industry
standard
servers

march 2003

hp ProLiant BL p-Class system overview and planning

technical
white paper

introduction

This white paper provides an overview of the HP ProLiant BL p-Class server blades, infrastructure components, and management tools, as well as providing guidance for establishing a deployment infrastructure and power planning.

executive summary

The ProLiant BL p-Class system is part of the new generation of ProLiant BL server blades and infrastructure portfolio developed for adaptive computing and optimized for rapid deployment and automated provisioning. ProLiant BL p-Class systems are high-performance, high-availability server blades for multi-tiered data center architectures. The ProLiant BL p-Class system protects your investment with an intelligent, modular infrastructure that can accommodate future server blades. The server blades currently available in the ProLiant BL p-Class family include:

- ProLiant BL20p server blade—The ProLiant BL20p server blade is ideal for multi-server applications such as dynamic Web-hosting, terminal server farms, and media streaming. The server blade features up to two Intel® Pentium® III 1.40-GHz processors, 4 GB ECC SDRAM max memory, integrated RAID, Integrated Lights-Out Advanced, three NC3163 10/100T network interface controllers (NICs), and two hot-plug SCSI drives.

- ProLiant BL20p Generation 2 server blade—The ProLiant BL20p G2 server blade features up to two Intel Xeon processors, up to 8 GB PC2100, ECC, Registered, DDR SDRAM memory, integrated RAID, optional Fibre Channel Mezzanine Card for storage area network (SAN) capability, Integrated Lights-Out Advanced, three NC7781 10/100/1000T NICs, and two hot-plug SCSI drives.

- ProLiant BL40p server blade—The ProLiant BL40p server blade features up to four Intel Xeon processors, up to 12 GB PC2100, ECC, Registered, DDR SDRAM memory, integrated RAID, Integrated Lights-Out Advanced, five NC7781 10/100/1000T NICs, four hot-plug SCSI drives, and two PCI-X slots for redundant SAN connectivity.

overview of the ProLiant BL p-Class system components

The following figure (figure 1) shows a ProLiant BL p-Class system installed in a 42U rack.

figure 1. Server blade and power components in a 42U rack with ProLiant BL p-Class system installed
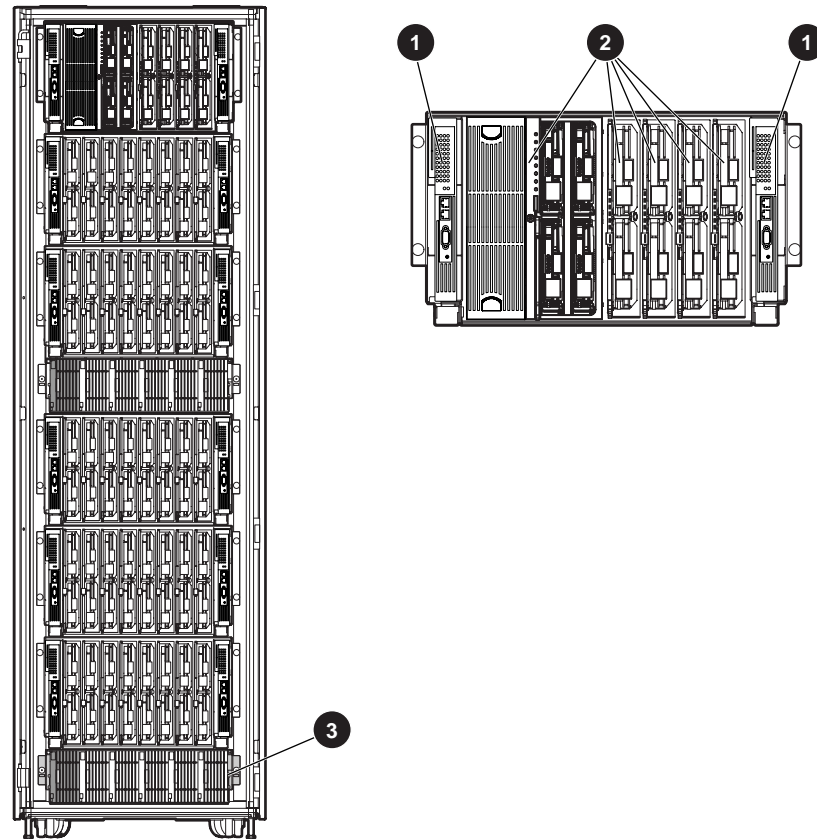
table 1. Server blade and power components

item	description
1	ProLiant BL p-Class interconnects (2) in a ProLiant BL p-Class server blade enclosure (Interconnect Switch shown)
2	ProLiant BL p-Class server blades (four 2-processor and one 4-processor shown) in a ProLiant BL p-Class server blade enclosure
3	ProLiant BL p-Class power enclosure with hot-plug power supplies
4	Mini Bus Bars (2) on rear of rack*
* not shown	

The ProLiant BL p-Class architecture is comprised of several different components. The following table (table 2) provides the required component categories.

table 2. ProLiant BL p-Class system required components

required components	function	options
ProLiant BL20p server blade	ProLiant BL20p server blades feature up to two Intel Pentium III 1.4-GHz processors, four DIMM slots for up to 4 GB maximum memory, two hot-plug Ultra3 SCSI hard drive bays, Smart Array 5i RAID controller with an optional Battery-Backed Write Cache, three NC3163 10/100T NICs, and Integrated Lights-Out Advanced.	SKUs: Single Intel Pentium III 1.4-GHz processor, 512 MB ECC SDRAM -or- Two Intel Pentium III 1.4-GHz processors, 1 GB ECC SDRAM (Model not offered in North America)
ProLiant BL20p G2 server blade	ProLiant BL20p G2 server blades feature up to two Intel Xeon processors, four DIMM slots for up to 8 GB max memory, two hot-plug SCSI hard drive bays, Smart Array 5i Plus RAID controller with an optional Battery-Backed Write Cache, optional Fibre Channel Mezzanine Card for SAN capability, three NC7781 10/100/100T NICS, and Integrated Lights-Out Advanced.	SKUs: Single Intel Xeon 2.80-GHz processor, 512 MB PC2100 DDR memory -or- Two Intel Xeon 2.80-GHz processors, 1 GB PC2100 DDR memory (Model not offered in North America) -or- Single Intel Xeon 2.80-GHz processor, 512 MB PC2100 DDR memory, dual-port Fibre Channel Mezzanine Card -or- Two Intel Xeon 2.80-GHz processors, 1 GB PC2100 DDR memory, dual-port Fibre Channel Mezzanine Card (Model not offered in North America)
ProLiant BL40p server blade	ProLiant BL40p server blades feature up to four Intel Xeon processors, six DIMM slots for up to 12 GB max memory, four hot-plug SCSI hard drive bays, Smart Array 5i Plus RAID controller with an optional Battery-Backed Write Cache, two 64-bit, 100-MHz PCI-X host bus adapters, five NC7781 10/100/1000T NICs, and Integrated Lights-Out Advanced.	SKUs: Single Intel Xeon MP 1.5-GHz processor, 512 MB PC2100 DDR base memory -or- Two Intel Xeon MP 2.0-GHz processors, 1 MB PC2100 DDR base memory

continued

table 2. ProLiant BL p-Class system required components *continued*

required components	function	options
ProLiant BL p-Class server blade enclosure	ProLiant BL p-Class server blade enclosure holds two interconnects plus: • Eight ProLiant BL20p or BL20p G2 server blades, in any combination • Two ProLiant BL40p server blades • Any combination of ProLiant BL20p, BL20p G2, and BL40p server blades Server blades and interconnects blind mate into server blade enclosures for network connection and power.	ProLiant BL p-Class server blade enclosure with ProLiant Essentials Rapid Deployment Pack **trial** -or- ProLiant BL p-Class server blade enclosure with, eight ProLiant Essentials Rapid Deployment Pack **licenses**
ProLiant BL p-Class interconnects	Each ProLiant BL p-Class server blade enclosure requires a pair of interconnects for redundancy. The interconnects collect the NIC signals from the server blades for connection to the customer network. The RJ-45 Patch Panel 2 and GbE2 Interconnect Switch (available 2Q03) provide optional pass through of ProLiant BL20p G2 Fibre Channel signals.	ProLiant BL p-Class RJ-45 Patch Panel (with 32 RJ-45 Ethernet connectors) -or- ProLiant BL p-Class RJ-45 Patch Panel 2 (with 32 RJ-45 Ethernet connectors plus 16 fibre channel connectors) -or- ProLiant BL p-Class C-GbE Interconnect Switch (copper) kit (with 4 RJ-45 10/100/1000 T/TX/T and 4 RJ-45 10/100 T/TX uplink connectors) -or- ProLiant BL p-Class F-GbE Interconnect Switch (fiber) kit (with 4 LC 1000 SX connectors and 4 RJ-45 10/100 T/TX uplink connectors) **Note:** Interconnect Switches reduce number of network cables per server blade enclosure from 32 to as few as 1.

continued

table 2. ProLiant BL p-Class system required components *continued*

required components	function	options
power enclosure with power supplies (not needed if using facility -48 V DC +/- 10%)	The ProLiant BL p-Class system has shared external, redundant hot-plug power.	Single-phase power enclosure with four power supplies (NA and international versions)
		-or-
		Three-phase power enclosure with six power supplies (NA and international versions)
		Note: 3-phase power can support more server blades than single-phase power. Refer to the *HP ProLiant BL p-Class Sizing Utility* for additional power configuration information.
6U power distribution	Power is distributed from the power enclosure to the server blade enclosures using either scalable or mini bus bars attached to the back of the rack or a power bus box. Both ProLiant BL p-Class bus bars and the ProLiant BL p-Class power bus box provide power redundancy.	ProLiant BL p-Class scalable bus bar—supports up to 5 server blade enclosures and 2 power enclosures
		-or-
		ProLiant BL p-Class mini bus bar— Supports up to 3 server blade enclosures and 1 power enclosure
		Note: To deploy a full rack of ProLiant BL p-Class server blades, 2 mini bus bars are needed.
		-or-
		ProLiant BL p-Class power bus box—connects 1 power enclosure to 1 server blade enclosure
		Note: The power bus box is mainly used for evaluation purposes.

Note: Power requirements for a ProLiant BL p-Class system: 200 V – 240 V AC, 30 amp or facility DC –48V +/-10%

key benefits

- Rapid deployment/redeployment saves valuable time

  – Once the infrastructure is in place, server blades are installed and ready for automated provisioning within seconds

  – Single-sided easy access to most pluggable components

  – Dynamic scaling—add more server blades or power supplies without powering down the system

- Innovative design cuts cabling up to 80% compared to traditional 1U servers

  – As few as one network cable per eight server blades using the HP ProLiant BL p-Class GbE Interconnect Switch

  – Designed for headless management—no keyboard, video, or mouse cables

  – Fewer power cables—centralized hot-plug power provides power cable consolidation

- Designed to protect your investment

  – With the introduction of the ProLiant BL40p server blade, the HP ProLiant server blade portfolio now spans one-, two-, and four-processor server blades, allowing data centers, service providers, and telcos to build complete, multi-tiered environments. These comprehensive blade systems now cover front-end, mid-tier, and back-end applications.

  – Power headroom was designed into the p-Class architecture to accommodate future processors so there is no need to repurchase power infrastructure for next generation server blades.

  – All ProLiant BL p-Class server blades can fit in the current BL p-Class enclosure, can be mixed in the same enclosure, and use the same power subsystem. This investment protection is important to customers, and it is one of the key benefits of the ProLiant BL p-Class system.

  – Fits into ProLiant, telco, and third-party racks that meet minimum rack requirements (Refer to "system rack" for rack requirements).

  – Mixes with traditional servers and storage

- Redundant features to provide peace of mind

  – N+N redundant power supplies—redundant AC power feeds into power enclosures and redundant DC power feeds from power enclosure to server blade enclosures

  – Hot-plug SCSI hard drive bays and integrated RAID (Smart Array 5i or Smart Array 5i Plus) on every server blade (Battery-Backed Write Cache is optional.)

  – Redundant Fibre Channel SAN connectivity

  – Redundant NIC capability

  – Redundant ROM on each server blade

  – Redundant hot-pluggable interconnect switch option

Optimized for rapid deployment and automated provisioning, the ProLiant BL40p and BL20p G2 server blades provide redundant SAN connectivity.

software benefits

- Quickly configure server blades using ProLiant Essentials Rapid Deployment Pack software

  – Configure 2-100 server blades in 30 minutes using multicasting

  – Rip and replace—replace one server blade with a new server blade and server role is automatically restored to new server blade

- Reduces IT headcount by managing remotely

  – Preboot eXecution environment (PXE) technology enhances remote access by installing and configuring operating systems to boot remotely

  – Integrated Lights-Out (iLO) Advanced ships standard on every ProLiant BL p-Class server blade. In addition to full graphical access to the host server's display, keyboard, and mouse, the advance functionality also includes virtual diskette capability.

  – Fewer IT staff are needed to manage a large number of server blades because of the enhanced management features and ease of deployment.

- Take total control with a visualization tool that keeps a pulse on total rack status with graphical location detail

  – Insight Manager 7 is an easy-to-use, flexible, scalable and secure solution for managing HP servers, desktops, workstations, and portables. It provides rapid access to detailed fault and performance information

  – Insight Manager 7 provides visualization of all blades at an enclosure and rack level for ProLiant BL server blades
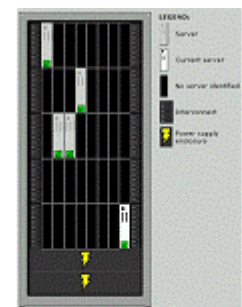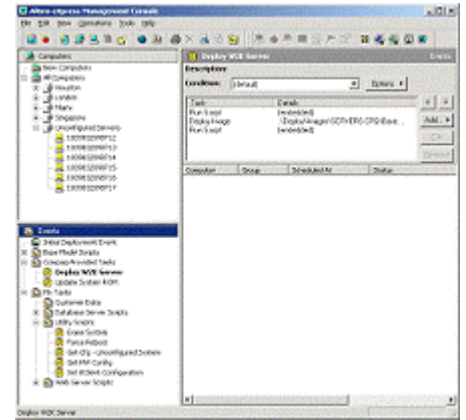
p-Class rack in Insight Manager 7 with physical detail view

hardware components

ProLiant BL p-Class server blade family

The three available ProLiant BL p-Class server blades have the following common features:

- Chipset—Server blades offer the ServerWorks chipset.

- Management—Integrated Lights-Out (iLO) Advanced functionality ships standard on every ProLiant BL p-Class server blade. In addition to full graphical access to the host server's display, keyboard, and mouse, the advance functionality also includes virtual media. Preboot eXecution environment (PXE) technology enhances remote access by installing and configuring operating systems to boot remotely.

- Headless—Keyboard, video, mouse, and diskette drive are available virtually using iLO.

- Pluggable—Server blades blind mate into the server blade enclosure backplane for network and power connections. One handle locks blade in place.

- Diagnostic cable connector—A diagnostic connector is on the front of each server blade. This connector is used to access iLO by connecting a PC directly to the server blade. Each server blade enclosure ships with two diagnostic cables.

figure 2. Diagnostic Cable
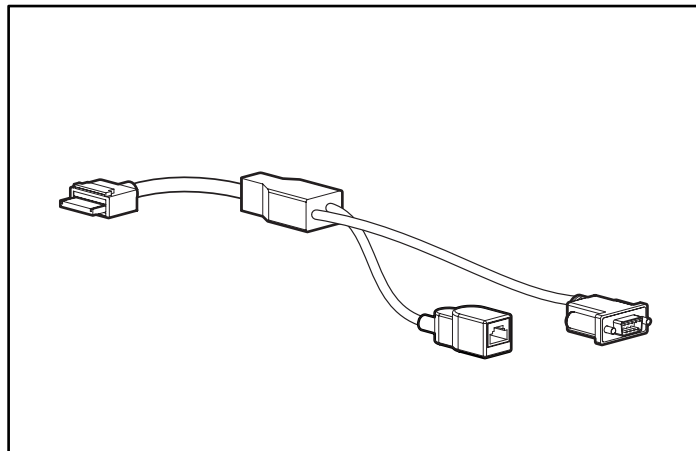
ProLiant BL20p
server blade

figure 3.   ProLiant BL20p server blade
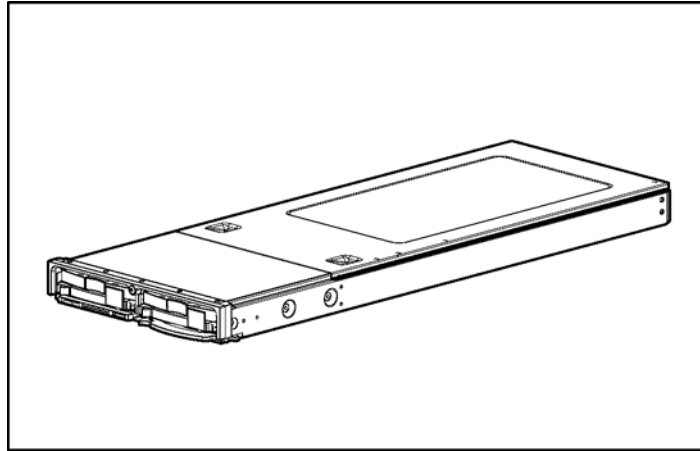
description

The ProLiant BL20p server blade is ideal for the following applications:

– Web-hosting

– E-Commerce

– Computational cluster

– Terminal Server Farm

– AV, Streaming Media

– Messaging front-end and mobility

This server blade has many of the same core features (chipset and architecture) as the ProLiant DL360 G2 server. ProLiant BL20p server blades fit within the 10-bay server blade enclosure, that can hold eight ProLiant BL20p server blades and two interconnects.

features

- Processor—Server blades include up to two 1.4-GHz Intel Pentium III processors with 512 K Level-2 cache, 133-MHz system bus

- Hard drives and controller—Two universal hot-plug SCSI hard drives offer up to 292-GB capacity and are connected to next-generation SCSI Smart Array 5i controllers with Ultra3 performance and optional Battery-Backed Write Cache

- Memory—Four DIMM slots have a maximum capacity of 4 GB of 133-MHz ECC SDRAM. Server blades feature 2 x 1 interleave memory for added performance. DIMMs must be added in pairs.

- Network interface controllers (NICs)—Each server blade has four 10/100T Ethernet NICs: three NC3163 Fast Ethernet PCI 10/100 NICs with full WOL (Wake On LAN), and one 10/100T NIC dedicated to iLO. Two NC3163 NICs are upgradeable to 10/100/1000T using the Dual Gigabit Ethernet NC7780 option kit. All three NC-Series NICs support PXE and HP NIC teaming.

- LEDs—The ProLiant BL20p server blade has the same front panel LEDs as other ProLiant servers. Each server blade has the following LEDs:

  – Power

  – NIC link and activity

  – Disk drive activity

  – Server blade health

  – Unit identification (UID)—a blue LED that can be activated remotely to help an on-site user find a specific blade in a densely loaded rack.

- Density—Up to 48 ProLiant BL20p server blades can fit into a 42U rack.

ProLiant BL20p G2 server blade

figure 4. ProLiant BL20p G2 server blade
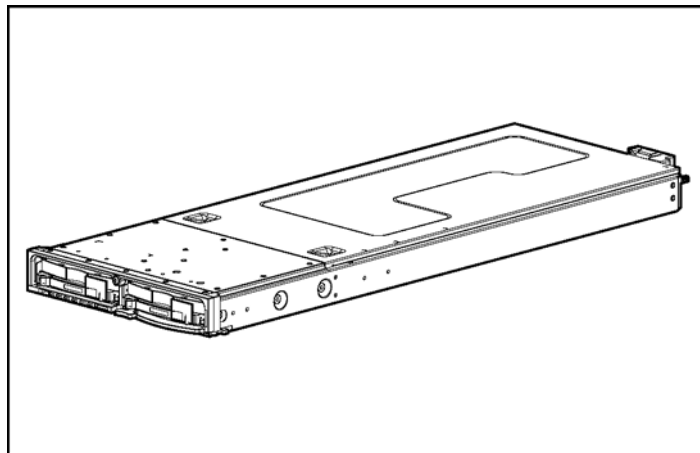
description   HP offers the industry's broadest portfolio of server blades and technologies optimized to address customer needs. The ProLiant BL20p G2 server blade is ideal for the following applications:

- Web-hosting
- E-Commerce
- Computational cluster
- Terminal Server Farm
- AV, Streaming Media
- Messaging front-end and mobility
- Small database
- Application server

The ProLiant BL20p G2 server blade delivers optional Fibre Channel support for SAN implementations and clustering capabilities. Through the implementation of a SAN with the ProLiant BL20p G2 server blade, customers can achieve improved data availability, easily scale capacity, and realize management cost savings from consolidating disk resources. In addition, HP has fused SAN and NAS (Network Attached Storage) so customers can design a storage architecture that incorporates application, database and file serving solution functionality. Fibre Channel capability is achieved using a Dual Port Fibre Channel Mezzanine Card (2-Gb) specifically designed for the ProLiant BL20p G2 server blade. The ProLiant BL20p G2 server blade is optimized for HP StorageWorks and compatible with select EMC and Hitachi SANs.

features

- Processor—Server blades include up to two Intel 2.8-GHz or 3.06-GHz, 533-MHz Xeon processors

- Hard drives and controller—Two universal hot-plug SCSI hard drives offer up to 292-GB capacity and are connected to next-generation SCSI Smart Array 5i Plus controllers and optional Battery-Backed Write Cache

- Memory—Four DIMM slots have a maximum capacity of 8 GB of PC2100, ECC, Registered SDRAM. Server blades feature 2 x 1 interleave memory for added performance. DIMMs must be added in pairs.

- Network interface controllers (NICs)—Each server blade has four 10/100/1000T Ethernet NICs: three NC7781 Gigabit PCI-X 10/100/1000T NICs with full WOL (Wake On LAN), and one 10/100T NIC dedicated to iLO. All three NC-Series NICs support PXE and HP NIC teaming.

- LEDs—The ProLiant BL20p G2 server blade has the same front panel LEDs as other ProLiant servers. Each server blade has the following LEDs:

  – Power

  – NIC link and activity

  – Disk drive activity

  – Server blade health

  – Unit identification (UID)—a blue LED that can be activated remotely to help an on-site user find a specific blade in a densely loaded rack.

- Density—Up to 48 ProLiant BL20p G2 server blades can fit into a 42U rack.

ProLiant BL40p
server blade

figure 5. ProLiant BL40p server blade
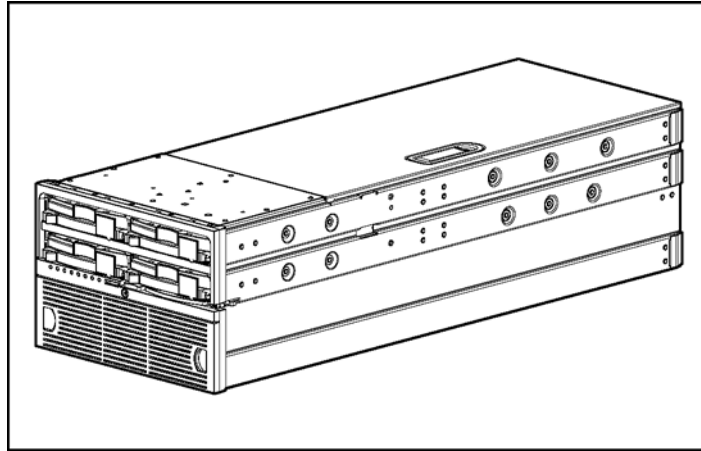
description

The ProLiant BL40p server blade is ideal for the following applications:

- Medium to large enterprise databases

- Messaging and collaboration

- IPC Clustering / Failover Clustering

- Application servers

- "e-business" (eCommerce, web hosting)

- Server consolidation

- Enterprise Resource Planning (ERP)

- Customer Relationship Management (CRM)

- Data Warehousing

- Large file/print or domain controllers

features

- Processor—Server blades include up to four Intel Xeon MP processors with 1.5-GHz processor, 512 K Level-2 cache or 2.0-GHz processors, 1-MB Level-2 cache, 400-MHz system bus

- Hard drives and controller—Four universal hot-plug SCSI hard drives offer up to 586-GB capacity and are connected to the Smart Array 5i Plus controllers, with Battery-Backed Write Cache

- Memory—Six DIMM slots have a maximum capacity of 12 GB of PC2100, ECC, Registered DIMMs, 2 x 1 interleave memory. DIMMs must be added in pairs.

- Network interface controllers (NICs)—Each server blade has six 10/100/1000T Ethernet NICs: five NC7781 Gigabit PCI-X 10/100/1000T NICs with full WOL (Wake On LAN), and one 10/100T NIC dedicated to iLO. All five NC7781 NICs support PXE and HP NIC teaming.

- LEDs—The ProLiant BL40p server blade has the same front panel LEDs as other ProLiant servers. Each server blade has the following LEDs:

    – Power

    – NIC link and activity

    – Disk drive activity

    – Server blade health

    – Unit identification (UID)—a blue LED that can be activated remotely to help an on-site user find a specific blade in a densely loaded rack.

- Density—Up to 12 ProLiant BL40p server blades can fit into a 42U rack.

storage area
network (SAN)
connectivity

Both the BL20p G2 and the ProLiant BL40p server blades can support redundant Fibre Channel SAN connectivity.

SAN connection on
the ProLiant BL40p
server blade

The ProLiant BL40p server blade has 2 PCI-X slots (64-bit/100-MHz) that enable Fibre Channel SAN connectivity through the use of host-bus adapter cards.

SAN connection on
the ProLiant BL20p
G2 server blade

Fibre Channel capability is achieved using a Dual Port Fibre Channel Mezzanine Card specifically designed for the ProLiant BL20p G2 server blade.

Fibre Channel signals travel from a ProLiant BL20p G2 server blade with a Dual Port Fibre Channel Mezzanine Card installed through the BL p-Class server blade enclosure backplane. SERDES signal traces carry Fibre Channel traffic across the BL p-Class server blade enclosure backplane to the interconnect bays.

dual port fibre
channel mezzanine
card features

figure 6. Dual Port Fibre Channel Mezzanine Card
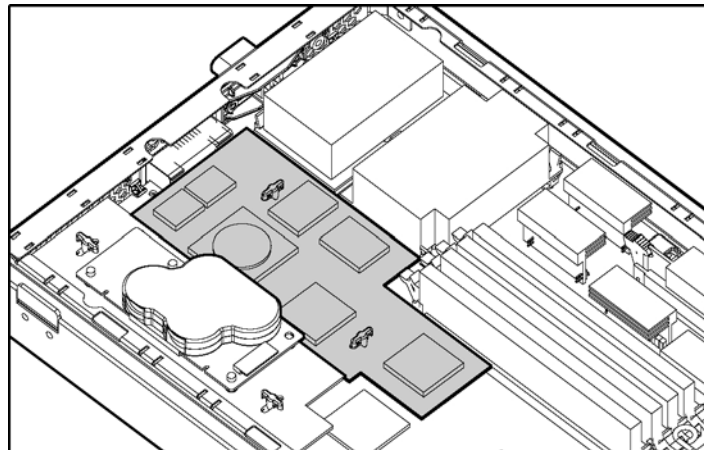
- The ProLiant BL20p G2 server blade can be ordered with the Dual Port Fibre Channel Mezzanine Card installed or the Dual Port Fibre Channel Mezzanine Card Option Kit can be ordered separately.

- The Dual Port Fibre Channel Mezzanine Card supports up to 2 Gb/s and the card is backward compatible with existing 1 Gb/s Fibre Channel equipment.

- The Dual Port Fibre Channel Mezzanine Card can only be installed in the ProLiant BL20p G2 server blade.

- The RJ-45 Patch Panel 2 or GbE2 Interconnect Switch (available 2Q03) is required when using the ProLiant BL20p G2 server blade Fibre Channel option.

- The Dual Port Fibre Channel Mezzanine Card includes two Small Form Factor transceivers with LC connectors. These optical transceivers are universal and can be used with either the GbE2 Interconnect Switch or the Patch Panel 2.

- The Fibre Channel card uses a QLogic (2312) chipset.

The Fibre Channel signals are terminated through the RJ-45 Patch Panel 2 or GbE2 Interconnect Switch (available 2Q03) in the interconnect bays. To provide redundancy each server blade has two Fibre Channel signals. One signal terminates through the right interconnect and one signal terminates through the left interconnect.

figure 7. RJ-45 Patch Panel 2 installed in an enclosure with ProLiant BL20p G2 server blades
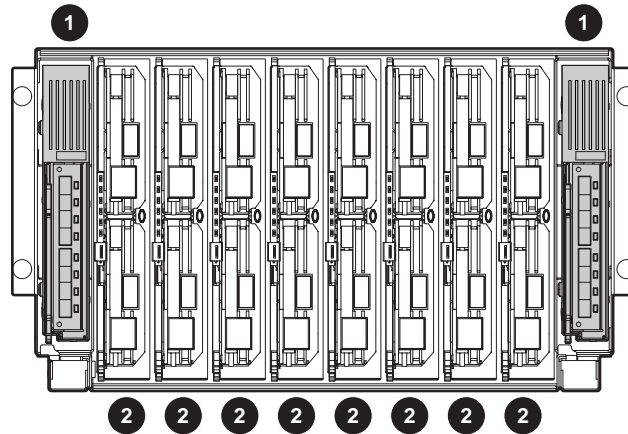
table 3. Enclosure components

component	description
1	RJ-45 Patch Panel 2
2	ProLiant BL20p G2 server blades

The ProLiant BL20p G2 and BL40p server blades are optimized for hp StorageWorks arrays and can also attach to select Third Party SANs. In addition, the server blades will be able to integrate with "fused" NAS and SAN configurations, providing the ability to work in file and block environments seamlessly.

The following components are required to support SAN connectivity on the ProLiant BL20p G2 server blade:

- ProLiant BL20p G2 server blade with Dual Port Fibre Channel Mezzanine Card installed

- Interconnect kit that provides Fibre Channel pass through:

  – ProLiant BL p-Class RJ-45 Patch Panel 2

  – ProLiant BL p-Class GbE2 Interconnect Switch with the GbE2 Storage Connectivity Kit option (available 2Q03)

StorageWorks arrays supported:

- StorageWorks MSA 1000

- StorageWorks Enterprsie Virtual Array (EVA)

- StorageWorks EMA/MA arrays

- StorageWorks XP

- Select Hitachi and EMC models will be compatible

SecurePath is supported for multipath functionality in all the previous environments.

ProLiant BL p-Class server blade enclosure

figure 8.   Server blade enclosure
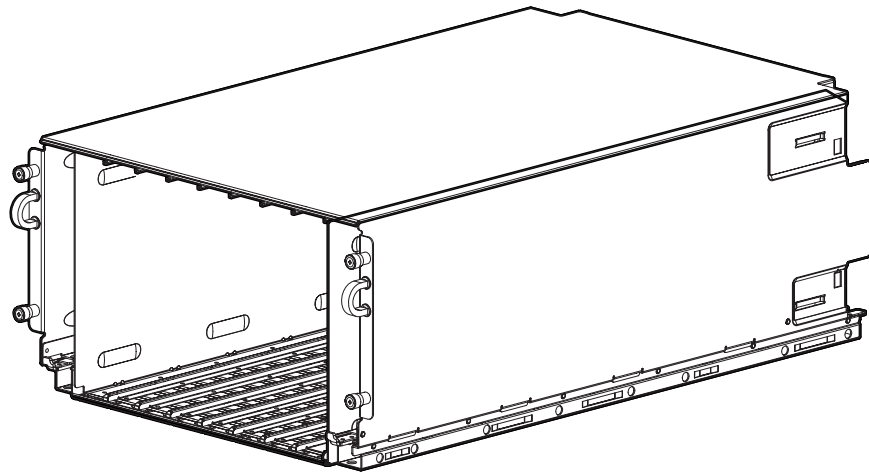
description

ProLiant p-Class server blades are housed in a server blade enclosure. The server blades slide into the server blade enclosure backplane for power and data connections.

Each server blade enclosure has eight server blade bays and two interconnect bays. The two interconnect bays are the outermost slots and are occupied either by RJ-45 patch panels or an interconnect switch with Gigabit Ethernet uplinks for network cable reduction. The remaining eight bays can support up to eight 2-processor server blades or two 4-processor server blades, in any combination. Up to six server blade enclosures can fit in a 42U rack.

features

- Dimensions—Server blade enclosures are high, standard 48-cm (19-in) wide, and 73.30-cm (28.86-in) deep.

- Toolless installation—Server blade enclosures are easily installed with spring-loaded rack rails and thumbscrews. Rack rails are common between the ProLiant BL p-Class server blade enclosure and the ProLiant BL p-Class power enclosure, as well as with the ProLiant BL e-Class architecture.

- Removable backplanes—Toolless removal of power and data backplane is possible without removing the server blade enclosure from rack or removing blades from the enclosure.

- Forward compatible—Next-generation ProLiant BL p-Class server blades will fit into server blade enclosures and can be mixed in the same enclosure.

- Server blade management module—Attached to the back of each server blade enclosure is a server blade management module. This pluggable microcontroller card polls server blades in the server blade enclosure through the enclosure backplane by communicating with the iLO ASIC on each blade. The management module reports thermal, power, and protection fuse events to all server blades in the server blade enclosure; provides asset and inventory information; and enables each enclosed server blade to communicate with other server blade enclosures.

- Rack requirements:

  – HP ProLiant 10000 Series racks (recommended)

  – HP ProLiant 9000 Series racks

  – HP ProLiant 7000 Series racks with door extension and perforated door panels

  – Telco racks

  – Some third-party racks. Refer to "planning for a ProLiant BL p-Class installation" for third-party rack requirements.

ProLiant BL
p-Class
interconnects

Each server blade enclosure requires a pair of interconnects. These interconnects slide into the server blade enclosure and collect NIC signals from all of the server blades inside of the server blade enclosure.

There are several types of interconnects:

- HP ProLiant BL p-Class RJ-45 Patch Panel

- HP ProLiant BL p-Class RJ-45 Patch Panel 2 with Fibre Channel pass through

- HP ProLiant BL p-Class Interconnect Switch (available with either fiber-based 1000SX or copper-based 10/100/1000T uplink ports)

ProLiant BL p-Class
RJ-45 patch panel

figure 9. RJ-45 Patch Panel components
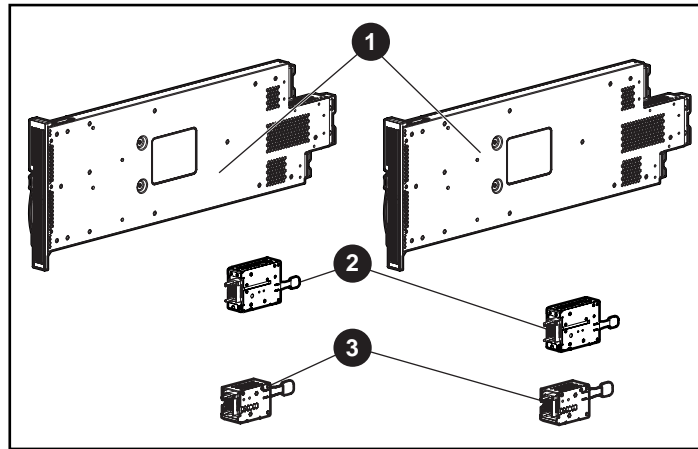
table 4. RJ-45 Patch Panel Components

Item	Description
1	RJ-45 Patch Panels
2	RJ-45 Interconnect Module (10-connector)
3	RJ-45 Interconnect Module (6-connector)

figure 10. RJ-45 Patch Panel locations
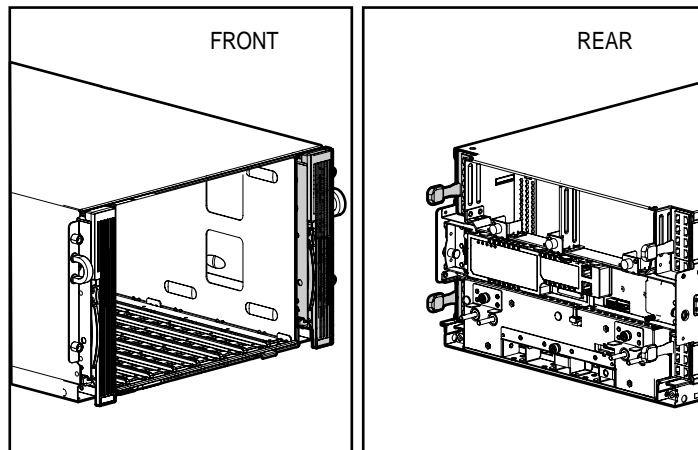
description

The RJ-45 Patch Panel functions as an Ethernet pass through for customers who want to have flexibility in choosing network switches. The patch panel brings all NIC signals out as separate RJ-45 connections. A server blade enclosure full of 2-processor server blades has 32 RJ-45 connections, and a server blade enclosure full of 4-processor server blades has 12 RJ-45 connections. A combination of 2-processor and 4-processor server blades can have up to 22 RJ-45 connections.

features

The RJ-45 Patch Panel offers fault tolerance. Ethernet signals exit the back of the server blade into the backplane in the server blade enclosure. Half of the signals from the server blade go to the left interconnect and the other half go to the right interconnect, providing separate paths for the redundant network ports.

ProLiant BL p-Class
RJ-45 patch panel 2

figure 11. RJ-45 Patch Panel 2 components
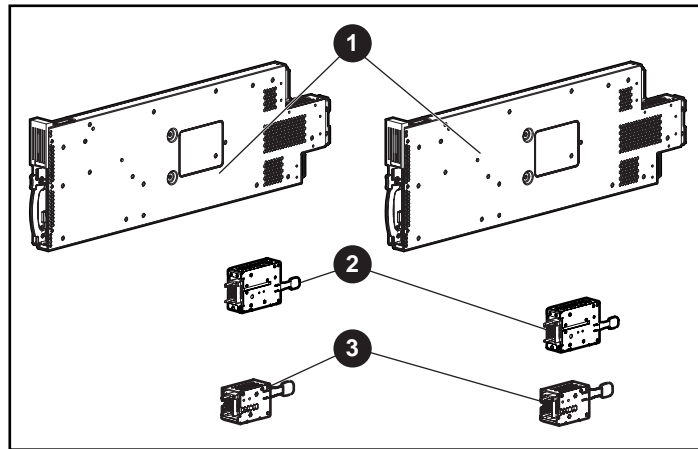
table 5. RJ-45 Patch Panel 2 Components

item	description
1	RJ-45 Patch Panel 2
2	Patch Panel 2 Interconnect Module (10-connector)
3	Patch Panel 2 Interconnect Module (6-connector)

ethernet description

For Ethernet NIC signal pass through, the RJ-45 Patch Panel 2 functions in the same manner as the previously discussed RJ-45 Patch Panel. In addition to Ethernet pass through, the RJ-45 Patch Panel 2 provides Fibre Channel pass through for up to eight ProLiant BL20p G2 server blades with the Dual Port Fibre Channel Mezzanine Card installed.

fibre channel pass through description

In addition to Ethernet pass through, the RJ-45 Patch Panel 2 provides fibre connections for one server blade enclosure.

figure 12: RJ-45 Patch Panel 2 SFF transceivers
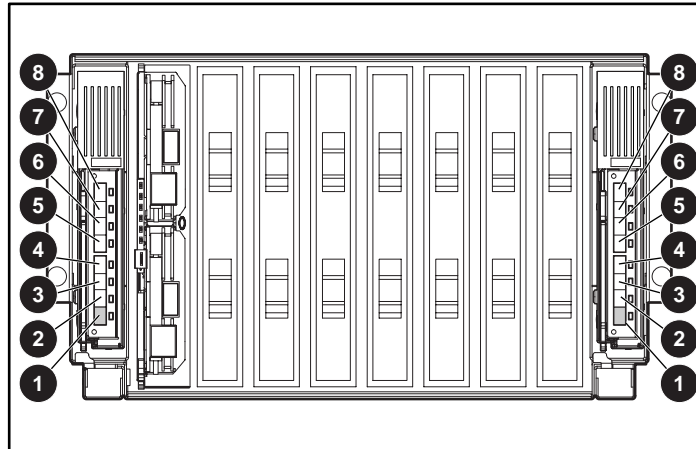
table 6. RJ-45 Patch Panel 2 SFF transceivers

connector	corresponds to
1	Server blade bay 1 (occupied in figure 1)
2	Server blade bay 2
3	Server blade bay 3
4	Server blade bay 4
5	Server blade bay 5
6	Server blade bay 6
7	Server blade bay 7
8	Server blade bay 8

- LAN (Ethernet) signals exit through the rear of the server blade; SAN (Fibre Channel) signals exit through the front.

- The RJ-45 Patch Panel 2 is required if using the BL20p G2 with the Fibre Channel Mezzanine Card.

- Eight Fibre Channel connections exist per RJ-45 Patch Panel 2.

- RJ-45 Patch Panel 2 interconnects use Small Form Factor (SFF) transceivers, which are shipped with the Fibre Channel Mezzanine Card.

features

- The RJ-45 Patch Panel 2 offers fault tolerance. Ethernet signals exit the back of the server blade into the backplane in the server blade enclosure in the same manner as the RJ-45 Patch Panel.

- Eight transceiver slots per interconnect provide pass through of ProLiant BL20p G2 Fibre Channel signals. Each ProLiant BL20p G2 server blade with the Dual Port Fibre Channel Mezzanine Card installed has two Fibre Channel signals. One Fibre Channel signal is routed to the left interconnect and the other signal goes to the right interconnect, providing separate paths for the redundant storage ports.

- The Fibre Channel signals are individually sent out of the front of the RJ-45 Patch Panel 2. A cable channel is located at the bottom of the RJ-45 Patch Panel 2 to allow the Fibre Channel cables to be routed to the back of the server blade enclosure. The RJ-45 Patch Panel 2 is recessed in the server blade enclosure to allow correct Fibre Channel cable bend radius while the rack door is closed.

- The BL20p G2 Dual Port Fibre Channel Mezzanine Card includes two Small Form Factor transceivers with LC connectors. These optical transceivers are universal and can be used with either the Patch Panel 2 or the GbE2 Interconnect Switch. These optical transceivers are installed in the transceiver slots located on the front of the RJ-45 Patch Panel 2.

ProLiant BL p-Class GbE interconnect switch

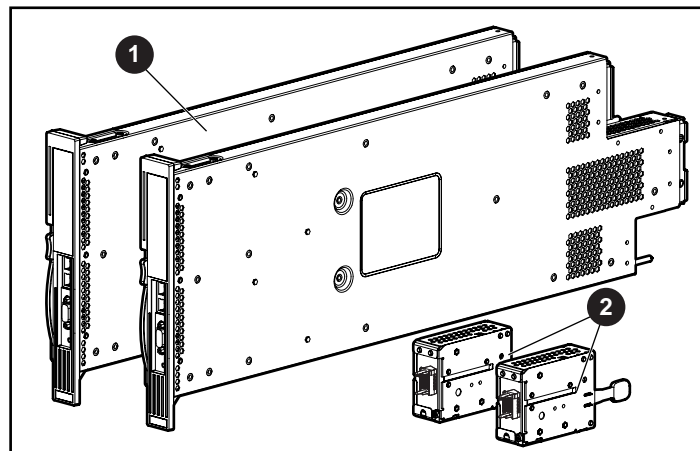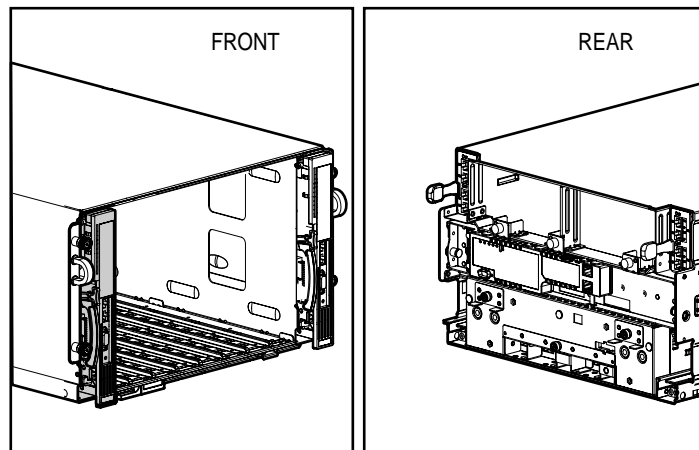figure 13. GbE Interconnect Switch components

table 7. GbE Interconnect Switch Components

item	description
1	GbE Interconnect Switch
2	GbE interconnect module

figure 14. GbE Interconnect Switch locations

FRONT	REAR

description

The ProLiant BL p-Class GbE Interconnect Switch is designed to reduce the number of network connections from 32 to as little as 1 per server blade enclosure. The interconnect switch uses layer 2 switching technology supporting an extensive list of industry-standard, enterprise features. The GbE Interconnect Switch uplinks are available as either fiber-based 1000SX or copper-based 10/100/1000T ports The GbE Interconnect Switch offers several advanced features.

features

- Pluggable—The GbE Interconnect Switch is a pluggable component of the ProLiant BL p-Class server blade enclosure with the ability to retain the switch configuration. When removing the switch option, you do not need to disconnect the networking connections from the server blades or the uplink ports.

- Reduced cabling—Each GbE Interconnect Switch (total of two per server blade enclosure) reduces sixteen 10/100T ports to two 10/100T and two Gigabit Ethernet uplink ports. You are not required to use all uplink ports and may use and configure one or more uplink ports as desired—providing up to a 32 to 1 reduction in the number of networking connections and cables per server blade enclosure.

- Fiber- and copper-based uplinks—The gigabit uplinks are available as either fiber-based 1000SX or copper-based 10/100/1000T Ethernet ports.

- Integrated high availability features including:

  – Pluggable with the capability to retain configuration

  – Redundant GbE Interconnect Switches per server blade enclosure

  – Redundant power inputs and cooling per each GbE Interconnect Switch

  – Redundant data paths to and from each GbE Interconnect Switch to each server blade

  – Redundant data path cross connections between the two GbE Interconnect Switches

  – Two pairs of redundant uplink ports per each GbE Interconnect Switch

 – Spanning tree protocol support to provide loop-free path redundancy

- Pre-configured—The GbE Interconnect Switch is completely pre-configured for immediate use. It plugs directly into the chassis and does not occupy a server blade slot or use any additional rack height

- Industry-standard design—The interconnect switch is industry standard and does not utilize proprietary network protocols. It is compatible with industry standard switches such as those from Cisco, Extreme, 3Com, etc.

- Enterprise-class features—The GbE Interconnect Switch includes a complete set of enterprise-class network features. It offers tagged VLAN capability, EtherChannel compatible trunking, QoS, IGMP snooping, spanning tree protocol, port mirroring, TFTP client, flow control, and many other industry-standard network technologies. The interconnect switch includes a Web-based interface, a menu driven console, and a scriptable command line interface; Telnet, SNMP, and RMON are further supported.

NOTE: If using the GbE Interconnect Switch, the supported Ethernet network speed from the server blades to the interconnect switch is 10/100 Mbps (the downlink port speed.) If operating server blades with Gigabit Ethernet NICs, the Interconnect Switch automatically auto-negotiates the speed to 10/100 Mbps. This downlink port auto-negotiation is independent of the speed from the interconnect switch to your network (the uplink port speed.) In all cases, each GbE Interconnect Switch provides two 10/100T and two gigabit uplink ports to be used as desired.

NOTE: If gigabit speed from the server blade NICs is required, it is recommended that one of the patch panel options or the upcoming GbE2 Interconnect Switch be used.

ProLiant BL power enclosure with power supplies

figure 15. ProLiant BL power enclosure with power supplies
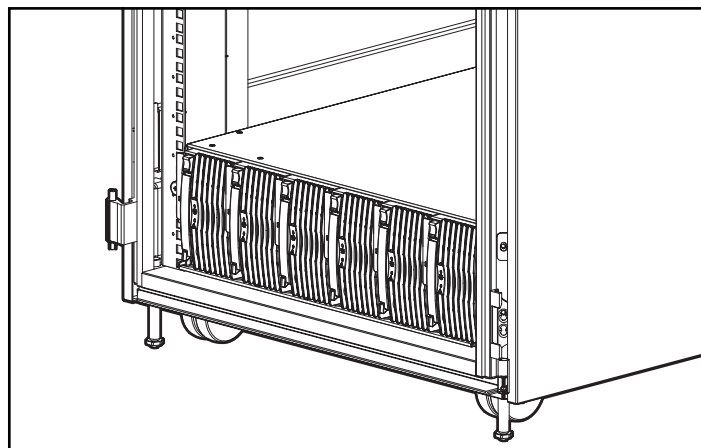
description

Hot-plug power supplies for the ProLiant BL p-Class infrastructure are housed in a ProLiant BL power enclosure. Power supplies convert 200VAC-240VAC to -48VDC to power server blades. The power supplies are front-accessible, hot-plug, and 1 + 1 redundant. The power enclosures must be mounted in a rack below the server blade enclosures that they power.

Two models of the power enclosure are offered:

- Single-phase power enclosure—This enclosure holds a maximum of four hot-plug power supplies.

- Three-phase power enclosure—This enclosure holds a maximum of six hot-plug power supplies. Three-phase power can support more server blades than single-phase power.

features

- Redundant—The ProLiant BL p-Class architecture supports dual power enclosures. Each power enclosure is attached to two power circuits to enable redundant power feeds (the equivalent of dual power cords). Each power enclosure must be able to support the full load of the rack in case of AC failure. Therefore, to ensure redundancy, the draw on each power feed must be limited to half its maximum power rating.

- Built-in power headroom—The power supplies were designed to supply enough power for next generation server blades.

- Toolless installation—Power enclosures are easily installed with spring-loaded rack rails and thumbscrews. Rails are common between the server blade enclosure and the power enclosure.

- Power management module—Each power enclosure includes a self-contained microcontroller that monitors the power supplies and the power enclosure. The power management module is responsible for determining if adequate power is available for new server blades during the power-up sequence. The power management module can be connected to the server blade enclosure management modules to communicate management information, such as server blade location, power supply budget, status, etc.

- The power management module is required for the power subsystem to operate in normal mode. Failure of the power subsystem monitor does not cause a power interruption to the server blades.

ProLiant BL p-Class power distribution

description

In the ProLiant BL p-Class infrastructure, redundant -48 VDC power (from the power enclosures or your own –48V DC power) is distributed to the server blade enclosures through the bus bar system. Hinges attach the ProLiant BL p-Class bus bars to the RETMA rails in a rack. The bus bars swing open from the center to enable easy rear access to the server blades and network cables. Power is distributed redundantly through independent A- side and B-side bus bars.

Three different power distribution solutions are available depending on the number of server blade enclosures planned for the rack:

- ProLiant BL p-Class scalable bus bar
- ProLiant BL p-Class mini bus bar
- ProLiant BL p-Class power bus box

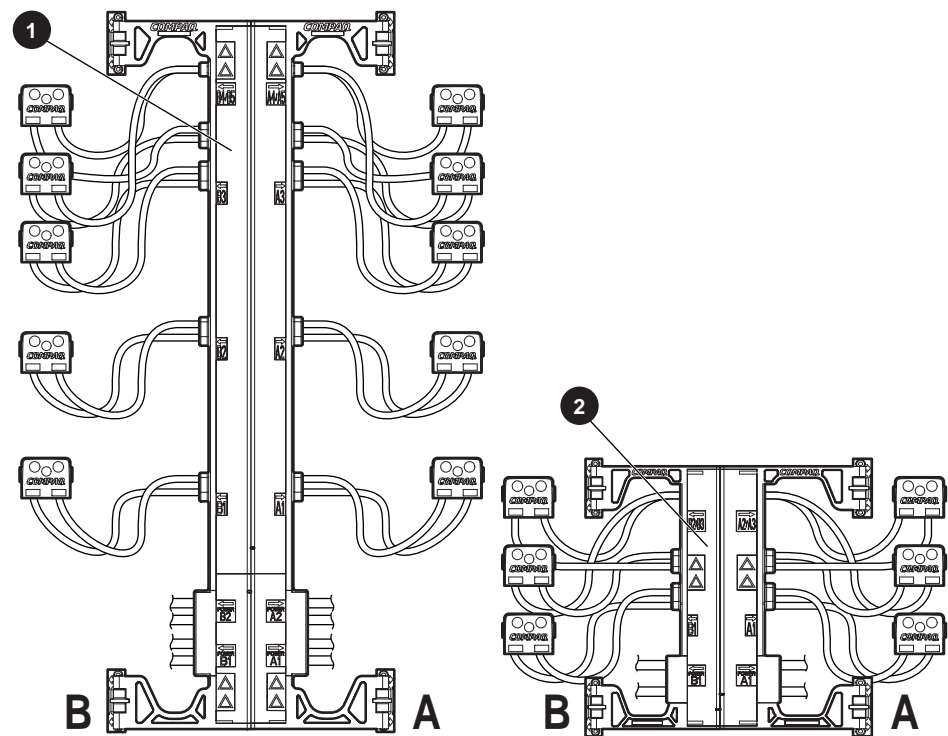figure 16.   A- and B-sided scalable and mini bus bars

table 8. Scalable and Mini Bus Bars

item	description
1	Scalable bus bars
2	Mini bus bars

figure 17. Power bus box
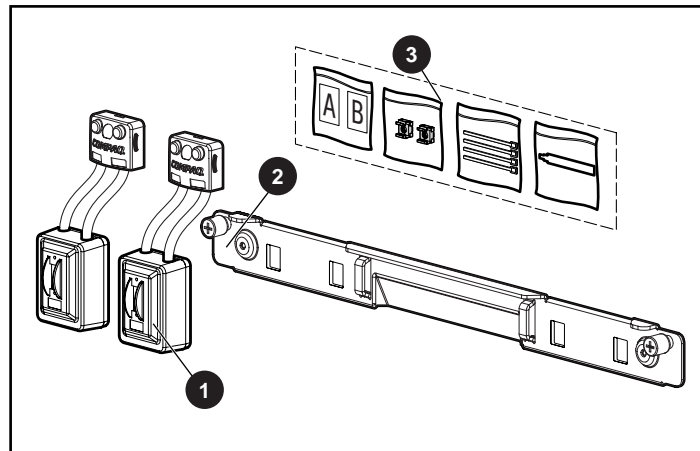
table 9. Power Bus Box

item	description
1	Power bus boxes
2	Cable bracket
3	Miscellaneous hardware bags
Not shown	Rack template

features

- Completely redundant solution—The ProLiant BL p-Class power infrastructure (power enclosures, bus bars, and cabling) is right-left redundant. The right side, or "A" side, is a mirror image of the left, or "B" side, when facing the rear of the rack. Each side has its own AC feed and DC distribution path. Half of the power supplies in the power enclosure provide power through the B-side bus bar, and the other power supplies in the power enclosure provide power through the A-side bus bar.

- Individually controlled—On both the A-side bus bar and the B-side bus bar, a DC circuit breaker is available at each server blade enclosure to enable shutting off the power to individual server blade enclosures for safe physical access. Each ProLiant p-Class server blade is individually fused so that a blown fuse cannot bring down other server blades in the server blade enclosure. These fuses, located on the power backplane of the server blade enclosure, are self-resetting.

- Flexibility—The power distribution solution comes in three configurations, depending on the number of server blade enclosures to be installed and the power input needed:

  – The scalable rack bus bar supports one or two power enclosures and up to five server blade enclosures. This bus bar solution enables future growth and flexibility in two ways: Customers can deploy this solution initially with less than the maximum supportable configuration, and then add ProLiant BL p-Class server blades and server blade enclosures as the computing needs grow, or customers can mount other devices (such as switching hardware) in the same rack above the server blade enclosures.

 – The mini bus bar supports one power enclosure and up to three end server blade enclosures. This solution also offers flexibility because other devices can be mounted above it in a rack. In fact, a second mini bus bar configuration can be installed in the space above the first one to provide support for a full 42U rack of ProLiant BL p-Class server blades.

 – The power bus box solution provides direct connection from one power enclosure to one server blade enclosure (primarily used for evaluating the ProLiant BL architecture).

The following table (table 10) summarizes the characteristics of the power distribution solutions for ProLiant BL p-Class server blades. Deploying a full 42U rack of ProLiant BL p-Class blades requires using two mini bus bars.

table 10. ProLiant BL Power Distribution Solutions

solution	power enclosures supported	server blade enclosures supported	max. rack space occupied
Scalable Bus Bar	≤ 2	≤ 5	36U
Mini Bus Bar	1	≤ 3	21U
Power Bus Box	1	1	9U

diagnostic station

ProLiant BL p-Class Diagnostic Station—enables you to power up a ProLiant BL p-Class server blade or interconnect switch outside of the rack environment. The diagnostic station contains a power supply that provides power to the server blade or interconnect switch and a system board with connectors for data transfer between the server blade, or interconnect switch, and a client PC (a laptop, desktop, or workstation). The client PC provides the keyboard, video, mouse, and diskette interface and facilitates the use of the iLO Remote Console.

> **NOTE:** If powering up a BL40p server blade outside the rack, you must purchase the ProLiant BL40p Server Blade Diagnostic Station Upgrade Kit.

The diagnostic station enables you to perform the following tasks outside of the rack:

- Power up a server blade or interconnect switch
- Observe external LEDs
- Test NIC and interconnect switch port activity
- Configure a server blade
- Configure an interconnect switch including VLANs and security
- Load software on a server blade
- Configure an interconnect switch to download an applicable configuration file
- Test a server blade or interconnect switch after installing an option or upgrade
- Diagnose server blade issues using iLO
- Diagnose the interconnect switch using the front panel Ethernet and RS-232 ports, or any uplink port

figure 18.   Diagnostic station
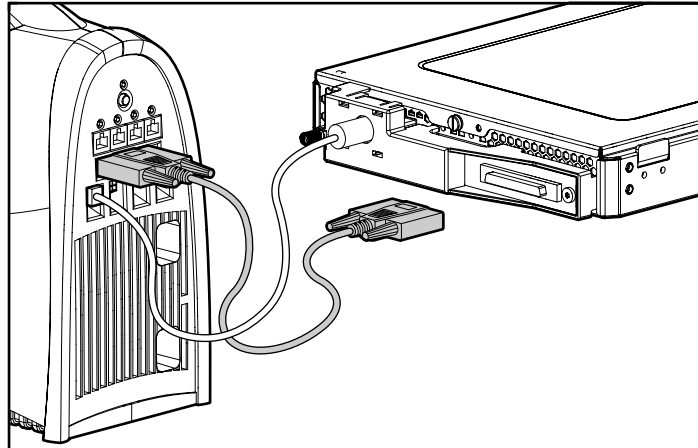
software components

operating system support

For the most current versions of supported operating systems, visit ftp://ftp.compaq.com/pub/products/servers/os-support-matrix-310.pdf

ProLiant essentials rapid deployment pack

The ProLiant Essentials Rapid Deployment Pack provides a remote console-based method for scalable, automated server deployment without network degradation. IT administrators can use the Rapid Deployment Pack to deploy from one to 100 server blades in 30 minutes.

The ProLiant Essentials Rapid Deployment Pack integrates two powerful software products: Altiris eXpress Deployment Server and SmartStart Scripting Toolkit. Altiris eXpress Deployment Server features industry-standard PXE technology and multicasting technology. The Scripting Toolkit includes a modular set of DOS-based utilities for automating many steps in the configuration process, and it provides sample scripts for configuring server blades.

All ProLiant BL server blades have PXE-enabled NICs. The Rapid Deployment Pack enables administrators to create a configuration script, or "server profile," for target ProLiant BL server blades by copying and editing files of a configured source server or server blade. Administrators can then copy that configuration script and Scripting Toolkit utilities to a network share or a bootable server configuration diskette. By combining scripts for server configuration and OS installation, IT administrators can rapidly configure a new server or server blade and install the OS remotely. This remote process shrinks a typical installation time from hours or days to minutes, making it possible to scale server blade deployments to high volumes rapidly.

The ProLiant Essentials Rapid Deployment Pack also enables ProLiant BL "rip-and-replace" functionality. An administrator can use the Rapid Deployment Pack to pre-assign a particular function or "role" to each server blade bay in a server blade enclosure.

For example, in order for a ProLiant BL20p G2 server blade in server blade bay number 4 to run Microsoft Windows 2000 with Microsoft Internet Information Server (IIS) and some HTML scripting, the administrator simply builds that image, or profile, for bay 4 and loads the image onto a deployment server. When a server blade is installed into bay 4, the server blade seeks out the deployment server, downloads the pre-assigned script, and begins working immediately without local intervention. If that server blade requires replacement, the new server blade automatically seeks out the deployment server and downloads the pre-assigned script to configure itself identically. In other words, the new server blade automatically takes on the role of the previous server blade, significantly reducing the time and effort needed to keep servers in production.

The ProLiant Essentials Rapid Deployment Pack maximizes your IT resources by providing a full server build from a remote console for initial power on, automated server configuration on the fly, and installation of standard software sets based on server roles. The intuitive interface reduces the level of IT skill sets needed to deploy and redeploy ProLiant BL servers in the data center and throughout the network.

insight manager 7 service pack 1.1

Insight Manager 7 Service Pack 1.1 is focused on delivering advanced visualization capabilities for the ProLiant BL p-Class server blades. Insight Manager 7 Service Pack 1 extends the capabilities of Insight Manager 7 with new capabilities for managing server blades, a new reporting engine, and discovery filters.

Insight Manager 7 SP1 delivers fault management and system software maintenance to the blade infrastructure. Systems administrators familiar with Insight Manager 7 will be able to take advantage of the same features used to manage ML and DL servers to manage their new ProLiant BL system.

Insight Manager 7 SP1 delivers the following server blade-specific benefits:

- Provides the Blade Server Visual Locator that properly identifies the location of each server blade within its enclosure and rack

- Extends pre-failure alerting, version control, and remote update capabilities to server blade environment.

- Correlates events generated by shared infrastructure components ensuring systems administrators receive a single event from each affected enclosure as opposed to a single event from each affected server blade.

- One click access to virtual presence and control provided by Integrated Lights-Out Advanced and Integrated Administrator

integrated lights-out advanced edition

Once an option, the Integrated Lights-Out (iLO) Advanced is now integrated into each server blade. Integrated Lights-Out Advanced is a LAN-only, cost-effective method of enabling authorized IT personnel to have full access and control of the system from any location, independent of the state of the server blade operating system or server blade hardware.

Integrated Lights-Out Advanced incorporates new functionality in its firmware to support the modular infrastructure of the ProLiant BL p-Class System, making it easier to deploy and manage. For example, Integrated Lights-Out Advanced enables complete virtual presence and control through its remote management capabilities. Because each server blade contains Integrated Lights-Out Advanced, the server blade can query and control crucial aspects of its environment within the infrastructure, such as the power allocation mechanisms. And because of its localized intelligence, dedicated management network, and direct connection to the management console, Integrated Lights-Out Advanced provides the intelligent communication channels to send alerts and other management information throughout the server blade infrastructure.

remote management

The ProLiant BL p-Class System is designed for remote and headless operation. There is no way to connect a keyboard, video monitor, or mouse directly to the server blade. However, because the ProLiant p-Class server blades ship from the factory with the iLO Advanced Feature set enabled, administrators have full use of the robust Graphical Remote Console and Virtual Media capabilities. Through these features, customers have the ability to view the server console at all times, to apply software and firmware updates over the network, to access troubleshooting information, to reset the server, and to watch the entire boot sequence from the convenience of a management console. Furthermore, customers are assured that through Integrated Lights-Out, these functions are secure, robust, and always available, regardless of server state or operating system. Thus, ProLiant p-Class server blades provide the cost and security advantages of a headless server blade, and in addition, Integrated Lights-Out Advanced provides customers with a "remote head"—an always-available keyboard, mouse, and monitor.

Integrated Lights-Out Advanced also provides a consistent management interface—the same "look and feel" —as other ProLiant servers. It is fully integrated with Insight Manager 7 to provide in-depth fault, configuration, and performance monitoring from a single management console.

Integrated Insight Lights-Out Advanced provides a virtual power button and a virtual diskette drive, and, through the firmware, it provides an integrated graphics remote console that is easily accessed from any standard Web browser without the need to purchase or install additional software.

iLO Advanced accommodates the need for fewer IT personnel, reduced travel time, and the ability to access and manage many server blades from a centralized location. An IT administrator can use the virtual power button to power on or power off a server blade from a remote location. The virtual diskette drive enables an IT administrator to perform remote ROM flash, remote diagnostics, remote IP configuration with DNS/DHCP, and remote loading of operating systems onto a server blade from a diskette inserted in a network client from anywhere on the network.

For more information about how iLO Advanced works with the ProLiant p-Class server blades, refer to the *Integrated Lights-Out in the ProLiant BL p-Class System* white paper.

smart array 5i plus controller	The Smart Array 5i Plus Controller is a hardware-based, cost-effective alternative to software-based RAID used in the ProLiant BL20p G2 and ProLiant BL40p server blades. The Smart Array 5i Plus Controller is an intelligent array controller for entry-level, hardware-based fault tolerance with support for Ultra3 SCSI technology and an improved data transfer rate maximum of 160 MB/s per channel. Embedded into the server blade, the Smart Array 5i Plus Controller provides worry-free data protection for all server blade internal storage needs. The ProLiant p-Class server blades support drive mirroring (RAID 1) and drive striping (RAID 0). The server blades also offer a battery-backed write cache option to prevent data loss during power interruptions.

> **NOTE:** The ProLiant BL40p server blade supports RAID 5 in addition to RAID 0 and 1.

> **NOTE:** The ProLiant BL20p server blade uses the Smart Array 5i Controller.

ProLiant BL P-Class GbE interconnect switch management	A Web-based interface, menu-driven console, and scriptable command line interface (CLI) are provided to configure, manage, and monitor the GbE Interconnect Switch on a per port basis. Any combination of the server network adapter ports, uplink ports, or cross-connection ports can be disabled, enabled, configured, and monitored using the interconnect switch management interfaces. All interfaces can be configured to require a valid username and password for authentication. For out-of-band local access, use either of the 10/100T Ethernet RJ-45 ports or the serial console port on the front of the interconnect switch. Remote access is possible from any uplink port on the interconnect switch.

The GbE Interconnect Switch supports both SNMP and RMON capabilities. Thus, an administrator can monitor the interconnect switch remotely from an RMON-based network management console or an SNMP-based management tool such as HP Insight Manager 7 and HP OpenView. The interconnect switch supports industry-standard SNMP management information bases (MIBs), HP Enterprise switch MIBs, and RMON groups 1, 2, 3, and 9 for fault detection, and monitoring of switch functionality.

Multiple interconnect switches can be configured by using the scriptable CLI or the provided SNMP scripting utility. Customized configuration files can be saved to a TFTP server and downloaded to one or more interconnect switches. This allows the rapid deployment of multiple server blade systems and provides robust backup and restore capabilities. The TFTP service also allows you to upgrade the interconnect switch firmware and copy the switch log file.

planning for a ProLiant BL p-Class installation	The ProLiant BL p-Class Sizing Utility is a flexible, graphical tool that provides valuable information necessary to help plan and prepare a site for delivery and installation of ProLiant BL p-Class systems. Site planning information, such as power distribution requirements and environmental specifications, is generated based on entered system configuration criteria. Simply configure each server blade with appropriate options, choose interconnects for each server blade enclosure, and enter data center power information.

ProLiant BL sizing utility

figure 19. ProLiant BL Sizing Utility

Once the valid information is entered, the tool calculates:

- Power specifications

- Summary table of server blade components in the rack (server blades, memory, processor, etc.)

- Number of power supplies and power enclosures needed for configuration entered

- System weight

- Equipment list

Equipment List

This Equipment List can be copied to an excel worksheet or word document. To copy this table simply select the table using the mouse.
Copy the selected table using Copy command from the Edit menu.
Go to the destination document and paste it.

Part Description	Qty	Part Number
BL20p with ONE Pentium III P1400-512K, 512MB RAM, no drives	4	230040-B21
BL40p with ONE Xeon MP1.5GHz-1MB Cache, 512MB RAM (2 x 256MB), no drives	1	293461-B21
BL40p with TWO Xeon MP2.0GHz-2MB Cache, 1GB RAM (2 x 512MB), no drives (Not available in NA)	4	293462-B21
BL20P G2 with ONE Xeon P2.8GHz, 512MB RAM (2 x 256MB), no drives	7	300876-B21
BL20p G2 with TWO Xeon P2.8GHz, 1GB RAM (2 x 512MB), no drives (Not available in NA)	8	300877-B21
BL20P G2 with ONE Xeon P2.8GHz, 512MB RAM (2 x 256MB), no drives, with FC Mezz Card	2	300980-B21
BL20p G2 with TWO Xeon P2.8GHz, 1GB RAM (2 x 512MB), no drives, with FC Mezz card (Not available in NA)	7	300981-B21
Additional 2 GB (2 x 1 GB) Memory Kit(s)	2	201695-B21
Additional DDR 512 MB (2 x 256 MB) Memory Kit(s)	6	300678-B21
Additional DDR 1 GB (2 x 512 MB) Memory Kit(s)	2	300679-B21
Additional DDR 2 GB (2 x 1 GB) Memory Kit(s)	8	300680-B21
Additional DDR 4 GB (2 x 2 GB) Memory Kit(s)	11	300682-B21
Additional Pentium III 1.4GHz	4	234277-B21
Additional Xeon MP 1.5 GHz	3	309330-B21

sizing and planning ProLiant BL deployment

IMPORTANT: To plan for system growth within the infrastructure, you should size a solution based on the **maximum** number of server blades you plan to deploy into the rack.

table 11. ProLiant BL Basic Hardware Requirements

component	units	choices
Rack	1	HP ProLiant, telco, or most third-party rack cabinets
ProLiant BL20p server blade	1	Single processor or Dual processor
ProLiant BL20p G2 server blade	1	Single processor or Dual processor
ProLiant BL40p server blade	1	Up to 4 processors
ProLiant BL p-Class server blade enclosure	1	With or without ProLiant Essentials Rapid Deployment Pack licenses

continued

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table 11. ProLiant BL Basic Hardware Requirements *continued*

component	units	choices
Interconnects	2	ProLiant BL p-Class RJ-45 Patch Panel
		or
		ProLiant BL p-Class RJ-45 Patch Panel 2
		or
		ProLiant BL p-Class GbE Interconnect Switch
ProLiant BL p-Class power enclosure Choose this component if you have AC power	1	Single-phase with hot-plug power supplies
		or
		Three-phase with hot-plug power supplies
Facility DC cable kit Choose this kit if you have facility DC power.	1	Facility DC kit
Power distribution devices	1 pair	ProLiant BL p-Class scalable bus bars
		or
		ProLiant BL p-Class mini bus bars
		or
		ProLiant BL p-Class power bus boxes

system configuration

required input power

The ProLiant BL p-Class system has specific AC power requirements. However, DC power may be used instead if the facility has DC power available.

ProLiant BL p-Class power (AC)

When using an AC power source, the ProLiant BL p-Class infrastructure requires single-phase or three-phase 200-240 VAC input power. Each power enclosure uses two 30 A circuits for redundant functionality.

The capacity of the ProLiant BL p-Class power supply enclosures varies with the voltage level of the local AC power source. Maximum capacity can be achieved using only a 240V nominally rated power source, and lower voltages may result in lower server blade capacity. The ProLiant BL p-Class Sizing Utility takes this into consideration. Refer to figure 20 for the maximum output power capacity for various input voltages between 200-240Vac.

figure 20: Maximum output power capacity

NA/JPN Power Enclosures

80% Plug derating applied

Power Enclosure Model	Number of Power Enclosures	Total Number of Power Supplies per Side	Nominal AC Input Line Voltage (Vac)	Total DC Pwr Available (W)	Number of slots supported at X Watts per slot						
					150	175	200	225	250	275	300
Single-phase	1	1	200-240	2,930	19	16	14	13	11	10	9
		2	200	3,998	26	22	19	17	15	14	13
			208	4,158	27	23	20	18	16	15	13
	2	2	200-240	5,860	39	33	29	26	23	21	19
		4	200	7,997	53	45	39	35	31	29	26
			208	8,317	55	47	41	36	33	30	27
Three-phase	1	3	200	6,925	46	39	34	30	27	25	23
			208	7,202	48	41	36	32	28	26	24
	2	6	200	13,851	60+	60+	60+	60+	55	50	46
			208	14,405	60+	60+	60+	60+	57	52	48

International Power Enclosures

80% Plug derating applied

Power Enclosure Model	Number of Power Enclosures	Total Number of Power Supplies per Side	Nominal AC Input Line Voltage (Vac)	Total DC Pwr Available (W)	Number of slots supported at X Watts per slot						
					150	175	200	225	250	275	300
Single-phase	1	1	200-240	2,930	19	16	14	13	11	10	9
		2	220	4,398	29	25	21	19	17	15	14
			230	4,598	30	26	22	20	18	16	15
			240	4,798	31	27	23	21	19	17	15
	2	2	200-240	5,860	39	33	29	26	23	21	19
		4	220	8,796	58	50	43	39	35	31	29
			230	9,196	60+	52	45	40	36	33	30
			240	9,596	60+	54	47	42	38	34	31
Three-phase	1	3	200-240	8,790	50+	50	43	39	35	31	29
	2	6	200-240	17,580	60+	60+	60+	60+	60+	60+	58

Power Bus Box supports up to 10 slots	1-10
Mini-bus supports up to 30 slots with one Power Enclosure	11-30
Scalable supports up to 50 slots with one or two Power Enclosures	31-50
Though total is 30 slots or less, requires Scalable to support two Power Enclosures	X
Mini-bus x 2 supports up to 60 slots with two Power Enclosures, each connected to one bus	51-60
DC power greater than max required for 50 slots - Scalable with one or two Power Enclosures is max choice	50+
DC power greater than max required for 60 slots - Mini-bus x 2 with two Power Enclosures is max choice	60+

facility DC power connection

Facility DC power requires a Facility DC Power Connection option kit to distribute the current through system using A- and B-sided bus bars to the server blade enclosures. A ProLiant BL p-Class system requires –48VDC with no more than +/-10% voltage variance. If you are using facility DC power, power supplies and power enclosures are not necessary for operation as the DC input will provide power through a direct connection to the infrastructure's bus bar.

power phases and power supply enclosures

The ProLiant BL p-Class infrastructure is designed for AC input power from either single-phase or three-phase power sources. Three-phase power supports maximum density configurations.

Geography and number of AC phases dictate the appropriate model of power enclosure for the data center. Each model of power enclosure uses a different connector, as detailed in the chart below. Additionally, each power enclosure requires two separate 30 A power feeds for redundancy.

figure 21.   Power enclosure connectors

AC power enclosure connectors

Four models of power enclosures are available.

table 12. Power Enclosure Connectors and Compatibility

item	two circuits/connectors	model	typical electrical service	compatibility
1	L6-30	NA 1-phase (239162-001)	Single-phase 208VAC	NEMA receptacles (NA/Japan)
2	L15-30	NA 3-phase (230769-001)	Three-phase delta 208VAC	
3	3-pin (2-pole + ground)	Intl. 1-phase (230162-421)	Single-phase 230VAC	IEC 309 pin & sleeve connectors (International)
4	5-pin (4 pole + ground)	Intl. 3-phase (230769-421)	Three-phase "Y" 380/415VAC	

Power supply enclosures and power supplies are not used for configurations using facility DC connections.

ProLiant BL p-Class interconnects	Each server blade enclosure requires a pair of RJ-45 patch panels or interconnect switches to provide network access for data transfer or remote management. The leftmost and rightmost bays of each server blade enclosure are communication bays for these devices.

The RJ-45 Patch Panel, RJ-45 Patch Panel 2, and GbE Interconnect Switches may be mixed within the rack, but not within the same server blade enclosure. The corresponding interconnect modules, the ProLiant BL p-Class RJ-45 interconnect module and the ProLiant BL p-Class GbE interconnect modules, may also be mixed within the rack, but not within the same server blade enclosure. |
| ProLiant BL p-Class RJ-45 patch panel | The RJ-45 Patch Panel is designed to provide a convenient centralized location to connect the network cables to the back of the server blade enclosure. When using the RJ-45 Patch Panel interconnect, plan for cable egress of 1 to 4 CAT5 network cables per server blade. For example, a fully deployed server blade enclosure can have as many as 32 cables; a fully deployed 42U rack (6 full server blade enclosures with 48 server blades) may have as many as 192 cables. Alternatively, a standard network switch can be mounted above the ProLiant BL infrastructure to concentrate cables coming from the server blades. |
| ProLiant BL p-Class RJ-45 patch panel 2 | The RJ-45 Patch Panel 2 offers all the same benefits of the first generation patch panel, in addition to supplying Fibre Channel pass through for up to eight ProLiant BL20p G2 server blades with the Dual Port Fibre Channel Mezzanine Card installed. In addition to 1 to 4 CAT5 network cables per server blade, two optical cables with LC connectors will be required for each ProLiant BL20p G2 server blade with the Dual Port Fibre Channel Mezzanine Card installed. LC-to-SC optical connector converters can be used if SC connectors are preferred. |
| GbE interconnect switch | The GbE Interconnect Switch is used to consolidate server blade network cables to a more manageable quantity. It provides additional convenience by consolidating the 32 network connections into as little as a single cable per server blade enclosure.

The C-GbE Interconnect Kit provides four 10/100T and four 10/100/1000T Ethernet uplinks all with RJ-45 connectors; one to all eight uplinks may be used. Therefore, plan on one to eight CAT5 network cables per server blade enclosure.

The F-GbE Interconnect Kit provides four 10/100T Ethernet uplinks with RJ-45 connectors and four 1000SX Ethernet uplinks with LC connectors; one to all eight uplinks may be used. Therefore, plan on one to four CAT5 and one to four optical network cables per server blade enclosure. LC-to-SC optical connector converters can be used if SC connectors are preferred. |
| system rack | The ProLiant BL p-Class infrastructure is optimized for use with the ProLiant 10000 and 9000 Series racks. However, telco and third-party racks that meet minimum system specifications and performance requirements may also be used. When using telco racks, the telco option kits are required. The following are minimum rack specifications:

- Compatible with 19-inch Standard EIA rail sets
- EIA rail-to-rail depth is 29-30 inches |

- Cabinet depth must be at least 36 inches deep overall (Additional minimum 3.5 inches clearance from rear RETMA rail to rear door, inclusive in the 36 inches overall depth)

- Ample room for top and bottom cable egress (approximately 8 square inches for full rack configuration with the patch panel)

- Must be capable of supporting 1600 lbs (for full rack configuration)

- Perforated front and rear doors to accommodate front-to-back cooling

- Must have 65% open perforation on server blade enclosure doors to support airflow requirements

quantity of server blades

To size for site planning, the quantity of server blades should be the total number of server blades that will be deployed into the infrastructure over the life of the installation. Planning for growth is necessary to ensure that users purchase the appropriate bus bar and quantities of server blade enclosures. Additionally, growth sizing enables the preconfiguration of ample power to ensure that server blades and infrastructure can be fully used. If users mix in a rack with traditional servers and storage, they should allow for space in the rack, weight, and power of additional devices.

configuration of server blade options (processors, memory, and hard drives)

For accurate site sizing, server blade option entries should be the aggregate total number of all options to be installed in the server blades over the life of the installation. Options such as processors and hard drives can have a significant affect on power consumption, heat generation, and system weight.

server blade enclosures

The number of server blades needed for the application drives the quantity of server blade enclosures. Each server blade enclosure has a total of ten slots; two of these are reserved for networking blades and eight are designated for server blades. The ProLiant BL20p and BL20p G2 server blades consume one slot each, so a total of eight server blades fit in each server blade enclosure. The ProLiant BL40p server blades consume four slots each, enabling a total of two server blades per server blade enclosure. To plan for future growth, additional server blade enclosures can be installed in advance enabling rapid server deployments as needed. In the Sizing Utility, the summary page indicates the appropriate number of server blade enclosures for the configuration specified on the previous pages.

power distribution

The ProLiant BL Sizing Utility suggests the optimum power supply distribution method for supporting a redundant configuration. This quantity enables the deployment of the specific configuration based on data entries.

ProLiant BL p-Class scalable bus bar

The ProLiant BL p-Class scalable bus bar accommodates up to five server blade enclosures and either one or two power enclosures. This configuration provides maximum flexibility and future growth potential. The scalable bus bar consumes a minimum of 28U of space in the back of the rack; other devices cannot be installed within this space. However, devices may be installed directly above this space.

ProLiant BL p-Class mini bus bar	The ProLiant BL p-Class mini bus bars accommodates one power supply enclosure and up to three server blade enclosures. This bus bar consumes 11U of space in the back of the rack and other devices may not be installed within this area. Two mini bus bar configurations may be stacked in a rack with at least 42U of space to provide maximum density and processing power.
ProLiant BL p-Class power bus box	The ProLiant BL p-Class power bus box connects one server blade enclosure to one power enclosure. The power bus box is typically used for testing, demonstrations, and proof of concept within production environment at data center. To maximize cost and space savings, the power bus box can be replaced with either ProLiant BL p-Class bus bar model.
site recommendations	The ProLiant BL p-Class Sizing Utility provides environmental load estimates (total DC and AC power consumption, generated heat in BTU, weight and floor space requirements) based on the configuration. This information can be used to assist with planning and managing the data center environment. Some additional recommendations for planning the proper data center environment are covered in the sections that follow.
total power consumption	The installation of this equipment shall be in accordance with local/regional electrical regulations governing the installation of information technology equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA 75, 1992 Edition (code for Protection of Electronic Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product's rating label or the user documentation supplied with that option.

When installing a ProLiant BL p-Class system, observe the following guidelines:

- The power load must be balanced between available supply branch circuits.
- The overall system current load must not exceed 80 percent of the branch circuit current rating.

For DC systems, ProLiant BL p-Class systems run on 48VDC ±10%. When power supplies are included in the ProLiant BL p-Class system, they will require 230VAC (International) or 208VAC (US).

total cooling and airflow	ProLiant BL p-Class server blades draw in cool air through the front door and expel warm air through the rear door. Therefore, the front and rear rack doors must be adequately ventilated to allow ambient room air to enter the cabinet, and the rear door must be adequately ventilated to allow the warm air to escape from the cabinet.

When any vertical space in the rack is not filled by server blades or rack components, the gaps between the components cause changes in airflow through the rack and across the server blades. Cover all gaps with blanking panels to maintain proper airflow. HP 10000 and 9000 Series racks provide proper server blade cooling from flow-through perforations in the front and rear doors that provide 65% open area for ventilation.

total weight	Data on the dimensions and weights of ProLiant BL p-Class system components can be found in the *HP ProLiant BL p-Class System Maintenance and Service Guide*. The same data can be determined by using the online ProLiant BL p-Class Sizing Utility. In general, the raised floor must be capable of withstanding a uniform load of 1,220 kg/m^2 (250 lb/ft^2) or a load of 454 kg (1,000 lb) on any 6.5 cm^2 (1.0 in^2) surface, with a maximum deflection of 2.5 mm (0.1 in).

total floor space	To enable servicing and adequate airflow, observe the following spatial requirements when deciding where to install an HP ProLiant, telco, or third-party rack:

- Leave a minimum clearance of 63.5 cm (25 in) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 in) in the back of the rack.

Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the rear of another rack or row of racks.

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