COMPAQ
White Paper

May 2001

Prepared by Customer Service
Training and Development

Compaq Computer Corporation

Contents

Compaq ProLiant DL760

Service Overview

Abstract: This white paper outlines new features and benefits of the Compaq ProLiant DL760, successor to the ProLiant 8500. Key differences include the new PCI-X bus, new ROM Based Setup Utility (RBSU) and the Intel Pentium III 900 MHz processor. PCI-X information includes a description of PCI-X technology, physical expansion board and slot configurations and distribution guidelines. Information on RBSU addresses features, configuration options and startup procedures. Descriptions and part numbers for three models of the ProLiant DL760 and a list of supported operating systems are also included. Since existing ProLiant 8500 systems can be upgraded to ProLiant DL760 systems in the field, you will find information and part numbers for the upgrade kits.

Help us improve our technical communication. Let us know what you think about the technical information in this document. Your feedback is valuable and will help us structure future communications. Please send your comments to: robert.campbell@compaq.com

Compaq ProLiant DL760 Service Overview© 2001 Compaq Computer Corporation

Product Description

The Compaq ProLiant DL760 is a high-density data center server with 8-way scalable performance intended for use in 24x7 multiserver rack environments. The server is based on the ProFusion 8-Way architecture and is packaged in a dense, 7U form factor design.

Performance is maximized with up to 8 Pentium III Xeon processors and 16GB of ECC SDRAM memory. Eight 64-bit PCI-X slots, three 64-bit PCI slots an integrated Smart Array Controller and Ultra3 hard drives, enhance input/output performance.

The Compaq ProLiant DL760 has the following standard high availability features:

- PCI Hot Plug slots
- Redundant hot pluggable power supplies and fans
- Redundant processor power modules and network interface controllers
- Smart Array 4200 controllers
- Error checking and correcting (ECC) memory
- Disk System Tracking and Disk Drive Fault Tolerance
- Automatic Server Recovery (ASR2).

In addition to a new Intel Pentium III Xeon 900 MHz processor, the ProLiant DL760 ships standard with PCI-X technology and ROM-Based-Setup-Utility (RBSU).

New Models

Three new server models are shown in the following table. The number of processors, size of cache, memory capacity and processor speed vary according to model. The following features are common to each model:

- Pentium III Xeon processors
- ECC protected 100MHz SDRAM DIMM memory
- PCI and PCI-X I/O busses
- Integrated Smart Array controller

NOTE: The integrated Smart Array controller is implemented using RAID on a Chip (ROC) which is physically embedded in the system I/O board. A small jumper board called the Array Enabler routes the ROC signals to the hard drives. This board can be replaced with a bypass cable assembly (Integrated Array Bypass) to allow an optional controller such as the Compaq 4200 Array Controller to run the internal drives.

Processors	Speed	Cache	Memory	Part Number
2	700MHz	1MB	1GB	177656-xx1
4	700MHz	2MB	2GB	177657-xx1
4	900MHz	2MB	2GB	212692-xx1

New Features

PCI-X technology leverages the wide acceptance of the PCI bus and provides an evolutionary I/O upgrade to conventional PCI. PCI-X technology increases bus capacity to more than eight times the conventional PCI bus bandwidth — from 133 MB/s with the 32-bit, 33-MHz PCI bus to 1066 MB/s with the 64-bit, 133-MHz PCI-X bus.

PCI-X enhances the PCI protocol to develop an industry-standard interconnect that exceeds a raw bandwidth of 1 gigabyte per second (GB/s) and will meet upcoming bandwidth needs of enterprise computing systems.

PCI-X provides backward compatibility with the PCI bus at both the expansion board and system level.

ROM–Based Setup Utility (RBSU) will automatically configure the system based on the operating system selected. RBSU supports a wide range of customizable configuration features. RBSU replaces the System Configuration Utility feature.

Faster Intel Pentium III Xeon processors are supported on the ProLiant DL760 server. The server is capable of supporting up to eight processors and eight Processor Power Modules. Each processor requires an associated Processor Power Module. Each Processor Power Module has two identical power circuits on it to provide redundancy for its processor. A ninth Processor Power Module is always present to provide processor bus termination power.

NOTE: The server will NOT boot if the Intel Pentium III Xeon processors are NOT the same speed.

Understanding PCI-X

PCI-X is an evolutionary bus architecture based on the prevalent PCI bus. PCI-X technology leverages the wide acceptance of the PCI bus and provides an evolutionary I/O upgrade to conventional PCI.

PCI-X technology increases bus capacity to more than eight times the conventional PCI bus bandwidth — from 133 MB/s with the 32-bit, 33-MHz PCI bus to1066 MB/s (1GB/s) with the 64-bit, 133-MHz PCI-X bus as summarized in the table below:

PCI-X Bus Performance		
64-bit card	133 MHz	1066 MB/s

The 64-bit, 133-MHz interconnect protocol achieves this performance through the use of a register-to-register design that allows higher clock frequencies and new protocol enhancements such as the attribute phase and split transactions that allow more efficient use of the bus.

PCI-X technology is backward compatible with conventional PCI systems at the system, device driver, and the adapter level. Conventional PCI adapters will operate in PCI-X systems, and vice versa; however, when a PCI-X adapter is placed on a conventional PCI bus, it is limited to conventional PCI speeds.

A PCI-X system automatically switches between conventional PCI and PCI-X mode, depending on the type of adapters installed on the bus segment. If a PCI-X bus segment includes *any* conventional PCI adapters, that segment must operate in conventional PCI mode.

Just as with conventional PCI, the operating frequency is adjusted to match that of the slowest device on the bus. If the bus includes a 33-MHz adapter, the bus must operate at 33 MHz. If only conventional 66-MHz devices are present, a PCI bus optionally operates in conventional 66-MHz or 33-MHz mode. The table below illustrates several possible combinations of system and adapter frequencies:

	Bus Frequency MHz	Conventional PCI adapters			PCI-X adapters	
		33 MHz (5 V)	33 MHz (3.3V or Universal)	66 MHz (3.3V or Universal)	66 MHz (3.3V or Universal)	133 MHz (3.3V or Universal)
PCI system	33	33	33	33	33	33
	66		33	66	33 or 66	33 or 66
PCI-X system	66		33	33 or 66	66	66
	100		33	33 or 66	66	100
	133		33	33 or 66	66	133

Note: The shaded cells denote PCI-X areas of operation.

Understanding RBSU

RBSU is an updateable, "intelligent" configuration utility that is embedded in the server ROM. The purpose of RBSU is to help you configure certain server hardware settings and prepare your server for operating system (OS) installation. Like its predecessor, SCU, RBSU allows you to view and establish server configuration settings during initial system startup, as well as modify them after the server has been configured.

The Configuration Options table describes some of the configuration options that may be available through RBSU.

Option	Description
System	Select or configure system specific options such as OS, COM ports, LPT ports, standard boot order, NUMLock
PCI devices	View installed PCI devices and configure IRQs for these devices.
Date and time	View and change system date and time
Automatic Server Recovery (ASR)	View and configure ASR settings
Server passwords	Set and change server passwords
System identification	Set the server asset tag and text displayed on the IMD
Boot controller order	View and change the controller order. All mass storage devices are included in this selection.
Advanced options	Configure options normally set by default and not user-modified, such as MPS/APIC mode, Hot-Plug Reservation, and CPU correction marking.

Key Features

The features that make RBSU an efficient and flexible configuration tool include:

- Familiar Interface. RBSU retains the look, feel, and functionality of SCU to ease transition for customers accustomed to using SCU. Only a few menu and navigation differences are noticeable.

- Flexible User Control. RBSU allows you to select between a default configuration or create your own, customized configuration settings.

- ROM-Embedded Location. Because it is housed in the system ROM, RBSU can be accessed by pressing the F9 function key during the system startup process. This feature allows you to change your settings without having to depend on a SmartStart and Support Software CD or startup diskette.

- "Silent" Conflict Resolution. Rather than allow configuration conflicts to occur, RBSU automatically avoids any settings that would create hardware and software conflicts. RBSU checks each setting as it is made and immediately resolves possible conflicts without issuing an audible warning message.

- Virtual Presence. Because RBSU is embedded in the system ROM, system administrators can use the Compaq Remote Insight Lights-Out Edition to remotely access and configure the system in a totally unattended fashion. (When these tools are used in combination with the SmartStart Scripting Toolkit, multiserver configurations can also be performed remotely in a silent command line mode.)

NOTE: A reboot is required to enable the Remote Insight Board to access the ROM.

- Automated Language Selection. RBSU is available in English, French, Italian, German, Spanish, or Japanese. RBSU allows you to change your language selection at any time and it automatically updates the keyboard mappings to match the standard keyboard for the language you select.

- Machine-Specific Settings. RBSU is customized to each server, based on the unique hardware and software environment of the server. Because RBSU contains only the information relevant to a single machine, it is smaller and runs faster than traditional configuration utilities.

- Replication Support. RBSU is designed to work with ConRep to create an editable script file containing the configuration settings of the server. This script file can then be deployed across multiple servers with similar hardware and software components.

- System Restore Capability. RBSU uses the Compaq Intelligent Manageability tools to backup system settings to a configuration file. These settings can be saved for a quick system restore in a server recovery situation.

- Easy to Update. You can quickly install the latest version of RBSU on an already configured server by flashing the system ROM using the latest version of ROMPaq.

- Does Not Require or Use the System Partition. RBSU can be installed as part of the configuration process onto the system partition, if desired. However, unlike SCU, RBSU does not automatically create the system partition – SmartStart will create the system partition if it finds no data on the disk.

For more information, see the ROM Based Setup Utility User Guide at www.compaq.com.

Upgrade Options

ProLiant 8500 to DL760 Upgrade

For customers who have already invested in the ProLiant 8500, Compaq provides an upgrade kit that enables them to take advantage of the features offered in the ProLiant DL760. There is also a kit available to upgrade 8500 processors from 550MHz to 900MHz :

Upgrade Kit	Part Number
ProLiant 8500 I/O Module Upgrade Kit	180592-B21
900 MHz Processor Upgrade Kit	232291-B21

At the completion of the I/O Module upgrade, the ProLiant 8500 will be renamed the ProLiant DL760 and will carry an additional serial number. A service white paper entitled *Compaq 8500 I/O Module Upgrade* (April 2001) is available on the Learning Utility.

Operating Systems Supported

The following operating systems support the ProLiant 8-Way SMP servers:

- Microsoft Windows NT 4.0 Enterprise Edition, Terminal Server Edition
- Microsoft Windows 2000 Advanced Server, Datacenter Server
- SCO Unixware 7.1.1, Unixware 7.1
- Novell Netware 5.x, Netware 4.2 SMP
- Linux from Redhat, SuSE, TurboLinux, Caldera
- Sun Solaris 7 and 8 Intel Platform Edition

Service Considerations

New I/O Module PCI/PCI-X Slot Information

I/O Board Slot Descriptions

The new I/O module has 11 slots divided into 3 buses. The Primary bus (slots 7 through 9) is keyed (1) for 64-bit 5V PCI boards or 64-bit PCI universal boards.

The Secondary bus (slots 1 through 6) and the Tertiary bus (slots 10 through 11) are keyed (2) for 64-bit 3.3V PCI/PCI-X boards or 64-bit universal PCI/PCI-X boards.

This is a change from the previous I/O module, where the Secondary bus (slots 1 through 6) supported 64-bit 5V PCI boards.
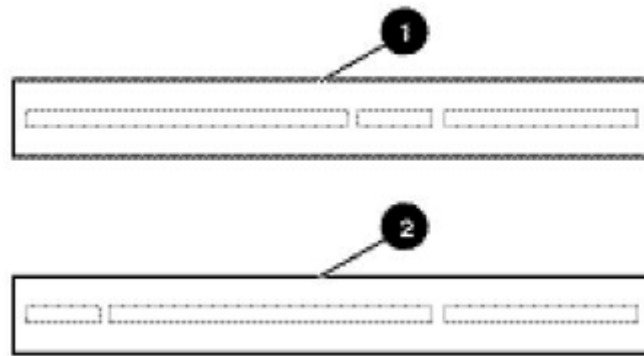
I/O Expansion Board Descriptions

The Primary bus will accept a 64-bit 5-V PCI board (1) or a 64-bit universal PCI board (3).The Secondary and Tertiary buses will accept a 64-bit 3.3-V PCI/PCI-X board (2) or a 64-bit universal PCI/PCI-X board (3).
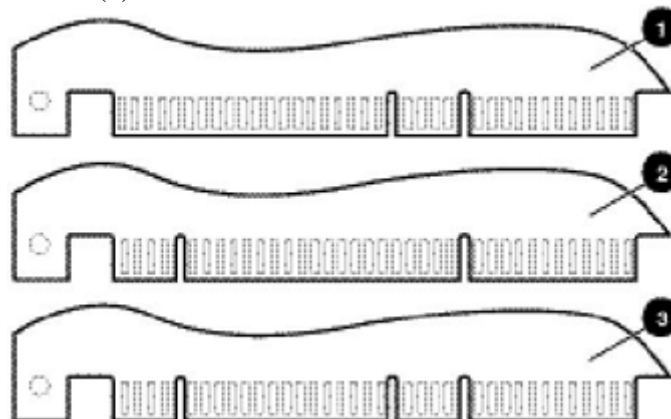
PCI Hot-Plug I/O Expansion Boards

The ProLiant DL760 server supports PCI Hot Plug. PCI Hot Plug and the server's operating system work together to allow the following hot-plug actions:

- **Hot replacement of expansion boards–**This feature allows you to replace a failed expansion board with an identical expansion board without powering down the server.

- **Hot addition of expansion boards–**This feature allows you to install new PCI/PCI-X expansion boards in previously empty slots without powering down the server under some operating systems.

- **Hot upgrade of expansion boards–**This feature allows you to replace an expansion board with a different expansion board without powering down the server.

PCI Hot Plug is backward compatible, although system components fit into one of two categories; hot-plug aware or non-hot-plug aware. The following three components are required in the server for complete PCI Hot Plug capability:

- PCI Hot Plug system hardware (available in this server)

- Operating system with PCI Hot Plug support (currently Microsoft Windows 2000, Microsoft Windows NT, Novell NetWare, and SCO UNIX – support level varies)

- PCI Hot Plug device drivers (available from operating system vendors, Compaq SmartStart CD, and some individual hardware vendors)

IMPORTANT: If any of the three required components are not hot-plug aware, the system is fully functional, but not PCI Hot Plug-capable. For further information about PCI Hot Plug consult the ProLiant DL760 Servers User Guide First Edition (March 2001) Part Number 173774-001

IMPORTANT: Hot addition is not supported under Windows NT 4.0. Empty slots are powered up at boot and opening the slot release lever will cause the slot to be powered off. If you add a board in this manner, you will not be able to power up the slot. Windows NT 4.0 does, however, support hot replacement of identical I/O expansion boards. See the Compaq QuickSpecs for the Compaq ProLiant DL760 servers at www.compaq.com for a list of supported I/O expansion boards.

PCI-X and PCI Bus Distribution Guidelines

The new I/O board in the new I/O module has 11 PCI Hot Plug I/O expansion slots.
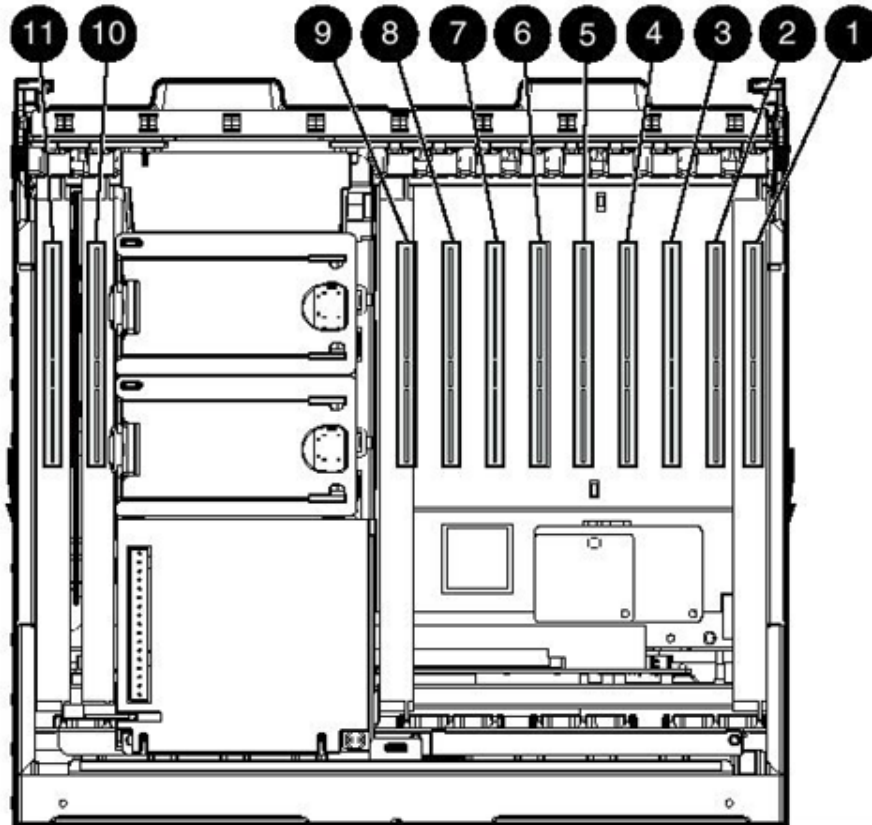
Maximum bus speed and expansion board type for each slot are shown in the table below:

Bus Distribution of PCI Hot Plug I/O Expansion Slots

Slots	Bus	Maximum PCI/PCI-X Bus Speed	Expansion Board
1-6	Secondary	64-bit, 33 MHz PCI or 50 MHz PCI-X	64-bit, 33 MHz PCI or 66 MHz (running at 50 MHz) PCI-X Boards (3.3v keying)
7-9	Primary	64-bit, 33 MHz PCI	64-bit, 33 MHz PCI Boards (5v keying)
10-11	Tertiary	64-bit, 66 MHz PCI or 100 MHz PCI-X	64-bit, 33 or 66 MHz PCI, 66 or 133 MHz (running at 100 MHz) PCI-X Boards (3.3v keying)

Notes: 1. All PCI-X buses support PCI cards at 33 MHz.
2. The bus speed will only run as fast as the slowest board installed.

RBSU Operation

Starting and Exiting RBSU

During initial installation when the server is not yet configured, RBSU starts automatically. After the server has been configured, you can launch RBSU by pressing *F9* when prompted during the power up. Once you are finished with configuration activities you can exit RBSU by pressing *Escape* at the main menu and confirming your intention by pressing *F10*.
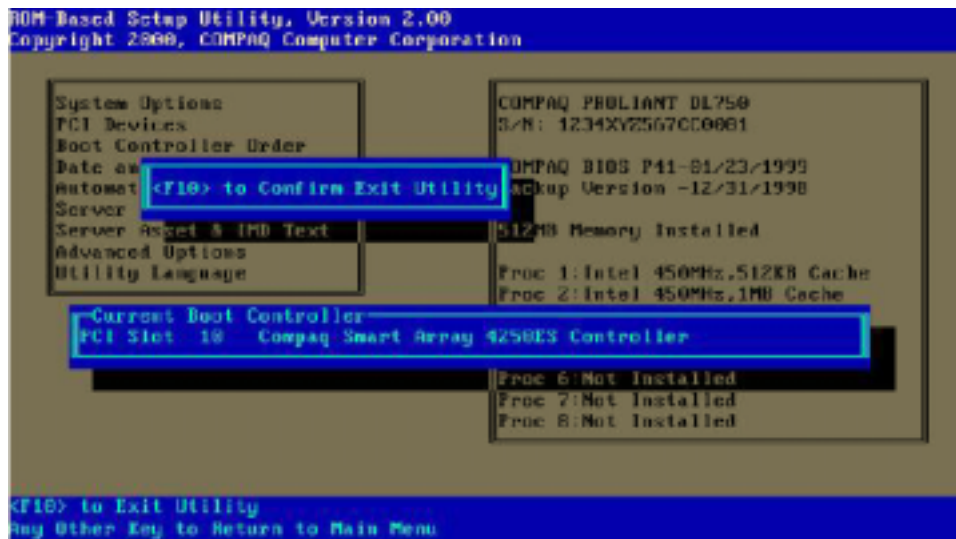
RBSU Main Menu

The main menu selects which configuration setting to view or modify. From the main menu some selections bring you directly to configuration functions while others lead to sub menus that expand the available choices.