC** and use the menu options to remove the default MP user name and password and create your own unique user name and password. HP recommends setting your own user name and password for security purposes.

The user name must have a minimum of 6 characters, and the password must have a minimum of 8 characters. You must set the same user name and password on every node. The user name and password are required to access the power management device and console.

8. If required, set static IP addresses. For more information, see “Setting Static IP Addresses on Integrity Servers” (page 122).
9. Enter **PC** (power cycle) and then enter **on** to turn on power to the node.
10. Press **Ctrl-B** to return to the **MP Main Menu**.
11. Enter **CO** to connect to the console.
12. Perform this step on all nodes except the head node. From the **EFI Boot Manager** menu, which is displayed when the node is powering on, select the **Boot Configuration** menu.

Do the following from the **Boot Configuration** menu:

- a. Select **Add Boot Entry**.
- b. Select the network boot device, which is a Gigabit Ethernet (GigE) port:
  - On HP Integrity rx1620 servers, select **Load File [Core LAN Gb A]**.
  - On HP Integrity rx2600 servers, select **[Acpi(HWP0002,100)/Pci(2|0)/Mac(XXXXXXXXXXXX)]**.
- c. Enter the string **Netboot** as the boot option description. This entry is required and must be set to the string **Netboot** (with a capital letter N).
- d. Press the **Enter** key when prompted to enter a load option.
- e. If prompted, save the entry to NVRAM.
- f. Enter **x** to return to the previous menu.

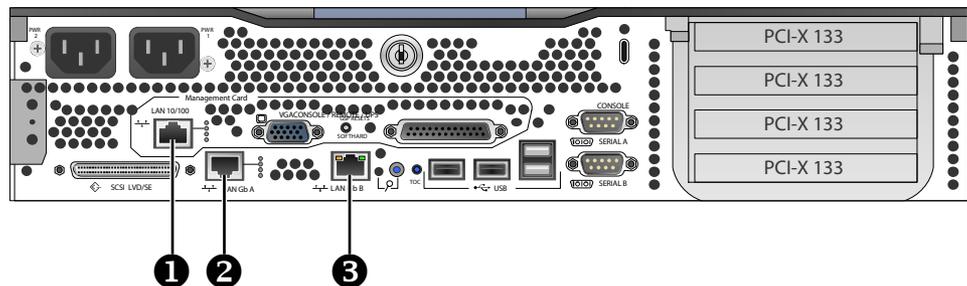
For more information about how to work with these menus, see the documentation that came with the HP Integrity server.

13. Perform this step on all nodes except the head node. From the **Boot Configuration** menu, select the **Edit OS Boot Order** option.  
Do the following from the **Edit OS Boot Order** option:
  - a. Use the navigation instructions shown on the screen to move the Netboot entry you just defined to the top of the boot order.
  - b. If prompted, save the setting to NVRAM.
  - c. Enter **x** to return to the previous menu.
14. Perform this step on all nodes, including the head node.  
Select the **Console Configuration** option, and do the following:
  - a. Enable the **Serial Acpi(HWP0002,PNP0A03,700)/Pci(1|1) Vt100+ 9600** option.
  - b. Press the **Esc** key or enter **x** as many times as necessary to return to the **Boot Configuration** menu.
  - c. When prompted, save the entry to NVRAM.
15. Turn off power to the node:
  - a. Press **Ctrl-B** to exit console mode.
  - b. Enter **CM** to display the **Command Menu**.
  - c. Enter **PC** and enter **off** to turn off power to the node.

### 4.9.3 Preparing HP Integrity rx2620 Nodes

Figure 4-28 shows a rear view of the HP Integrity rx2620 server and the appropriate port assignments for an HP XC system.

**Figure 4-28 HP Integrity rx2620 Server Rear View**



The callouts in the figure enumerate the following:

1. The port labeled LAN 10/100 is the MP connection to the ProCurve Console Switch.
2. The port labeled LAN Gb A connects to the Administration Switch (branch or root).
3. The port labeled LAN Gb B is used for an external connection.

#### Setup Procedure

Perform the following procedure on each HP Integrity rx2620 server:

1. Use the instructions in the accompanying hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. For each node in the system, ensure that the power cord is connected but that the processor is not turned on.
3. Follow this procedure to connect a personal computer to the Management Processor:
  - a. Connect a three-way DB9-25 cable to the MP DB-25 port on the back of the HP Integrity rx2620 server.
  - b. Connect the CONSOLE connector to a null modem cable, and connect the null modem cable to the PC COM1 port.

- c. Use a terminal emulator, such as HyperTerminal, to open a terminal window.
- d. Press the **Enter** key to access the MP. If there is no response, press the MP reset pin on the back of the MP and try again.
- e. Log in to the MP using the default user name and password shown on the screen. The MP Main Menu appears:

MP MAIN MENU:

```

CO: Console
VFP: Virtual Front Panel
CM: Command Menu
SMCLP: Server Management Command Line Protocol
CL: Console Log
SL: Show Event Logs
HE: Main Help Menu
X: Exit Connection

```

4. Enter **SL** to show event logs. Then, enter **C** to clear all log files and **Y** to confirm.
5. Enter **CM** to display the **Command Menu**.
6. Perform the following steps to ensure that the **IPMI over LAN** option is set. This setting is required for Nagios monitoring.
  - a. Enter **LC**.
  - b. Verify the **IPMI over LAN** option is enabled.
  - c. Enable this option if it is disabled.
  - d. Return to the **Command Menu**.
7. Enter **UC** and use the menu options to remove the default MP user name and password and create your own unique user name and password. HP recommends setting your own user name and password for security purposes.

The user name must have a minimum of 6 characters, and the password must have a minimum of 8 characters. You must set the same user name and password on every node. The user name and password are required to access the power management device and console.

8. If required, set static IP addresses. For more information, see “Setting Static IP Addresses on Integrity Servers” (page 122).
9. Enter **PC** (power cycle) and then enter **on** to turn on power to the node.
10. Press **Ctrl-B** to return to the **MP Main Menu**.
11. Enter **CO** to connect to the console.
12. Perform this step on all nodes except the head node. From the **Boot Menu** screen, which is displayed during the power on of the node, select the **Boot Configuration Menu**.

Do the following from the **Boot Configuration Menu**:

- a. Select **Add Boot Entry**.
- b. Select **Load File [Core LAN Gb A]** as the network boot choice, which is a Gigabit Ethernet (GigE) port.
- c. Enter the string **Netboot** as the boot option description. This entry is required and must be set to the string **Netboot** (with a capital letter N).
- d. Press the **Enter** key for no db-profile options.
- e. Press the **Enter** key for no boot options.
- f. If prompted, save the entry to NVRAM.

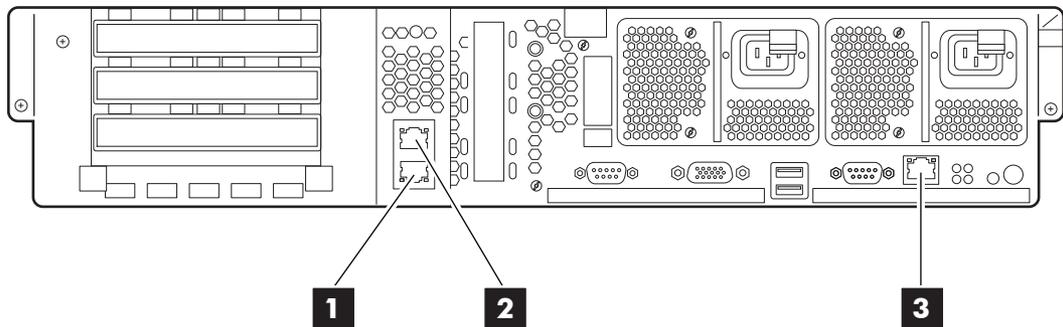
For more information about how to work with these menus, see the documentation that came with the HP Integrity server.

13. Perform this step on all nodes except the head node. From the **Boot Configuration** menu, select the **Edit OS Boot Order** option.  
Do the following:
  - a. Use the navigation instructions on the screen to move the Netboot entry you just defined to the top of the boot order.
  - b. If prompted, press the **Enter** key to select the position.
  - c. Enter **x** to return to the **Boot Configuration** menu.
14. Perform this step on all nodes, including the head node.  
Select the **Console Configuration** option, and do the following:
  - a. Enable the **Serial Acpi(HWP0002,PNP0A03,700)/Pci(1|1) Vt100+ 9600** option.
  - b. Press the **Esc** key or enter **x** as many times as necessary to return to the **Boot Configuration** menu.
  - c. When prompted, save the entry to NVRAM.
15. Turn off power to the node:
  - a. Press **Ctrl-B** to exit the console mode.
  - b. Enter **CM** to display the **Command Menu**.
  - c. Enter **PC** and enter **off** to turn off power to the node.

#### 4.9.4 Preparing HP Integrity rx2660 Nodes

Figure 4-29 shows a rear view of the HP Integrity rx2660 server and the appropriate port assignments for an HP XC system.

**Figure 4-29 HP Integrity rx2660 Server Rear View**



The callouts in the figure enumerate the following:

1. The LAN port labeled Gb 1 connects to the Administration Switch (branch or root).
2. The LAN port labeled Gb 2 is used for an external connection.
3. The port labeled MP LAN is the MP connection to the ProCurve Console Switch.

#### **Setup Procedure**

Perform the following procedure on each HP Integrity rx2660 server:

1. Use the instructions in the accompanying hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. For each node in the system, ensure that the power cord is connected but that the processor is not turned on.
3. Follow this procedure to connect a personal computer to the Management Processor (MP):
  - a. Connect a cable to the console port (located to the left of the MP LAN port) on the back of the HP Integrity rx2660 server.

- b. Connect the CONSOLE connector to a null modem cable, and connect the null modem cable to the PC COM1 port.
- c. Use a terminal emulator, such as HyperTerminal, to open a terminal window.
- d. Press the **Enter** key to access the MP. If the MP does not respond, press the MP reset pin on the back of the MP and try again.
- e. Log in to the MP using the default user name and password shown on the screen. The MP Main Menu appears:

MP MAIN MENU:

```

CO: Console
VFP: Virtual Front Panel
CM: Command Menu
SMCLP: Server Management Command Line Protocol
CL: Console Log
SL: Show Event Logs
HE: Main Help Menu
X: Exit Connection

```

4. Enter **SL** to show event logs. Then, enter **C** to clear all log files and **Y** to confirm.
5. Enter **CM** to display the **Command Menu**.
6. Perform the following steps to ensure that the **IPMI over LAN** option is set. This setting is required for Nagios monitoring.
  - a. Enter **SA**.
  - b. Verify the **IPMI over LAN** option is enabled.
  - c. Enable this option if it is disabled.
  - d. Return to the **Command Menu**.
7. Enter **UC** and use the menu options to remove the default MP user name and password and create your own unique user name and password. HP recommends setting your own user name and password for security purposes.

The user name must have a minimum of 6 characters, and the password must have a minimum of 8 characters. You must set the same user name and password on every node. You must have this user name and password to access the power management device and console.

8. If required, set static IP addresses. For more information, see [“Setting Static IP Addresses on Integrity Servers”](#) (page 122).
9. Enter **PC** (power cycle) and then enter **on** to turn on power to the node.
10. Press **Ctrl-B** to return to the **MP Main Menu**.
11. Enter **CO** to connect to the console.
12. Perform this step on all nodes except the head node. From the **Boot Menu** screen, which is displayed during the power on of the node, select the **Boot Configuration Menu**.

Do the following from the **Boot Configuration Menu**:

- a. Select **Add Boot Entry**.
- b. Select **Load File [Core LAN Gb A]** as the network boot choice, which is a Gigabit Ethernet (GigE) port.
- c. Enter the string **Netboot** as the boot option description. This entry is required and must be set to the string **Netboot** (with a capital letter N).
- d. Press the **Enter** key for no boot options.
- e. If prompted, save the entry to NVRAM.

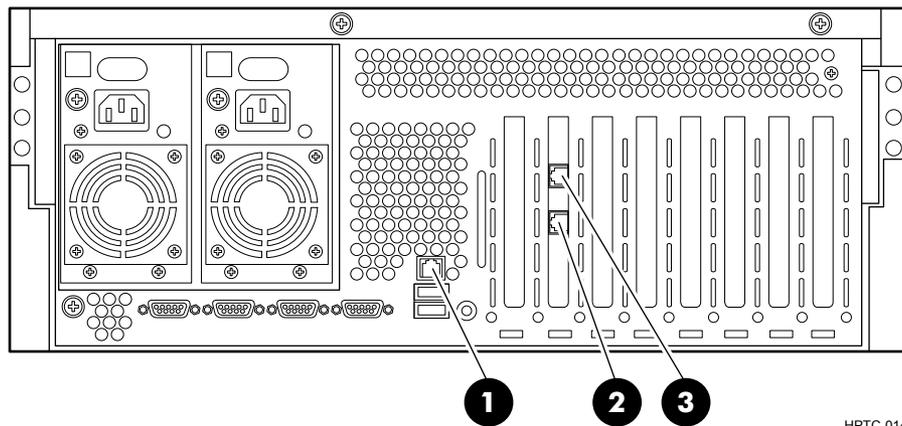
For more information about how to work with these menus, see the documentation that came with the HP Integrity server.

13. Perform this step on all nodes except the head node. From the **Boot Configuration** menu, select the **Edit OS Boot Order** option.  
Do the following:
  - a. Use the navigation instructions on the screen to move the Netboot entry you just defined to the top of the boot order.
  - b. If prompted, press the **Enter** key to select the position.
  - c. Enter **x** to return to the **Boot Configuration** menu.
14. Perform this step on all nodes, including the head node. Select the **Console Configuration** option, and set **Serial Acpi(HWP0002,PNP0A03,0)/Pci(1|2) Vt100+ 9600** as the primary console interface.
15. Press the **b** key to set the baud rate to 115200.
16. Press the **Esc** key or enter **x** as many times as necessary to return to the **Boot Menu**.
17. Turn off power to the node:
  - a. Press **Ctrl-B** to exit the console mode.
  - b. Enter **CM** to display the **Command Menu**.
  - c. Enter **PC** and enter **off** to turn off power to the node.

### 4.9.5 Preparing HP Integrity rx4640 Nodes

Figure 4-30 shows a rear view of the HP Integrity rx4640 server and the appropriate port assignments for an HP XC system.

**Figure 4-30 HP Integrity rx4640 Server Rear View**



The callouts in the figure enumerate the following:

1. The port labeled **MP LAN** is the MP connection to the ProCurve Console Switch.
2. The port labeled **LAN Gb** connects to the Administration Switch (branch or root).
3. This unlabeled port is used for an external connection.

#### **Setup Procedure**

Perform the following procedure on each HP Integrity rx4640 server:

1. Use the instructions in the accompanying hardware documentation to connect a monitor, mouse, and keyboard to the node.
2. For each node in the system, ensure that the power cord is connected but that the processor is not turned on.
3. Follow this procedure to connect a personal computer to the Management Processor:

- a. Connect a three-way DB9-25 cable to the MP DB-9 port on the back of the HP Integrity rx4640 server.  
This port is the first of the four DB9 ports at the bottom left of the server; it is labeled MP Local.
- b. Connect the CONSOLE connector to a null modem cable, and connect the null modem cable to the PC COM1 port.
- c. Use a terminal emulator, such as HyperTerminal, to open a terminal window.
- d. Press the **Enter** key to access the MP. If the MP does not respond, press the MP reset pin on the back of the MP and try again.
- e. Log in to the MP using the default user name and password shown on the screen. The MP Main Menu appears:

MP MAIN MENU:

```

CO: Console
VFP: Virtual Front Panel
CM: Command Menu
SMCLP: Server Management Command Line Protocol
CL: Console Log
SL: Show Event Logs
HE: Main Help Menu
X: Exit Connection

```

4. Enter **SL** to show event logs. Then, enter **C** to clear all log files and **Y** to confirm.
5. Enter **CM** to display the **Command Menu**.
6. Perform the following steps to ensure that the **IPMI over LAN** option is set. This setting is required for Nagios monitoring.
  - a. Enter **LC**.
  - b. Verify the **IPMI over LAN** option is enabled.
  - c. Enable this option if it is disabled.
  - d. Return to the **Command Menu**.
7. Enter **UC** and use the menu options to remove the default MP user name and password and create your own unique user name and password. HP recommends setting your own user name and password for security purposes.  
The user name must have a minimum of 6 characters, and the password must have a minimum of 8 characters. You must set the same user name and password on every node. You must have this user name and password to access the power management device and console.
8. If required, set static IP addresses. For more information, see “Setting Static IP Addresses on Integrity Servers” (page 122).
9. Enter **PC** (power cycle) and then enter **on** to turn on power to the node.
10. Press **Ctrl-B** to return to the **MP Main Menu**.
11. Enter **CO** to connect to the console.
12. Perform this step on all nodes except the head node. From the **Boot Menu** screen, which is displayed during the power on of the node, select the **Boot Configuration Menu**.

Do the following from the **Boot Configuration Menu**:

- a. Select **Add Boot Entry**.
- b. Select **Load File [Core LAN Gb A]** as the network boot choice, which is a Gigabit Ethernet (GigE) port.
- c. Enter the string **Netboot** as the boot option description. This entry is required and must be set to the string **Netboot** (with a capital letter N).
- d. Press the **Enter** key for no db-profile options.

- e. Press the **Enter** key for no boot options.
- f. When prompted, save the entry to NVRAM.

For more information about how to work with these menus, see the documentation that came with the HP Integrity server.

13. Perform this step on all nodes except the head node. From the **Boot Configuration** menu, select the **Edit OS Boot Order** option.

Do the following:

- a. Use the navigation instructions on the screen to move the Netboot entry you just defined to the top of the boot order.
- b. If prompted, press the **Enter** key to select the position.
- c. Enter **x** to return to the **Boot Configuration** menu.

14. Perform this step on all nodes, including the head node. Select the **Console Configuration** option, and do the following:

- a. Enable the **P Serial Acpi(HWP0002,PNP 0A03,0)/Pci(1|1) Vt100+ 9600** option on HP Integrity rx4640 servers.
- b. When prompted, save the entry to NVRAM.
- c. Enter **x** to return to the previous menu.

15. Turn off power to the node:

- a. Press **Ctrl-B** to exit the console mode.
- b. Enter **cm** to display the **Command Menu**.
- c. Enter **PC** and enter **off** to turn off power to the node.

## 4.9.6 Preparing HP Integrity rx8620 Nodes

Follow this procedure to prepare each HP Integrity rx8620 node.



**IMPORTANT:** Integrity rx8620 Nodes are configured with static addresses, not DHCP. On an HP XC system with one or more Integrity rx8620 nodes, you must configure the Management Processor (MP) on all nodes for static IP addresses rather than DHCP.

### General Hardware Preparation

The connection of nodes to ProCurve switch ports is important for the automatic discovery process.

1. Connect the Gigabit Ethernet ports on the HP Integrity rx8620 Core IO boards into the ProCurve 28xx switch at the next available ports. Use one Gigabit Ethernet port for each partition, for a total of two ports for one HP Integrity rx8620 node.

On each HP Integrity rx8620 node, connect partition 0 to the highest-numbered available open port, and connect partition 1 to the next lower-numbered port. Repeat this step for the next HP Integrity rx8620, and so on.

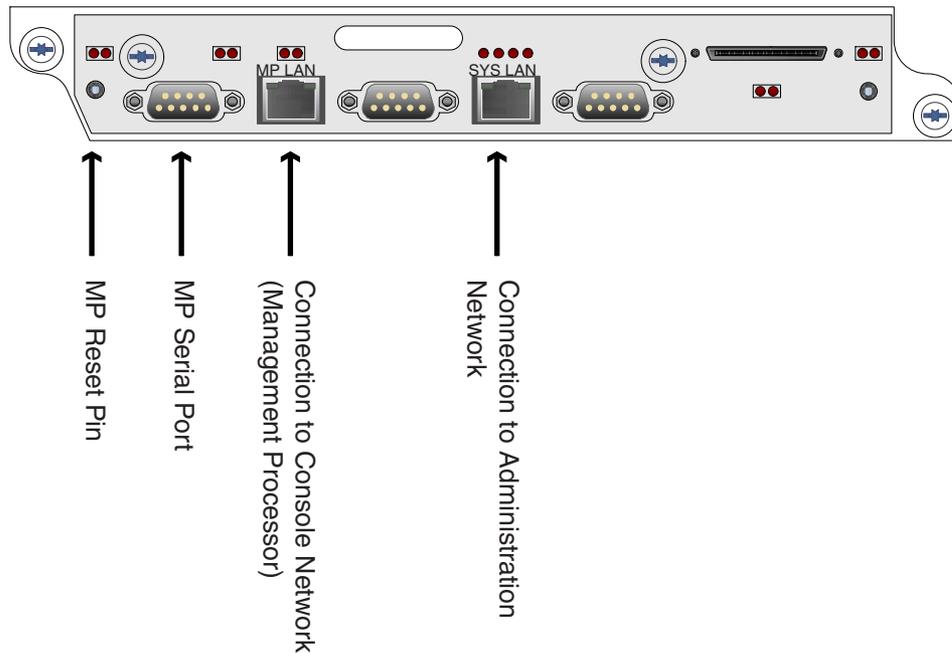
See Table 4-46 for more information.

2. Connect the Quadrics boards in the HP Integrity rx8620 partitions to the Quadrics switch using the same pattern as the Gigabit Ethernet connections to the ProCurve 28xx switches.

Connect partition 0 of the first HP Integrity rx8620 server to the highest available Quadrics switch port, which is followed by partition 1 to the next highest available switch port, which is followed by partition 0 of the second HP Integrity rx8620 server, and so on.

Figure 4-31 shows the HP Integrity rx8620 Core IO board and the appropriate connections to the administration network and console network.

Figure 4-31 HP Integrity rx8620 Core IO Board Connections



### Preparing Individual Nodes

Follow this procedure for each HP Integrity rx8620 node in the hardware configuration:

1. Ensure that the power cord is connected but that the processor is not turned on.
2. Connect a personal computer to the Management Processor (MP):
  - a. Connect a null modem serial cable between the MP serial port and the PC COM1 port.
  - b. Use a terminal emulator, such as HyperTerminal, to open a terminal window.
  - c. Press the **Enter** key to access the MP. If there is no response, press the MP reset pin on the back of the MP and try again.
  - d. Log in to the MP using the default user name and password shown on the screen. The **MP Main Menu** appears:

MP MAIN MENU:

```
CO: Console
VFP: Virtual Front Panel
CM: Command Menu
SMCLP: Server Management Command Line Protocol
CL: Console Log
SL: Show Event Logs
HE: Main Help Menu
X: Exit Connection
```

3. Enter **SL** to clear the error logs (**CLR**).
4. Enter **CM** to display the Command Menu.



---

**NOTE:** Most of the MP commands of the HP Integrity rx8620 are similar to the HP Integrity rx2600 MP commands, but there are some differences. The two MPs for the HP Integrity rx8620 operate in a master/slave relationship. Only the master MP, which is on Core IO board 0, is assigned an IP address. Core IO board 0 is always the top Core IO board. The slave MP is used only if the master MP fails.

---

5. Enter **LC** to configure the IP address, subnet mask, and default gateway address for the HP Integrity rx8620 master MP interfaces; do not configure an IP address for the slave MP.

See “Setting Static IP Addresses on Integrity Servers” (page 122) for information on static IP addresses.

Also verify the **IPMI over LAN** option is enabled. Enable this option if it is disabled. This setting is required for Nagios monitoring.

Return to the **Command Menu**.

6. Enter **XD** to apply your changes. Enter **R** to restart the MP.
7. Enter **CM** to return to the **Command Menu**.
8. Enter **SO** to set the MP user name and password. The user name must have a minimum of 6 characters, and the password must have a minimum of 8 characters. You must set the same user name and password on every node.



---

**IMPORTANT:** The remaining steps in this procedure (setting the network boot option, the boot order, and console options) must be performed twice, once for each partition on the HP Integrity rx8620 system.

On HP Integrity rx8620 systems, some MP commands, such as **CO** and **PE**, prompt you to supply the partition on which to perform the action.

---

9. Enter **PE** (power enable) to turn on power to the cabinet, if it is not already turned on.
10. Enter **PE** (power enable) to turn on power to the partition.
11. Press **Ctrl-B** to return to the Main Menu; then enter **CO** to connect to the console of the partition.



---

**NOTE:** If the console stops accepting input from the keyboard, the following message is displayed:

[Read-only - use ^Ecf to attach to console.]

In that situation, press and hold down the **Ctrl** key and type the letter **e**. Release the **Ctrl** key, and then type the letters **c** and **f** to reconnect to the console.

---

12. Do the following from the **EFI Boot Manager** screen, which is displayed during the power-up of the node.
- 



**NOTE:** For more information about how to work with these menus, refer to the *HP Integrity rx8620–32 Server Installation Guide*, which was shipped with the hardware.

---

- a. Choose the **Boot Option Maintenance Menu** on the **EFI Boot Manager** screen.
    - i. Choose **Add a Boot Option**.
    - ii. Choose **Load File [Acpi(HWP0002,0)/Pci(1|0)/Mac(XXXXXXXXXXXX)]**, which is the Gigabit Ethernet (GigE) port on the server.
    - iii. Enter the string **Netboot** as the description for the boot option. This entry is required and must be set to the string **Netboot**.
    - iv. Enter **N** for **No Boot Option** when prompted for the Boot Option Data Type.
    - v. Choose the option to save the entry to NVRAM.
    - vi. Choose **Exit** to quit the **Add a Boot Option** menu.
  - b. Choose the option to **Change Boot Order** from the **EFI Boot Manager** screen.
    - i. Press the **u** key on the keyboard to move the **Netboot** entry you just defined to the top of the boot order.
    - ii. Save the setting to the NVRAM.
    - iii. Choose **Exit** to quit the **Change Boot Order** menu.
13. Enable console messages:
    - a. Choose the **Select Active Console Output Devices** option from the **Boot Option Maintenance** menu to enable console messages to be displayed on the screen when you turn on the system:
      - i. Set the **Acpi(HWP0002,0)/Pci(0|1)/Uart(9600 N81)/VenMsg(Vt100+)** option; this is the only option that is set.
      - ii. Save the setting to the NVRAM.
      - iii. Choose **Exit** to return to the **Boot Option Maintenance** menu.
    - b. Choose the **Select Active Console Input Devices** option from the **Boot Option Maintenance Menu** to enable console messages to be displayed on the screen when you turn on the system:
      - i. Set the **Acpi(HWP0002,0)/Pci(0|1)/Uart(9600 N81)/VenMsg(Vt100+)** option; this is the only option that is set.
      - ii. Save the setting to the NVRAM.
      - iii. Choose **Exit** to return to the **Boot Option Maintenance** menu.
    - c. Choose the **Select Active Standard Error Devices** option from the **Boot Option Maintenance** menu to enable console messages to be displayed on the screen when you turn on the system.
      - i. Set the **Acpi(HWP0002,0)/Pci(0|1)/Uart(9600 N81)/VenMsg(Vt100+)** option; this is the only option that is set.
      - ii. Save the setting to the NVRAM.
      - iii. Choose **Exit** to return to the **Boot Option Maintenance** menu.

14. From the **Boot Option Maintenance** menu, add a boot option for the EFI Shell (if one does not exist). Follow the instructions in step 12a.
15. Exit the **Boot Option Maintenance** menu.
16. Choose the **EFI Shell** boot option and boot to the EFI shell. Enter the following EFI shell commands:

```
EFI> acpiconfig enable softpowerdown
EFI> acpiconfig single-pci-domain
EFI> reset
```

The `reset` command reboots the machine. You do not have to wait for this reboot to complete before continuing to the next step to turn off power to the partition.

17. Turn off power to the partition; leave the cabinet power turned on:
  1. Press **Ctrl-B** to exit out of console mode.
  2. Enter **CM** to display the **Command Menu**.
  3. Enter **PE** to turn off power to the partition.

## 4.10 Preparing the Hardware for CP6000BL Systems

Use the management processor (MP) to perform the following tasks on each server blade in the hardware configuration after the head node is installed and the switches are discovered:

- Clear all event logs
- Enable IPMI over LAN
- Create an MP login ID and password that matches all other devices
- Add a boot entry for the string `DVD boot` on the head node, and add a boot entry for the string `Netboot` on all other nodes.
- Move the `DVD boot` and `Netboot` boot entries to top of the boot order
- Set the primary console
- Set the console baud rate to 115200

### Procedure

Perform the following procedure on each HP Integrity server blade. All nodes must be seated in an enclosure, plugged in, and power turned off.

1. Connect the local IO cable (also called the SUV cable) to the server blade. The local cable is shipped with the enclosure and connects to the server blade at one end and is divided into VGA, USB, and Serial ports at the other end.
2. Connect a serial terminal or laptop serial port to the serial port of the local IO cable.
3. Use a terminal emulator, such as HyperTerminal, to open a terminal window.
4. Press the **Enter** key to access the MP. If there is no response, press the MP reset pin on the back of the MP and try again.
5. Log in to the MP using the default administrator name and password that shown on the screen. The **MP Main Menu** is displayed.

```
MP MAIN MENU:
CO: Console
VFP: Virtual Front Panel
CM: Command Menu
SMCLP: Server Management Command Line Protocol
CL: Console Log
SL: Show Event Logs
HE: Main Help Menu
X: Exit Connection
```

6. Enter **SL** to show event logs. Then, enter **C** to clear all log files and **y** to confirm your action.
7. Enter **CM** to display the **Command Menu**.
8. Do the following to ensure that the IPMI over LAN option is set. This setting is required for Nagios monitoring.
  - a. Enter **SA** to display the **Set Access** configuration menu.
  - b. Verify that the IPMI over LAN option is enabled.
  - c. Enable the IPMI over LAN option if it is disabled.
    1. Enter the letter **i** to access the IPMI
    2. Enter the letter **e** to enable the IPMI over LAN
    3. Enter the letter **y** to confirm your action.
  - d. Return to the **Command Menu**.
9. Enter **UC** (user configuration) and use the menu options to remove the default administrator and operator accounts. Then, for security purposes, create your own unique user login ID and password. Assign all rights (privileges) to this new user.

The user login ID must have a minimum of 6 characters, and the password must have exactly 8 characters. You must set the same user login ID and password on every node and all MPs,

iLOs, and OAs must use the same user name and password. Do not use any special characters as part of the password.

10. Turn on power to the node:  
MP:CM> **pc -on -nc**
11. Press **Ctrl-B** to return to the **MP Main Menu**.
12. Enter **CO** to connect to the console. It takes a few minutes for the live console to display.
13. Add a boot entry and set the OS boot order. Your actions for the head node differ from all other nodes.

**Table 4-47 Adding a Boot Entry and Setting the Boot Order on HP Integrity Server Blades**

Head Node	All Other Nodes
Add a boot entry: <ol style="list-style-type: none"> <li>1. From the <b>Boot Menu</b> screen, which is displayed during the power on of the node, select the <b>Boot Configuration Menu</b>.</li> <li>2. Select <b>Add Boot Entry</b>.</li> <li>3. Select <b>Removable Media Boot</b> as the network boot choice.</li> <li>4. Enter the string <b>DVD boot</b> as the boot option description.</li> <li>5. Press the <b>Enter</b> key twice for no db-profile and load options.</li> <li>6. If prompted, save the entry to NVRAM.</li> </ol>	Add a boot entry: <ol style="list-style-type: none"> <li>1. From the <b>Boot Menu</b> screen, which is displayed during the power on of the node, select the <b>Boot Configuration Menu</b>.</li> <li>2. Select <b>Add Boot Entry</b>.</li> <li>3. Select <b>Load File [Core LAN Port 1 ]</b> as the network boot choice, which is a Gigabit Ethernet (GigE) port.</li> <li>4. Enter the string <b>Netboot</b> as the boot option description. This entry is required and must be set to the string <b>Netboot</b> (with a capital letter N).</li> <li>5. Press the <b>Enter</b> key twice for no db-profile and load options.</li> <li>6. If prompted, save the entry to NVRAM.</li> </ol>
Set the boot order: <ol style="list-style-type: none"> <li>1. From the <b>Boot Configuration</b> menu, select the <b>Edit OS Boot Order</b> option.</li> <li>2. Use the navigation instructions and the up arrow on the screen to move the <b>DVD boot</b> entry you just defined to the top of the boot order.</li> <li>3. Press the <b>Enter</b> key to select the position.</li> <li>4. Press the <b>x</b> key to return to the <b>Boot Configuration</b> menu.</li> </ol>	Set the boot order: <ol style="list-style-type: none"> <li>1. From the <b>Boot Configuration</b> menu, select the <b>Edit OS Boot Order</b> option.</li> <li>2. Use the navigation instructions and the up arrow on the screen to move the <b>Netboot</b> entry you just defined to the top of the boot order.</li> <li>3. Press the <b>Enter</b> key to select the position.</li> <li>4. Press the <b>x</b> key to return to the <b>Boot Configuration</b> menu.</li> </ol>

For more information about how to work with these menus, see the documentation that came with the HP Integrity server blade.

14. Perform this step on all nodes, including the head node. From the **Boot Configuration** menu, select the **Console Configuration** option, and do the following:
  - a. Select **Serial Acpi(HWP002,PNP0A03,0)/Pci(1|2) Vt100+ 9600** as the primary console interface.
  - b. Press the letter **b** key repeatedly until the baud rate is set to 115200.
  - c. Press the **Esc** key or press the **x** key as many times as necessary to return to the **Boot Menu**.
  - d. If prompted, save the entry to NVRAM.
  - e. If prompted, reset the system.
15. Turn off power to the node:
  - a. Press **Ctrl-b** to exit the console mode.
  - b. Return to the **Command Menu**:  
MP> **CM**
  - c. Turn off power to the node:  
MP:CM> **pc -off -nc**

16. Use the **RB** command to reset the BMC.
17. Press **Ctrl-b** to exit the console mode and press the **x** key to exit.

After preparing all the nodes in all the enclosures, return to the *HP XC System Software Installation Guide* to discover all the nodes and enclosures in the HP XC system.

---

# 5 Troubleshooting

This chapter describes known problems with respect to preparing hardware devices for use with the HP XC System Software and their solutions.

## 5.1 iLO2 Devices

### 5.1.1 iLO2 Devices Can Become Unresponsive

There is a known problem with the iLO2 console management devices that causes the iLO2 device to become unresponsive to certain tools including the HP XC power daemon and the iLO2 Web interface. When this happens, the power daemon generates `CONNECT_ERROR` messages.

Additional symptoms include the following:

- Inability to use the iLO2 Web interface
- Inability to control the node's boot options through the Onboard Administrator (OA) on HP server blade enclosures.

When this problem occurs, the iLO2 device is not completely dead; only parts of it are hung.

You can clear up the problem using either of these methods:

- Use the following procedure to restart and reboot the node:
  1. Completely remove power from the node by either removing the power cord or, in the case of an HP server blade, removing the server blade from the enclosure.
  2. Wait 15 seconds.
  3. Restore power to the node.

Restoring power restarts the iLO2 device and also reboots the node.

- Use the following procedure to restart the iLO2 device without rebooting the node:



---

**NOTE:** This method can be used only if the iLO2 command line interface is not hung.

---

1. Use the `telnet` or `ssh` command to access the hung iLO2 device.
2. Log in to the iLO2 device.  
Use the HP XC user name and password that you defined for your console devices.
3. Reboot the iLO2 device:  
`reset map1`



---

## A Establishing a Connection Through a Serial Port

Follow this generic procedure to establish a connection to a server using a serial port connection to a console port. If you need more information about how to establish these connections, see the hardware documentation.

1. Connect a null modem cable between the serial port on the rear panel of the server and a COM port on the host computer.
2. Launch a terminal emulation program such as Windows HyperTerminal.
3. Enter a name for the connection, select an icon, and click **OK**.
4. Select the COM port on the host computer to which the serial cable is connected, and click **OK**.
5. Make the following port settings:
  - a. Bits per second: **115200**
  - b. Data bits: **8**
  - c. Parity: **None**
  - d. Stop bits: **1**
  - e. Flow control: **None**
6. Click **OK**.



# B Server Blade Configuration Examples

This appendix contains illustrations and descriptions of fully cabled HP XC systems based on interconnect type and server blade height.

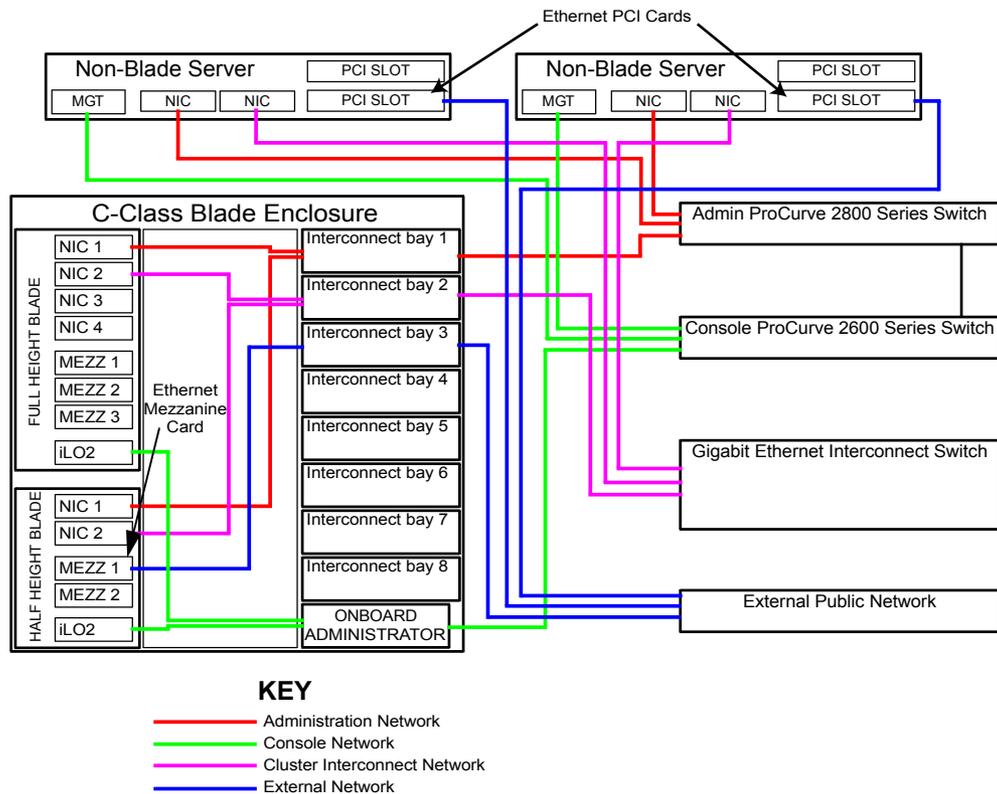
The connections are color-coded, so consider viewing the PDF file online or printing this appendix on a color printer to take advantage of the color coding.

## B.1 Gigabit Ethernet Interconnect With Half-Height Server Blades

In Figure B-1, only the half-height server blades and the non-blade server nodes have connections to the external network. Because the two NICs of the half-height server blade are already in use, an Ethernet card was added to mezzanine bay 1 to allow for the external network connection on the server blade. An interconnect module was added to bay 3.

On the non-blade server nodes, PCI Ethernet NICs are used for the external network connection. Available ports vary based on hardware model. See the *HP XC Hardware Preparation Guide* for more information about port assignments.

**Figure B-1 Gigabit Ethernet Interconnect With Half-Height Server Blades**

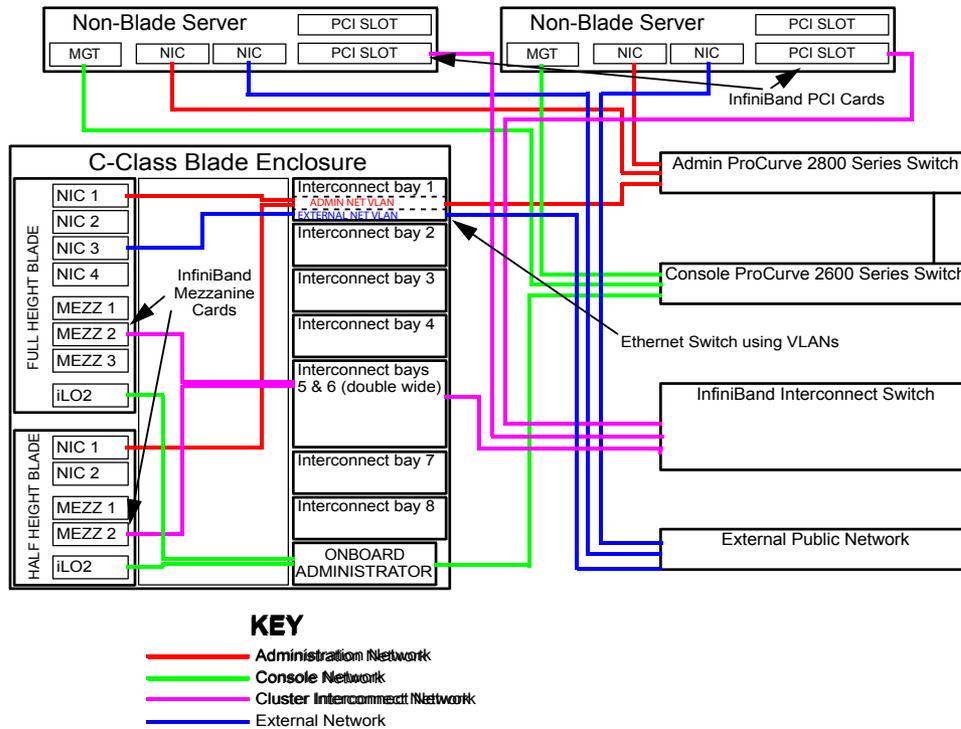


## B.2 InfiniBand Interconnect With Full-Height Server Blades

In the configuration shown in Figure B-2, connections to the external network were required only on the non-blade server nodes and the full-height server blades. On those server blades, NIC3 is used for the connection to the external network. A VLAN is used to separate the external network traffic from the administration network traffic on the switch in bay 1 to save the expense of an additional Ethernet interconnect module in bay 2.

On the non-blade server nodes, the built-in NICs were used for the external network connection. Available ports vary based on hardware model. See Chapter 3 (page 45) for more information about port assignments.

**Figure B-2 InfiniBand Interconnect With Full-Height Server Blades**

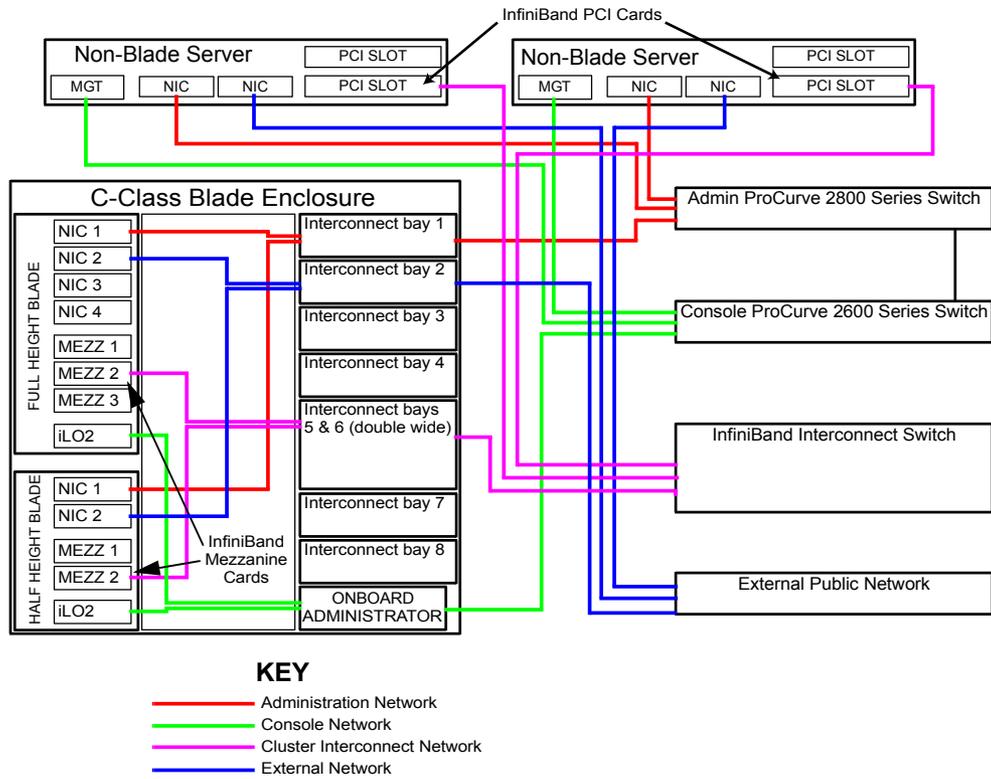


### B.3 InfiniBand Interconnect With Mixed Height Server Blades

The configuration shown in Figure B-3 is similar to the configuration shown in Figure B-1 (page 143). The only exception is that in this configuration, the half-height server blades require external connections as well. Because half-height blades have two NICs, you must use NIC2 for the connection to the external network. This also means that an interconnect module is required in bay 2.

On the non-blade server nodes, the built-in NICs are used for the external network connection. Available ports vary based on hardware model. See Chapter 3 (page 45) for more information about port assignments.

Figure B-3 InfiniBand Interconnect With Mixed Height Server Blades





---

# Glossary

## A

<b>administration branch</b>	The half (branch) of the administration network that contains all of the general-purpose administration ports to the nodes of the HP XC system.
<b>administration network</b>	The private network within the HP XC system that is used for administrative operations.
<b>availability set</b>	An association of two individual nodes so that one node acts as the first server and the other node acts as the second server of a service. <i>See also</i> improved availability, availability tool.
<b>availability tool</b>	A software product that enables system services to continue running if a hardware or software failure occurs by failing over the service to the other node in an availability set. <i>See also</i> improved availability, availability set.

## B

<b>base image</b>	The collection of files and directories that represents the common files and configuration data that are applied to all nodes in an HP XC system.
<b>branch switch</b>	A component of the Administration Network. A switch that is uplinked to the root switch and receives physical connections from multiple nodes.

## C

<b>cluster</b>	A set of independent computers combined into a unified system through system software and networking technologies.
<b>cluster alias</b>	The external cluster host name supported by LVS, which enables inbound connections without having to know individual nodes names to connect and log in to the HP XC system.
<b>CMDB</b>	Configuration and management database. Constructed during HP XC system installation, the CMDB is a MySQL database that stores information about the nodes, hardware, and software configuration, and network connectivity. This database runs on the node with the node management role.
<b>compute node</b>	A node that is assigned only with the compute role and no other. Jobs are distributed to and run on nodes with the <code>compute</code> role; no other services run on a compute node. .
<b>configuration and management database</b>	<i>See</i> CMDB.
<b>console branch</b>	A component of the administration network. The half (branch) of the administration network that contains all of the console ports of the nodes of the HP XC system. This branch is established as a separate branch to enable some level of partitioning of the administration network to support specific security needs.

## D

<b>DHCP</b>	Dynamic Host Control Protocol. A protocol that dynamically allocates IP addresses to computers on a local area network.
<b>Dynamic Host Control Protocol</b>	<i>See</i> DHCP.

## E

<b>EFI</b>	Extensible Firmware Interface. Defines a model for the interface between operating systems and Itanium-based platform firmware. The interface consists of data tables that contain platform-related information, plus boot and run-time service calls that are available to the
------------	---

operating system and its loader. Together, these provide a standard environment for booting an operating system and running preboot applications.

**enclosure** The hardware and software infrastructure that houses HP BladeSystem servers.

**extensible  
firmware  
interface** See EFI.

**external network  
node** A node that is connected to a network external to the HP XC system.

## F

**fairshare** An LSF job-scheduling policy that specifies how resources should be shared by competing users. A fairshare policy defines the order in which LSF attempts to place jobs that are in a queue or a host partition.

**FCFS** First-come, first-served. An LSF job-scheduling policy that specifies that jobs are dispatched according to their order in a queue, which is determined by job priority, not by order of submission to the queue.

**first-come,  
first-served** See FCFS.

## G

**global storage** Storage within the HP XC system that is available to all of the nodes in the system. Also known as local storage.

**golden client** The node from which a standard file system image is created. The golden image is distributed by the image server. In a standard HP XC installation, the head node acts as the image server and golden client.

**golden image** A collection of files, created from the golden client file system that are distributed to one or more client systems. Specific files on the golden client may be excluded from the golden image if they are not appropriate for replication.

**golden master** The collection of directories and files that represents all of the software and configuration data of an HP XC system. The software for any and all nodes of an HP XC system can be produced solely by the use of this collection of directories and files.

## H

**head node** The single node that is the basis for software installation, system configuration, and administrative functions in an HP XC system. There may be another node that can provide a failover function for the head node, but HP XC system has only one head node at any one time.

**host name** The name given to a computer. Lowercase and uppercase letters (a–z and A–Z), numbers (0–9), periods, and dashes are permitted in host names. Valid host names contain from 2 to 63 characters, with the first character being a letter.

## I

**I/O node** A node that has more storage available than the majority of server nodes in an HP XC system. This storage is frequently externally connected storage, for example, SAN attached storage. When configured properly, an I/O server node makes the additional storage available as global storage within the HP XC system.

**iLO** Integrated Lights Out. A self-contained hardware technology available on CP3000 and CP4000 cluster platform hardware models that enables remote management of any node within a system.

**iLO2** The next generation of iLO that provides full remote graphics console access and remote virtual media.  
See also iLO.

<b>image server</b>	A node specifically designated to hold images that will be distributed to one or more client systems. In a standard HP XC installation, the head node acts as the image server and golden client.
<b>improved availability</b>	A service availability infrastructure that is built into the HP XC system software to enable an availability tool to fail over a subset of eligible services to nodes that have been designated as a second server of the service <i>See also</i> availability set, availability tool.
<b>Integrated Lights Out</b>	<i>See</i> iLO.
<b>interconnect</b>	A hardware component that provides high-speed connectivity between the nodes in the HP XC system. It is used for message passing and remote memory access capabilities for parallel applications.
<b>interconnect module</b>	A module in an HP BladeSystem server. The interconnect module provides the Physical I/O ports for the server blades and can be either a switch, with connections to each of the server blades and some number of external ports, it can be or a pass-through module, with individual external ports for each of the server blades. <i>See also</i> server blade.
<b>interconnect network</b>	The private network within the HP XC system that is used primarily for user file access and for communications within applications.
<b>Internet address</b>	A unique 32-bit number that identifies a host's connection to an Internet network. An Internet address is commonly represented as a network number and a host number and takes a form similar to the following: 192 . 0 . 2 . 0.
<b>IPMI</b>	Intelligent Platform Management Interface. A self-contained hardware technology available on HP ProLiant DL145 servers that enables remote management of any node within a system.
<b>ITRC</b>	HP IT Resource Center. The HP corporate Web page where software patches are made available. The web address is <a href="http://www.itrc.hp.com">http://www.itrc.hp.com</a> . To download patches from this Web page, you must register as an Americas/Asia Pacific or European customer.
<b>L</b>	
<b>Linux Virtual Server</b>	<i>See</i> LVS.
<b>load file</b>	A file containing the names of multiple executables that are to be launched simultaneously by a single command.
<b>Load Sharing Facility</b>	<i>See</i> LSF-HPC with SLURM.
<b>local storage</b>	Storage that is available or accessible from one node in the HP XC system.
<b>LSF execution host</b>	The node on which LSF runs. A user's job is submitted to the LSF execution host. Jobs are launched from the LSF execution host and are executed on one or more compute nodes.
<b>LSF master host</b>	The overall LSF coordinator for the system. The master load information manager (LIM) and master batch daemon ( <code>mbatchd</code> ) run on the LSF master host. Each system has one master host to do all job scheduling and dispatch. If the master host goes down, another LSF server in the system becomes the master host.
<b>LSF-HPC with SLURM</b>	Load Sharing Facility for High Performance Computing integrated with SLURM. The batch system resource manager on an HP XC system that is integrated with SLURM. LSF-HPC with SLURM places a job in a queue and allows it to run when the necessary resources become available. LSF-HPC with SLURM manages just one resource: the total number of processors designated for batch processing.  LSF-HPC with SLURM can also run interactive batch jobs and interactive jobs. An LSF interactive batch job allows you to interact with the application while still taking advantage of LSF-HPC with SLURM scheduling policies and features. An LSF-HPC with SLURM interactive job is run without using LSF-HPC with SLURM batch processing features but is dispatched immediately by LSF-HPC with SLURM on the LSF execution host.  <i>See also</i> LSF execution host.

<b>LVS</b>	Linux Virtual Server. Provides a centralized login capability for system users. LVS handles incoming login requests and directs them to a node with a login role.
<b>M</b>	
<b>Management Processor</b>	<i>See</i> MP.
<b>master host</b>	<i>See</i> LSF master host.
<b>MCS</b>	An optional integrated system that uses chilled water technology to triple the standard cooling capacity of a single rack. This system helps take the heat out of high-density deployments of servers and blades, enabling greater densities in data centers.
<b>Modular Cooling System</b>	<i>See</i> MCS.
<b>module</b>	A package that provides for the dynamic modification of a user's environment by means of modulefiles. <i>See also</i> modulefile.
<b>modulefile</b>	Contains information that alters or sets shell environment variables, such as PATH and MANPATH. Modulefiles enable various functions to start and operate properly.
<b>MP</b>	Management Processor. Controls the system console, reset, and power management functions on HP Integrity servers.
<b>MPI</b>	Message Passing Interface. A library specification for message passing, proposed as a standard by a broadly based committee of vendors, implementors, and users.
<b>MySQL</b>	A relational database system developed by MySQL AB that is used in HP XC systems to store and track system configuration information.
<b>N</b>	
<b>NAT</b>	Network Address Translation. A mechanism that provides a mapping (or transformation) of addresses from one network to another. This enables external access of a machine on one LAN that has the same IP address as a machine on another LAN, by mapping the LAN address of the two machines to different external IP addresses.
<b>Network Address Translation</b>	<i>See</i> NAT.
<b>Network Information Services</b>	<i>See</i> NIS.
<b>NIS</b>	Network Information Services. A mechanism that enables centralization of common data that is pertinent across multiple machines in a network. The data is collected in a domain, within which it is accessible and relevant. The most common use of NIS is to maintain user account information across a set of networked hosts.
<b>NIS client</b>	Any system that queries NIS servers for NIS database information. Clients do not store and maintain copies of the NIS maps locally for their domain.
<b>NIS master server</b>	A system that stores the master copy of the NIS database files, or maps, for the domain in the <code>/var/yp/DOMAIN</code> directory and propagates them at regular intervals to the slave servers. Only the master maps can be modified. Each domain can have only one master server.
<b>NIS slave server</b>	A system that obtains and stores copies of the master server's NIS maps. These maps are updated periodically over the network. If the master server is unavailable, the slave servers continue to make the NIS maps available to client systems. Each domain can have multiple slave servers distributed throughout the network.
<b>O</b>	
<b>OA</b>	The enclosure management hardware, software, and firmware that is used to support all of the managed devices contained within the HP BladeSystem c-Class enclosure.

<b>onboard administrator</b>	<i>See</i> OA.
<b>P</b>	
<b>parallel application</b>	An application that uses a distributed programming model and can run on multiple processors. An HP XC MPI application is a parallel application. That is, all interprocessor communication within an HP XC parallel application is performed through calls to the MPI message passing library.
<b>PXE</b>	Preboot Execution Environment. A standard client/server interface that enables networked computers that are not yet installed with an operating system to be configured and booted remotely. PXE booting is configured at the BIOS level.
<b>R</b>	
<b>remote graphics software</b>	<i>See</i> RGS.
<b>resource management role</b>	Nodes with this role manage the allocation of resources to user applications.
<b>RGS</b>	HP Remote Graphics Software. A utility that enables remote access and sharing of a graphics workstation desktop.
<b>role</b>	A set of services that are assigned to a node.
<b>Root Administration Switch</b>	A component of the administration network. The top switch in the administration network; it may be a logical network switch comprised of multiple hardware switches. The Root Console Switch is connected to the Root Administration Switch.
<b>root node</b>	A node within an HP XC system that is connected directly to the Root Administration Switch.
<b>RPM</b>	Red Hat Package Manager. <ol style="list-style-type: none"> <li>1. A utility that is used for software package management on a Linux operating system, most notably to install and remove software packages.</li> <li>2. A software package that is capable of being installed or removed with the RPM software package management utility.</li> </ol>
<b>S</b>	
<b>scalable visualization array</b>	<i>See</i> SVA.
<b>serial application</b>	A command or user program that does not use any distributed shared-memory form of parallelism. A serial application is basically a single-processor application that has no communication library calls (for example, MPI, PVM, GM, or Portals). <p>An example of a serial application is a standard Linux command, such as the <code>ls</code> command. Another example of a serial application is a program that has been built on a Linux system that is binary compatible with the HP XC environment, but does not contain any of the HP XC infrastructure libraries.</p>
<b>server blade</b>	One of the modules of an HP BladeSystem. The server blade is the compute module consisting of the CPU, memory, I/O modules and other supporting hardware. Server blades do not contain their own physical I/O ports, power supplies, or cooling.
<b>SLURM backup controller</b>	The node on which the optional backup <code>slurmctld</code> daemon runs. On SLURM failover, this node becomes the SLURM master controller.
<b>SLURM master controller</b>	The node on which the <code>slurmctld</code> daemon runs.
<b>SMP</b>	Symmetric multiprocessing. A system with two or more CPUs that share equal (symmetric) access to all of the facilities of a computer system, such as the memory and I/O subsystems. In

an HP XC system, the use of SMP technology increases the number of CPUs (amount of computational power) available per unit of space.

- ssh** Secure Shell. A shell program for logging in to and executing commands on a remote computer. It can provide secure encrypted communications between two untrusted hosts over an insecure network.
- standard LSF** A workload manager for any kind of batch job. Standard LSF features comprehensive workload management policies in addition to simple first-come, first-serve scheduling (fairshare, preemption, backfill, advance reservation, service-level agreement, and so on). Standard LSF is suited for jobs that do not have complex parallel computational needs and is ideal for processing serial, single-process jobs. Standard LSF is not integrated with SLURM.
- SVA** HP Scalable Visualization Array. A highly affordable, scalable, ready-to-run visualization solution that completes the HP Unified Cluster Portfolio's integration of computation, data management and visualization in a single, integrated cluster environment. The HP SVA solution adds high-performance HP workstations in building block configurations that combine with industry-standard visualization components. State-of-the-art industry standard and open source clustering, graphics, and networking technology are leveraged to reduce costs and enhance flexibility. The tight integration of scalable computation, data management and visualization enables the following: clustered parallel visualization applications with support for very large data sets, display of complex, high resolution images, including volume visualization, and real-time rendering with computational steering through closely coupled visualization, computation and data management.
- symmetric multiprocessing** *See* SMP.

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