IBM BladeCenter S
Type 8886

Planning Guide

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Note

Before using this information and the product it supports, read the information in "Notices" on page 93.

Second Edition (November 2007)

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Chapter 1. Introduction

The BladeCenter® S Type 8886 is a high-density, high-performance rack-mounted server system. It supports up to six blade servers that can share common resources, such as power, cooling, management, and I/O resources within a single BladeCenter S chassis. In addition, it provides support for up to twelve 3.5-inch, hot-swappable SAS or SATA hard disk drives.

The BladeCenter S system provides the following features:

- **IBM® Enterprise X-Architecture® Technology**

  IBM Enterprise X-Architecture Technology leverages proven innovative IBM technologies to build powerful, scalable, and reliable blade servers. It provides features such as IBM Predictive Failure Analysis® (PFA) and real-time diagnostics.

- **Server expansion capabilities**

  You can add up to six blade servers to the BladeCenter S chassis. Some blade servers have connectors for additional optional devices that you can use to add capabilities to the blade server. For example, you can connect either a storage expansion unit or a PCI expansion unit to a blade server. Alternatively, you can add optional I/O expansion cards to add network interfaces or storage through I/O modules. SAS expansion cards provide access through SAS connectivity modules that are installed in I/O bays 3 and 4 to the SAS or SATA hard disk drives in the BladeCenter S chassis.

- **Hot-swap capabilities**

  Bays in the BladeCenter S chassis are hot-swappable. For example, you can add, remove, or replace a blade server or a SAS or SATA hard disk drive without removing power from the BladeCenter S chassis.

  The midplane provides hot-pluggable connectors for the following components:

  - Six blade servers
  - Four I/O modules
  - One advanced management module
  - One serial pass-thru module
  - Four power supplies
  - Four fan modules
  - Two storage modules
  - One media tray

- **High-availability design**

  Components in the BladeCenter S system enable continued operation if one of the components fails:

  - **Power modules**. In normal operation, the power modules provide power to share the system load. If a power module fails, the working power modules continue to handle the entire load. You can replace a power module without shutting down the BladeCenter S system.

    Power modules also provide cooling fans for the storage modules. Therefore, if you are using storage module 1, you must install power supplies 1 and 2. If you are using storage module 2, you must install power supplies 3 and 4.

  - **Fan modules**. In normal operation, fan modules share the cooling in the BladeCenter S system. If one fan module fails, the other three fan modules handle the entire load. You can replace a fan module without shutting down the BladeCenter S system.
  - **BladeCenter S system midplane**. The midplane has the following characteristics:
    - Redundant high-speed serialize/deserialize (SERDES) interconnects between blade servers and switches
    - I2C communication between the advanced management module and all modules (except blade servers)
    - RS-485 (EIA 485) communication between the advanced management module and blade servers
    - Analog video connectors from the blade servers to the advanced management module
    - USB connections between the blade servers and the advanced management module
  - **Redundant storage access**. Installing a pair of SAS connectivity modules in I/O module bays 3 and 4 provides support for redundant access to the storage modules in the BladeCenter S chassis.
- **Systems management**

  The advanced management module is used to communicate with the service processor in each blade server to provide system monitoring, event recording, and alerts. You can manage the BladeCenter S chassis, its devices, and the blade servers remotely.

Related documentation

In addition to this document, the following related documentation is provided in Portable Document Format (PDF) on the IBM *BladeCenter Documentation* CD that comes with your BladeCenter S chassis.

Note: The latest and most up-to-date product information for the BladeCenter S Type 8886 can be found at the IBM Systems Information Center, which at http://publib.boulder.ibm.com/infocenter/systems/index.jsp. To access the BladeCenter S system documentation from this site, click **Systems hardware** → **BladeCenter information** → **Chassis** → **BladeCenter S (8886)**.

In addition to the product documentation, online education is also available at this location.

- *BladeCenter S Type 8886 Installation and User's Guide*

  This document contains information about setting up and configuring your BladeCenter S Type 8886 and its components.
- *BladeCenter S Type 8886 Problem Determination and Service Guide*

  This document contains information for troubleshooting your BladeCenter S system and solving problems.
- *Serial over LAN Setup Guide*

  This guide provides detailed Serial over LAN configuration information for your BladeCenter S system.

- *Safety Information*

  This document contains translated caution and danger statements. Each caution and danger statement in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.
- *Warranty and Support*

  This document contains information about the terms of the warranty and getting service and assistance.

Additional documentation might be included on the IBM *BladeCenter Documentation* CD.

The BladeCenter S chassis might have features that are not described in the documentation that comes with the BladeCenter S chassis. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the BladeCenter documentation. These updates are available from the IBM Web site. To check for updated documentation, go to http://publib.boulder.ibm.com/infocenter/systems/index.jsp.

The IBM BladeCenter Documentation CD

The IBM *BladeCenter Documentation* CD contains documentation for your BladeCenter S chassis in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

The IBM *BladeCenter Documentation* CD requires the following minimum hardware and software:

- Microsoft® Windows® XP, Windows 2000, or Red Hat Linux®
- 100 MHz microprocessor
- 32 MB RAM
- Adobe® Acrobat® Reader 3.0 (or later) or xpdf, which comes with Linux operating systems

Using the Documentation CD

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents, using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in use in your system and presents the information in the language for that region (if available). If a topic is not available in the language for that region, the English-language version is displayed.

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the CD into the CD-RW/DVD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users:
  - If you are using a Windows® operating system, insert the CD into the CD-RW/DVD drive, and click **Start** → **Run**. In the **Open** field, type:

    `e:\win32.bat`

    where *e* is the drive letter of your CD-RW/DVD drive, and click **OK**.

– If you are using a Red Hat Linux, insert the CD into the CD-RW/DVD drive; then, run the following command from the /mnt/cdrom directory:

```
sh runlinux.sh
```

Select your BladeCenter S chassis from the **Product** menu. The **Available Topics** list displays all the documents for your BladeCenter product. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional topics under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document appears under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string appears are listed in order of the most occurrences. Click a document to view it, and press Ctrl+F to use the Acrobat search function, or press Alt+F to use the xpdf search function within the document.

Click **Help** for detailed information about using the Documentation Browser.

Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the IBM *BladeCenter Documentation* CD. Each statement is numbered for reference to the corresponding statement in your language in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

The following table provides a summary of the features and specifications of the BladeCenter S chassis.

Media tray (on front):

- CD-RW/DVD-ROM drive
- Two USB v2.0 ports
- Front system LED panel
- Two bay locations that are reserved for future use

Blade bays (on front): Six hot-swap blade server bays

Storage module bays (on front): Two storage bays, each containing up to six 3.5-inch disk drive bays.

Module bays (on rear):

- One hot-swap advanced management module bay
- Four hot-swap power module bays
- +
- Four hot-swap fan module bays
- Four hot-swap I/O module bays
- One hot-swap serial pass-thru module bay

Power modules:

- Minimum: Two hot-swap power modules.
- Maximum: Four hot-swap power modules

Cooling:

Four variable-speed, hot-swap fan modules

Two fans in each power supply cool the storage modules

Management module:

- One hot-swap advanced management module

Upgradeable microcode:

- Advanced management module firmware
- I/O module firmware
- Blade server firmware
- Storage module firmware

Security features:

- Login password for remote connection
- Secure Sockets Layer (SSL) security for remote management access
- Lightweight Directory Access Protocol (LDAP)

Predictive Failure Analysis (PFA) alerts:

- Fan modules
- Blade-dependent features

Size (7 U):

- Height: 306.3 mm (12 in.)
- Depth: 733.4 mm (28.9 in.)
- Width: 444 mm (17.5 in.)
- Weight:
  - Fully configured weight with blade servers: approximately 108.86 kg (240 lb)
  - Empty chassis without modules or blade servers: approximately 40.82 kg (90 lb)

Environment:

- Air temperature:
  - BladeCenter S system on:
    - Altitude: 0 to 914 m (3000 ft) 10° to 35°C (50° to 95°F)
    - Altitude: 914 m to 2134 m (3000 ft to 7000 ft) 10° to 32°C (50° to 90°F)
  - BladeCenter S system off: -40° to 60°C (-40° to 140°F).
- Humidity: 8% to 80%
- Acoustics: declared sound power level: 6.3 to 6.8 bels

Electrical input:

- Sine-wave input (50 - 60 Hz single-phase) required
- Input voltage (110 V ac):
  - Minimum: 100 Vrms
  - Maximum: 127 Vrms
- Input voltage (220 V ac):
  - Minimum: 200 Vrms
  - Maximum: 240 Vrms

Heat output: Approximate heat output in British thermal units (BTU) per hour:

- Minimum configuration: 1365 Btu per hour (400 watts)
- Maximum configuration: 11942 Btu per hour (3500 watts)

Components of the BladeCenter S Type 8886

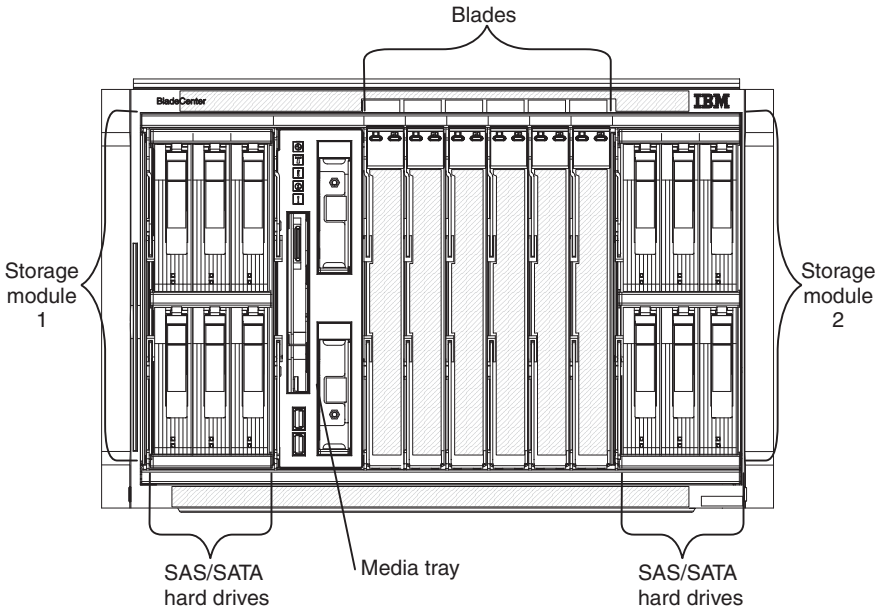
BladeCenter S system components include an advanced management module, blade servers, I/O modules, storage modules, power modules, fan modules, a serial pass-thru module, and a media tray.

Front view of the BladeCenter S chassis

Blade servers, storage modules, and the media tray are installed in the front of the BladeCenter S chassis.

Note: For proper cooling, each bay in the BladeCenter S chassis must have either a device or a filler installed.

The following illustration shows the front of the BladeCenter S chassis.



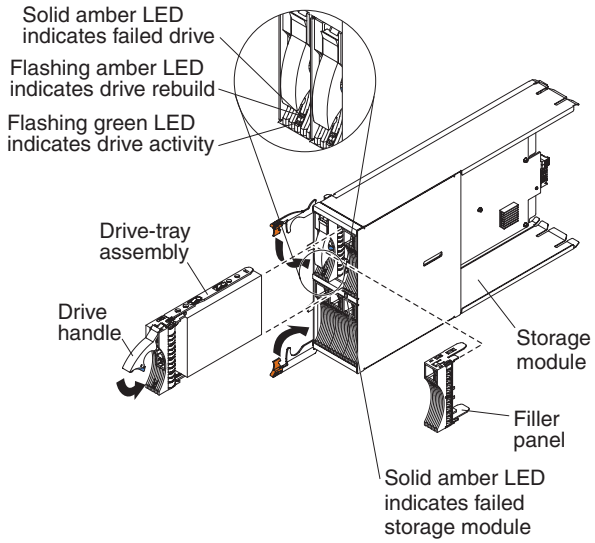
Storage module

You can install a maximum of two storage modules in the BladeCenter S chassis and each storage module contains hot-swap hard disk drives. A storage module and hard disk drives are commonly referred to as *integrated shared storage* because this storage is integrated in the BladeCenter S chassis and shared among the blade servers in the BladeCenter S system.

Each storage module can support up to six hot-swap, 3.5-inch hard disk drives. Both SAS and SATA hard disk drives are supported, and you can use both types of hard disk drives in each storage module).

Within each storage module, hard disk drives are numbered 1 through 6 from left to right, and top to bottom.

Note: Each hard disk drive bay must contain either a hard disk drive or a drive-bay filler.



For you to access the hard disk drives in the storage module, the following devices must be installed:

- At least one SAS connectivity module. If a single SAS connectivity module is installed, it controls access to both storage modules in the BladeCenter S chassis. If two SAS connectivity modules are installed, the module in I/O module bay 3 controls access to storage module 1, and the module in I/O module bay 4 controls access to storage module 2.
- A SAS expansion card in each of the blade servers to provide access through the SAS connectivity modules in I/O module bays 3 and 4 to the SAS or SATA hard disk drives in each storage module.

There is one LED on each storage module:

Fault Solid (amber) when there is a storage module failure.

There are two LEDs on each hard disk drive:

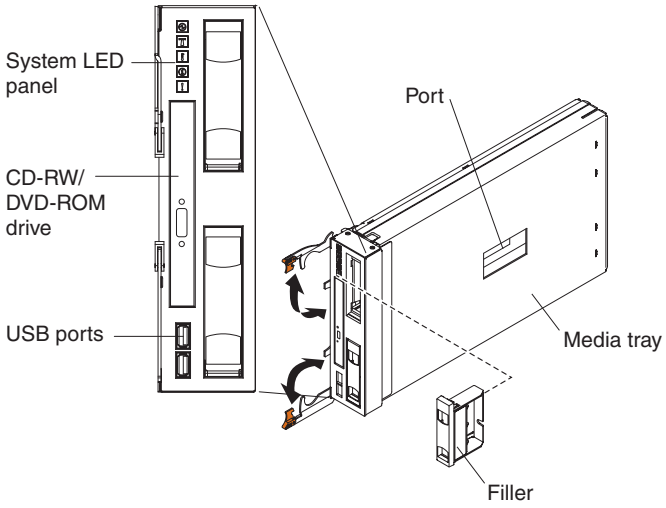
Activity
Flashing (green) when an operation, such as a read or a write, is being performed.

Fault Flashing (amber) when the hard disk drive is being rebuilt.

Solid (amber) when there is a drive failure.

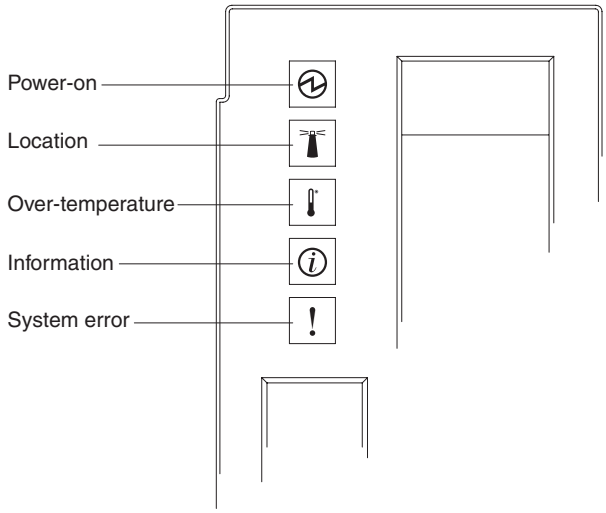
Media tray

The media tray contains the CD-RW/DVD-ROM drive and two USB v2.0 ports, which are shared by the blade servers.



Note: The bays on the front of the media tray and the port on the side of the media tray are reserved for future use.

Controls and indicators



The media tray contains the following controls and indicators:

System LED panel

The LEDs on this panel provide status information for the BladeCenter S chassis.

Note: These LEDs are also displayed on the rear of the BladeCenter S chassis.

Power-on

Lit (green). Power is being supplied to the BladeCenter S chassis.

Off. The power subsystem, ac power, or the LED has failed.

Note: Even if the power-on LED is off, always remove the power cords from all power modules before you service the BladeCenter S chassis.

Location
Lit or flashing (blue). It has been turned on by the system administrator to aid in visually locating the BladeCenter S chassis. You can turn off the location LED throught the Web interface or the IBM Director console.

Over-temperature
Lit (amber). The temperature in the BladeCenter S chassis exceeds the temperature limits, or a blade server reports an over-temperature condition. The BladeCenter S chassis might have already taken corrective action, such as increasing the fan speed. This LED turns off automatically when there is no longer an over-temperature condition.

Information
Lit (amber). A noncritical event has occurred that requires attention, such as the wrong I/O module being inserted into a bay, or power demands within the BladeCenter S chassis exceeding the capacity of the installed power modules.

You can turn off the information LED through the Web interface or the IBM Director console.

System error
Lit (amber). A system error has occurred, such as a module failure or a system error in a blade server. An LED on the failing component is also lit to assist in isolating the error.

CD-RW/DVD drive activity LED
Lit (green). The drive is in use.

CD-RW/DVD drive eject button
Press this button to open the CD-RW/DVD-ROM drive.

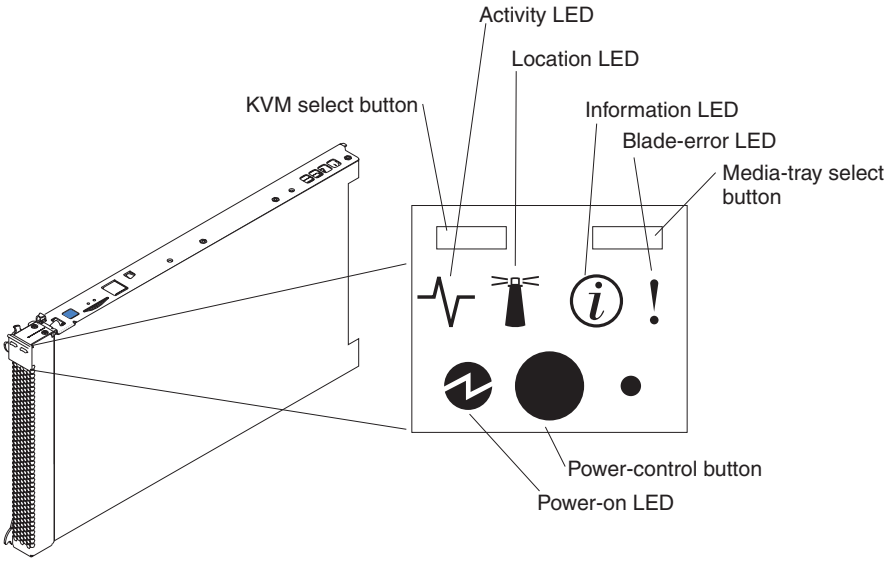
USB ports
Connect USB devices to these ports.

Blade server

Blade servers can contain components such as microprocessors, memory, Ethernet controllers, and hard disk drives. They receive power, network connection, and I/O devices (such as CD-RW/DVD-ROM, keyboard, mouse, video port, USB ports, and a remote monitoring port) from the BladeCenter S chassis.

A SAS expansion card must be installed in each blade server that will access the integrated shared storage.

Note: The control panel door is shown in the closed position in the following illustration. To access the power-control button, you must open the control panel door.



For information about the controls and LEDs that are available on a blade server, see the information for the blade server that you are using.

Controls and indicators

Blade servers typically contain the following controls and indicators:

KVM select button
When using an operating system that supports a local console and keyboard, press this button to associate the shared BladeCenter S chassis keyboard and video ports with the blade server.

Activity LED
When this green LED is lit, it indicates that there is activity on the hard disk drive or network.

Location LED
When this blue LED is lit, it has been turned on by the system administrator to aid in visually locating the blade server. The location LED can be turned off through the Web interface of the advanced management module or through the IBM Director Console.

Information LED
When this amber LED is lit, it indicates that information about a system error for the blade server has been placed in the advanced management

module event log. The information LED can be turned off through the Web interface of the advanced management module or through the IBM Director console.

Blade-error LED

When this amber LED is lit, it indicates that a system error has occurred in the blade server. The blade-error LED will turn off after one of the following events:

- Correcting the error
- Reseating the blade server in the BladeCenter S chassis
- Cycling the BladeCenter S chassis power

Media-tray select button

Press this button to associate the shared BladeCenter S chassis media tray (removable-media drive and front-panel USB ports) with the blade server. The LED on the button flashes while the request is being processed, then is lit when the ownership of the media tray has been transferred to the blade server. It can take approximately 20 seconds for the operating system in the blade server to recognize the media tray.

If there is no response when you press the media-tray select button, use the advanced management module to determine whether local control has been disabled on the blade server.

Power-control button

This button is behind the control panel door. Press this button to turn on or turn off the blade server.

The power-control button has effect only if local power control is enabled for the blade server. Local power control is enabled and disabled through the Web interface of the advanced management module.

Press down the power button for five seconds to begin powering down the blade server.

Power-on LED

This green LED indicates the power status of the blade server in the following manner:

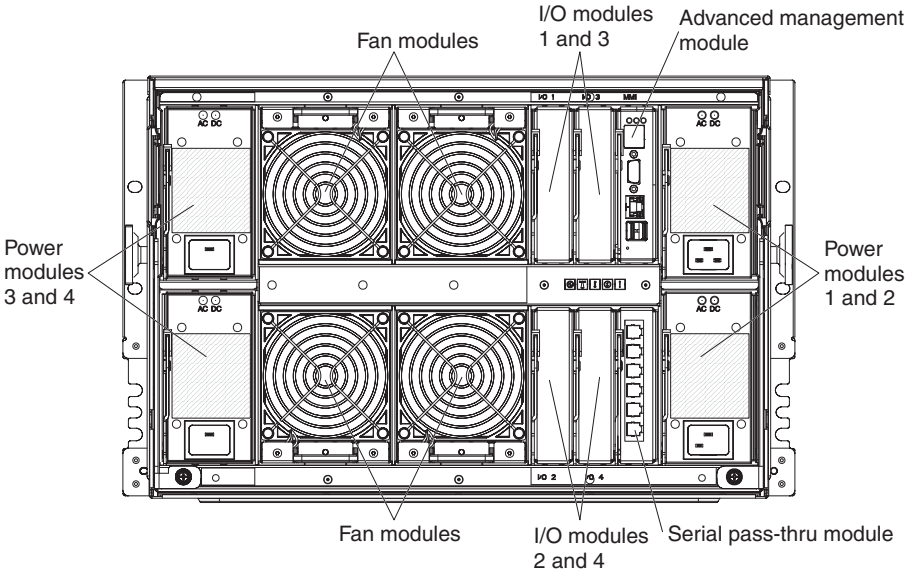
- Flashing rapidly: The service processor (BMC) is initializing the blade server.
- Flashing slowly: The blade server has completed initialization and is waiting for a power-on command.
- Lit continuously: The blade server has power and is turned on.

Rear view of the BladeCenter S chassis

Fan modules, I/O modules, power modules, the advanced management module, and the serial pass-thru module are in the rear of the BladeCenter S chassis.

Note: Each bay in the BladeCenter S chassis must have either a device or a filler installed.

The following illustration shows the rear of the BladeCenter S chassis.



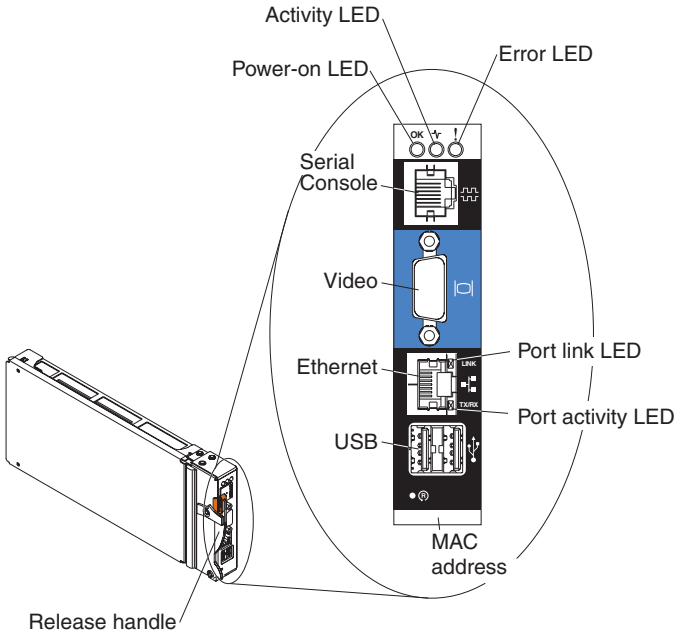
Advanced management module

The advanced management module is a hot-swap module that you use to configure and manage all installed BladeCenter components. The BladeCenter S chassis comes with one advanced management module in the advanced management module bay.

The advanced management module provides systems-management functions and keyboard/video/mouse (KVM) multiplexing for all blade servers in the BladeCenter S chassis that support KVM. It controls the following connections:

- A serial port for a local connection to another computer, such as a notebook computer
- The external video and USB connections for keyboard and mouse
- A 10/100 Mbps Ethernet connection

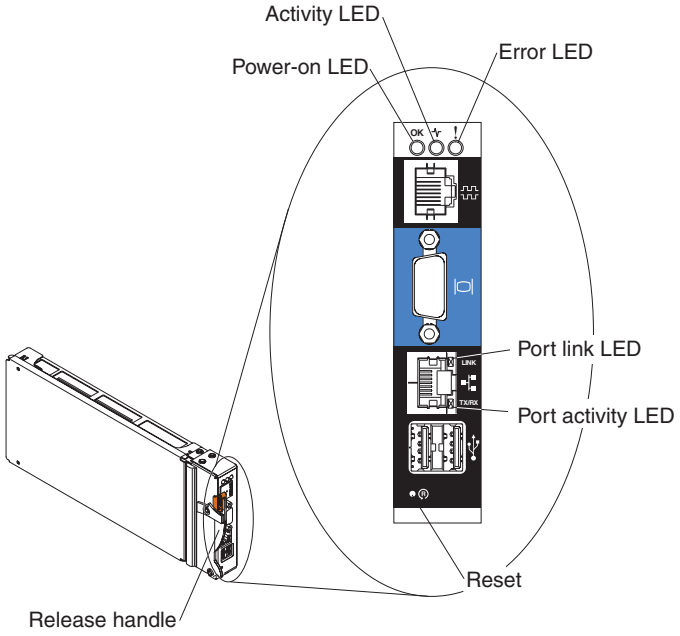
The advanced management module communicates with the service processor (also called the baseboard management controller, or BMC) in each blade server to support features such as blade server power-on requests, error and event reporting, KVM requests, and requests to use the BladeCenter S chassis shared media tray.



The BladeCenter S chassis supports a single advanced management module, and it must be installed in the advanced management module bay.

Advanced management module indicators and controls:

The advanced management module has several LEDs that you can use to obtain status about the advanced management module and the Ethernet connection.



The following advanced management module LEDs provide status information about the advanced management module and Ethernet connection:

Power-on

Lit (green) when the advanced management module has power.

Activity
Lit (green). The advanced management module is actively controlling the BladeCenter S system.

Error Lit (amber). An error has been detected in the advanced management module. When the error LED is lit, the BladeCenter system error LED is also lit.

Port Link
Lit (green). There is an active connection through the Ethernet port to the network.

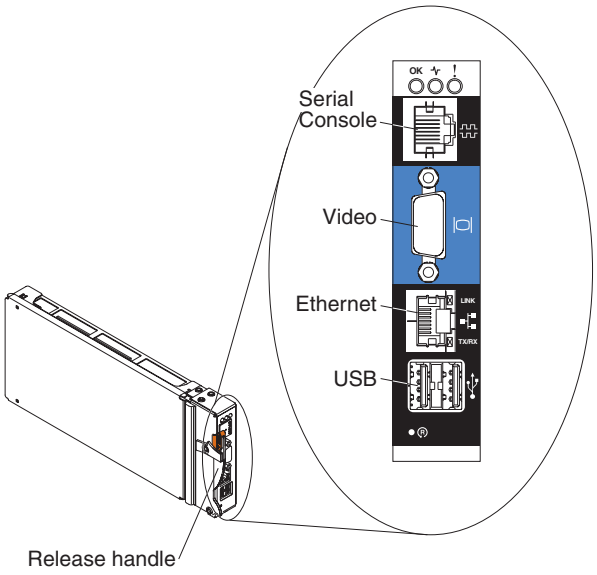
Port activity
Flashing (green). There is activity through the Ethernet port over the network link.

Reset

Insert a straightened paper clip into the reset pinhole and remove it to restart the advanced management module. The fan modules operate at full speed while the advanced management module is initializing.

Advanced management module input and output connectors:

The advanced management module has a serial connector, a video connector, two USB connectors for keyboard and mouse, and an Ethernet connector for remote management.



Serial Console
Use this connection to configure and manage the BladeCenter components through the advanced management module command-line interface (CLI). For example, you can connect a notebook computer to the serial connector and use a terminal emulator program to configure the IP addresses, user accounts and other settings.

The serial pinout for the advanced management module is an EIA-561, as shown in the following table:

Contact (pin number)	Signal name
1	DSR (Data set ready)
2	DCD (Data carrier detect)
3	DTR (Data terminal ready)
4	GND (Ground)
5	Receive (RX)
6	Transmit (TX)
7	CTS (Clear to send)
8	RTS (Request to send)

Video Use this connector to connect a compatible SVGA or VGA video monitor to the BladeCenter S system.

Ethernet
Use this connector to connect the BladeCenter S system to a the management station, either through an Ethernet cable or on the network.

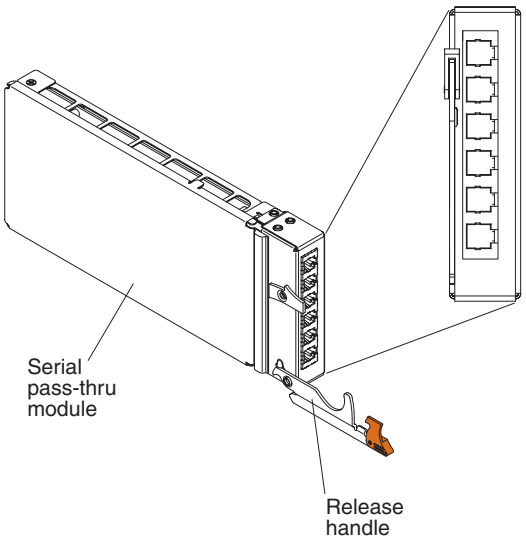
USB connectors
Use these connectors to connect a mouse and keyboard (or other USB devices). Unlike the USB connectors on the media tray, these connectors are shared by the blade servers through the BladeCenter KVM interface. The KVM interface owns these ports.

Serial pass-thru module

The serial pass-thru module has six serial ports that you can use to directly attach a four-wire serial RJ-45 connector to each of the blade servers in the BladeCenter S chassis. If you use the serial pass-thru module, it must be installed in the serial pass-thru module bay.

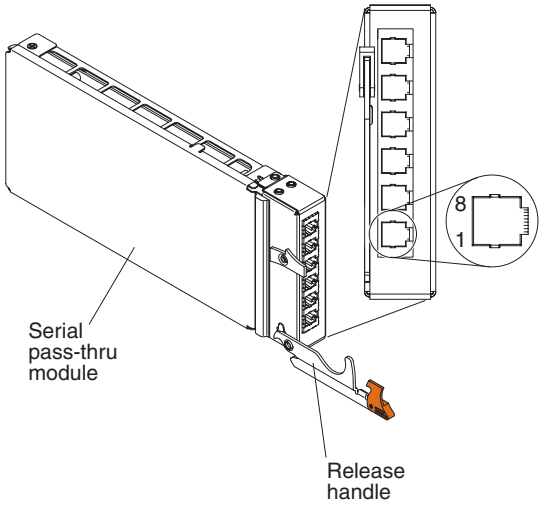
Note: See the documentation for the blade server that you are using to ensure that it supports this type of serial access.

The connectors are numbered 1 through 6, from top to bottom, and correspond to blade servers in blade server bays 1 through 6.



Serial pass thru connector pinout

There are eight pins on each RJ-45 port, numbered 1 through 8, from bottom to top.

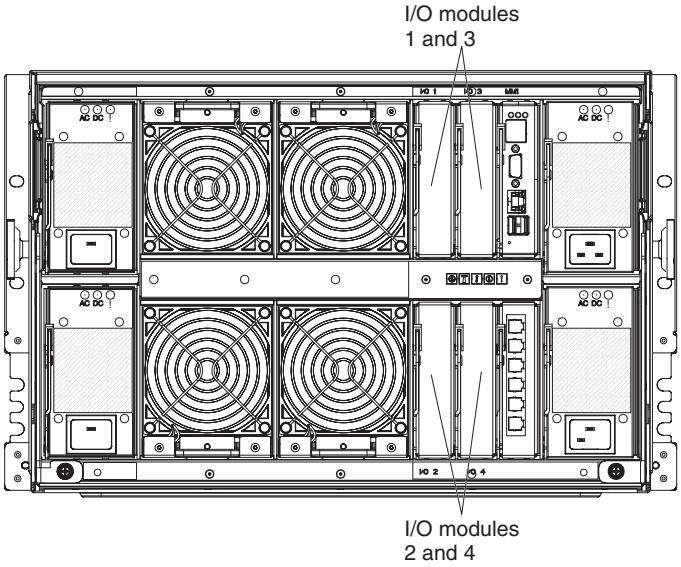


Contact (pin number)	Signal name	Signal direction
1	RTS (Request to send)	Output from blade server
2	Not used	n/a
3	RXD (Receive data)	Input to blade server
4	GND (Ground)	n/a
5	Not used	n/a
6	TXD (Transfer data)	Output from blade server
7	Not used	n/a
8	CTS (Clear to send)	Input to blade server

Note: The serial pass-thru module uses the DTE convention.

I/O modules

You can install up to four I/O modules in the BladeCenter S chassis, including Ethernet switch modules, Fibre Channel switch modules, pass-thru modules (optical and copper), and SAS connectivity modules.



I/O module bay 1

I/O module bay 1 supports any standard Ethernet or pass-thru module that connects to the two integrated Ethernet controllers in each of the blade servers.

Note: This I/O module bay is wired differently from I/O module bay 1 in a BladeCenter E or BladeCenter H chassis.

I/O module bay 2

At the time of the BladeCenter S Type 8886 announcement and general availability, IBM does not support a switch module for I/O module bay 2. Contact your IBM sales representative or see the BladeCenter support Web site at http://www.ibm.com/jct01004c/systems/support/supportsite.wss/brandmain?brandind=5000020 to determine when a supported I/O module will be available.

I/O module bays 3 and 4

I/O module bays 3 and 4 support SAS connectivity modules. If you are using only one SAS connectivity module, install the module in I/O module bay 3. You can install an additional SAS connectivity module in bay 4. A SAS connectivity module requires a SAS expansion card in each blade server that will access the integrated shared storage.

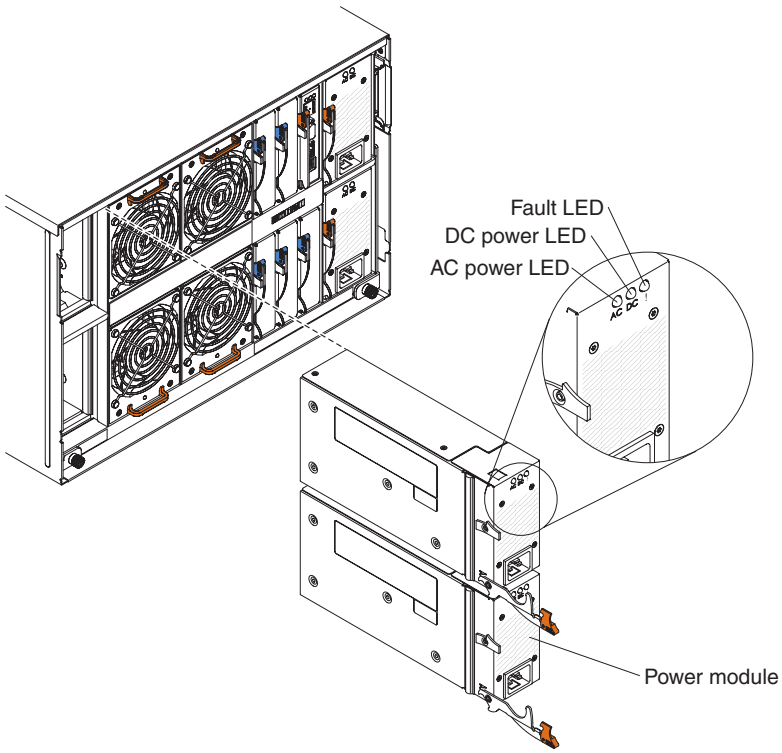
The two bays also support Ethernet switch modules, Fibre Channel switch modules, and pass-thru modules (optical and copper) if the storage modules are not being used.

Important: I/O module bays 3 and 4 must both contain the same type of switch (either SAS connectivity modules, Ethernet switch modules, pass-thru modules, or

Fibre Channel switch modules).

Power modules

The BladeCenter S system supports up to four autoranging power modules that are capable of supporting either 110 V ac or 220 V ac.



Within the BladeCenter S chassis, all power supplies are combined into a single power domain, which distributes power to each of the blade servers and modules through the system midplane.

You must install a minimum of two power modules. If you install only two power modules, install them in power module bays 1 and 2 (the top and bottom power module bays on the left as you face the rear of the BladeCenter S chassis).

Note: You must install all four power modules if you are using both storage modules.

If you disengage or remove all devices from the front of the BladeCenter S chassis (media tray, blade servers, and storage modules), the power modules will be disabled.

Indicators and controls

There are three LEDs on each power module:

AC power
Lit (green). Power is being supplied to the power module.

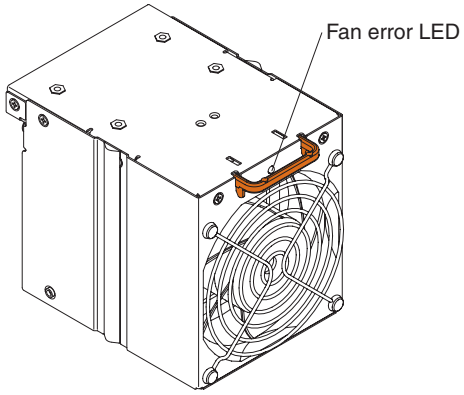
DC power
Lit (green). Power is being supplied from the power module to the BladeCenter S chassis midplane.

Fault Lit (amber). There is a fault with the power module.

Fan modules

The BladeCenter S chassis comes with four installed hot-swap fan modules.

The fan modules (sometimes called *fan packs*) are designed to provide cooling airflow to the blade servers and I/O modules. Each fan module contains two fans.



Indicators and controls

Each fan module has a single LED:

Error Lit (amber). Either of the fans in the fan module has failed.

Note: If one of the fans in the fan module fails, the other fan will begin operating at full speed.

Systems and storage management

IBM provides products that you can use to manage your BladeCenter S system and the integrated, shared storage that is available.

IBM Director

IBM Director provides a comprehensive entry-level workgroup hardware manager. It includes advanced self-management capabilities for maximum system availability and support for multiple operating systems, including Microsoft Windows, AIX, Linux, and i5/OS.

With IBM Director, a systems or network administrator can perform the following tasks:

- View and modify the hardware configuration of remote systems
- Monitor the usage, health, and performance of critical components, such as microprocessors, disks, and memory
- Centrally manage individual or large groups of IBM and non-IBM x86-processor-based servers, desktop computers, workstations, and notebook computers on a variety of platforms
- Inventory your environment
- Perform updates to managed systems, such as device drivers and firmware
- Automatically perform an action based on events or schedules, if IBM Director is configured to do so

IBM Director provides a comprehensive entry-level workgroup hardware manager. It includes the following key features:

- Advanced self-management capabilities for maximum system availability
- Multiple operating system platform support, including Microsoft Windows, AIX, Linux, and i5/OS

By deploying IBM Director, you can achieve reductions in ownership costs through the following benefits:

- Reduced downtime
- Increased productivity of IT personnel and users
- Reduced service and support costs

Storage Configuration Manager

Storage Configuration Manager is a Web based device management application.

Storage Configuration Manager provides user and programmatic interfaces that you need to configure and monitor multiple instances of different types of storage related devices, including the SAS connectivity modules and the SAS controllers on the expansion cards in each blade server. It includes a Web-based graphical user interface. It can be installed as a stand-alone application or as an extension to IBM Director 5.20.2.

You can connect to the Storage Configuration Manager Manager component of the application from any computer on the network that it is installed on, using a standard Web browser (Internet Explorer 6.x or later, Firefox 1.0 or later).

Instead of using Storage Configuration Manager, you have the option of configuring the integrated shared storage from the configuration wizard of the advanced management module if you choose one of the predefined configurations that are provided. However, you must install Storage Configuration Manager if you decide to modify an existing configuration or create your own customized configuration.

Chapter 2. Planning for the physical environment

Make sure that the site where the BladeCenter unit will be installed meets the minimum physical requirements for rack, power, and cooling.

Dimensions

A BladeCenter S chassis is 7 rack units (7 U) high.

A BladeCenter S chassis has the following dimensions:

Width: 444 mm (17.5 inches)
Height: 306.3 mm (12 inches)
Depth: 733.4 mm (28.9 inches) from front of the chassis to the rear

Weight considerations

Floors and racks have maximum weight loads. Take these loads into consideration when planning your floor space.

The fully configured weight with blade servers is approximately 108.86 kg (240 lbs).

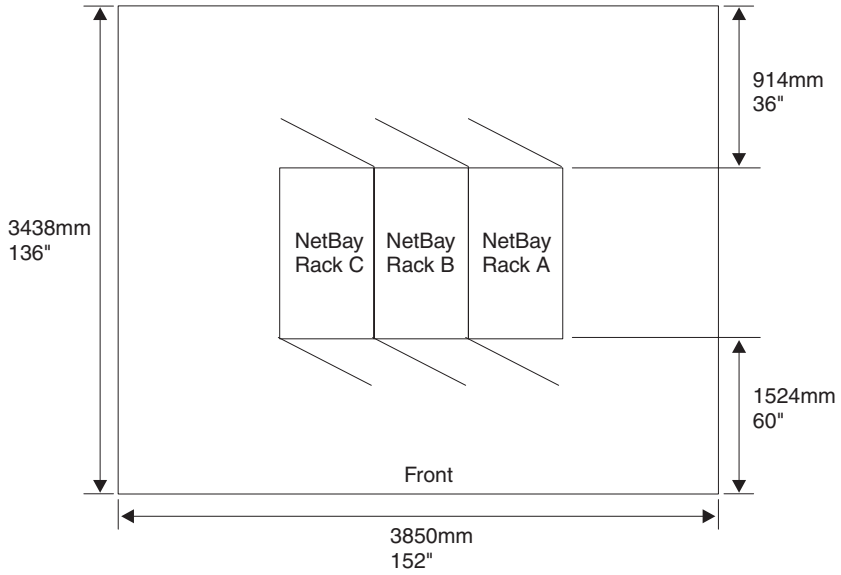
The empty chassis without modules or blade servers weighs approximately 40.82 kg (90 lbs).

Floor space

The required floor space must allow enough clearance in the front and rear of the rack so that the doors can be opened to access the equipment.

Front clearance is needed to access the blade servers, storage modules, and the media tray. Rear clearance is needed to access power supplies, fans, and network cable connections, as well as to attach a local monitor, keyboard, and mouse to the advanced management module. The following graphic shows the maximum operational clearances for IBM NetBAY racks and expansion units that are recommended for use with BladeCenter systems.

Note: Some racks, such as the IBM S2 25U Standard Rack and the IBM S2 42U Standard rack have dual doors and take up less space.



Rack requirements

Make sure the rack in which you are going to install the BladeCenter S chassis meets these minimum requirements.

- Make sure that the room air temperature is below 35°C (95°F).
- Do not block any air vents; usually, 15 cm (6 in.) of air space in the rear and 5 cm (2 in.) in the front provides proper airflow.
- Three or more people are required to install the device in a rack.
- Do not leave any unused U space within a rack open. Blank filler panels must be used to prevent recirculation of warm air.
- Install your BladeCenter S chassis only in a rack cabinet with perforated front and rear doors or in a rack equipped with the IBM Rear Door Heat eXchanger.
- Do not extend more than one device out of the rack at the same time.
- Remove the rack doors and side panels to provide easier access during installation.
- The rack-mounting flanges have holes and clearances per EIA-310-D.
- There is sufficient room in front of the front EIA flange to provide minimum bezel clearance of 70 mm (2.76 inches) deep.
- There is sufficient room behind the rear of the rear EIA flanges to provide for adequate cable management and routing.
- Rack weight-handling capacity must be sufficient for the aggregate weight of the BladeCenter S chassis, blade servers, power distribution units, and power cables.
- The rack needs to be stabilized with stabilization brackets and leveling pads so that it does not become unstable when fully loaded.

Important: When moving a 42U rack, remove all equipment installed above 22U before moving the rack to another location.

IBM NetBAY and non-IBM racks

Verify that you are not exceeding the maximum weight load limits for IBM NetBAY and non-IBM racks.

Table 1 shows the maximum weight limits for IBM NetBAY racks and expansion units that are recommended for use with BladeCenter S chassis. The table shows the maximum number of BladeCenter S chassis that can be installed in a NetBAY rack when the rack is:

- Installed in place and sitting on the rack leveling pads.
- Being relocated and is sitting on the rack castors.

For on-site relocation of the rack on castors, the maximum number of BladeCenter S chassis, including the power distribution units (PDUs) to support the configuration, is based on a 14-degree stability requirement established under IBM safety guidelines.

Table 1. Rack weight load limits

Rack	Rack weight	Maximum allowable rack weight load	Maximum number of fully loaded BladeCenter S units with rack on leveling pads or bolted to the floor	On-site relocation, rack on casters, maximum number of BladeCenter S units
NetBAY 11	37 kg (75 lb)	216 kg (475 lb)	1	1
NetBAY 42 Enterprise Rack	261 kg (575 lb)	928 kg (2045 lb)	6	3
NetBAY 42 Enterprise Expansion Cabinet	234 kg (511 lb)	928 kg (2045 lb)	6	3
NetBAY 42 Standard Rack	119 kg (262 lb)	765 kg (1683 lb)	6	3
NetBAY 42 Standard Expansion Cabinet	112 kg (246 lb)	739 kg (1626 lb)	6	3
NetBAY 25 Standard Rack	95 kg (209 lb)	466 kg (1025 lb)	3	3
NetBay S2 25 Standard Rack	100 kg (221 lb)	667 kg (1471 lb)	3	3
NetBay S2 42 Standard Rack	125 kg (275 lb)	1032 kg (2275 lb)	6	6

When determining your floor load limits, use the combined weight of the rack, populated BladeCenter S chassis, PDUs, and other rack mounting hardware to ensure the installation site can safely support the total weight. Consult your local building engineer to understand the weight limits for your site. Use the “Rack installation worksheet” on page 73 to record your information.

Noise considerations

Each BladeCenter S chassis has four fan modules for cooling and each fan module has 2 fans. The fan modules generate measurable noise.

The sound levels for the BladeCenter S chassis range from 6.3 bels to 6.8 bels depending on the number and type of blade servers that are installed.

The actual sound-pressure levels in your installation depend on a variety of factors, including the number of servers in the installation, the size, materials, and configuration of the room where the servers are installed, the noise levels from other equipment, the room ambient temperature, and employees' location in relation to the equipment.

Your server installation may be subject to government regulations, such as those prescribed by OSHA or European Community Directives, that cover noise-level exposure in the workplace. Consult a qualified person, such as an industrial hygienist, to determine the sound-pressure levels to which your employees are exposed.

Power considerations

When planning for power, you need to determine how many power modules you intend to install (either 2 or 4) and whether they are going to be connected to 110 V ac or 220 V ac power sources. In addition, you need to determine the type of power management policy that you intend to implement.

The power modules for the BladeCenter S system can accept either low voltage range (110 V ac nominal) or high voltage range (220 V ac nominal) line input from your power utility distribution network.

At a minimum, you need to install two power modules, and they must be installed in power module bays 1 and 2. These power modules will provide power to the following components:

- Blade server bays 1 through 6
- I/O module bays 1 through 4
- Advanced management module module bay
- Serial Pass-Thru Module module bay
- Storage module bay 1
- Fan module bays 1 through 4

If you are going to install a storage module in bay 2, you will also need to install two additional power modules in power module bays 3 and 4. In addition, the configuration of the blade servers that you have installed might require that you installed additional power modules.

In addition to this information, you can use the IBM System x and BladeCenter Power Configurator at http://www-03.ibm.com/systems/bladecenter/powerconfig/ to assist in planning for power.

Power source requirements

The BladeCenter S system can run on either 110 V ac or 220 V ac. Each of the four power supplies in the BladeCenter S chassis is capable of handling either type of power source.

Note: Although the power modules are autoranging and can support either 110 V ac or 220 V ac, you cannot mix voltage power sources within the same BladeCenter S Type 8886. All power modules within a BladeCenter S Type 8886 must be connected to either a 110 V ac or 220 V ac power sources.

AC power input must be adequate to supply the required voltage and amperage at an input frequency range from 50-60 hertz (Hz). The BladeCenter S system requires the following ac input voltage:

Table 2. ac input voltage requirements

Nominal Voltage	Minimum Voltage	Maximum Voltage
110 V ac	100	127
220 V ac	200	240

The ac input current requirements are shown in the following table:

Table 3. ac input current requirements

Nominal Voltage	Nominal Amps	Maximum Continuous Amps
100 V ac	11.2	13.9
200 V ac	8.0	9.0

Power consumption guidelines

The BladeCenter S system is configurable with varying numbers of some individual components. As you add components to the BladeCenter S system, the power consumption increases.

Blade servers, fan modules, SAS or SATA drives, and other components all contribute to the power footprint. A BladeCenter S system can have a minimum of two or a maximum of four power supply modules that must provide the 12-volt power for all of the components that you are including in the chassis.

Table 4. Power consumption of BladeCenter S system components

Component	Maximum Watts
Midplane	5W
Media tray	7.5W
Fans (four)	240W
Advanced management module	25W
Power module fans (two power modules)	20W
I/O module	45W
SAS connectivity module	65W
Storage module	120W
Serial pass-thru module **Note:** Power for the serial pass-thru module is provided by the blade servers.	0W

The maximum wattage requirement for blade serves varies depending on the type of blade server installed in the BladeCenter S system. For the latest information related to power consumption and requirements for blade servers, see the IBM System x and BladeCenter Power Configurator at http://www-03.ibm.com/systems/bladecenter/powerconfig/.

Power management policies

You can set the power management policy to be used for the BladeCenter S system from the advanced management module.

You can choose from the following power management policies:

- **AC power source redundancy**

  With this policy, the total allowable power draw is limited to the capacity of two power modules. If you use dual ac power sources, one ac power source can fail without affecting the operation of the blade servers. However, some blade servers may not be able to power on if doing so will exceed the power policy limit.

  The policy is intended for use when you have four power modules installed and two separate 220-volt AC power sources.

- **AC power source redundancy with blade throttling allowed**

  This policy is similar to AC power source redundancy. With this policy, the total allowable power draw is limited to the capacity of two power modules. If you use dual ac power sources, one ac power source can fail without affecting the operation of the blade servers.

  If power module redundancy is lost, processors on blade servers that are capable of throttling will throttle to reduce the power consumed to less than or equal to the total power. *Throttling* refers to achieving lower power consumption for a blade by temporarily reducing the CPU throughput. The advanced management module utilizes power management technologies built into certain processors to throttle the blades.

  Note: Not all blade servers are capable of throttling.

  The policy is intended for use when you have four power modules installed and two separate 220-volt AC power sources.

- **Power module redundancy**

  With this policy, the total allowable power draw is limited to one less than the number of power modules when more than one power module is present. One power module can fail without affecting blade server operation.

  Blade servers will power on only if they can operate without throttling if there is a power module failure. The number of blade servers allowed to power on is determined by the power available from one less than the total number of power modules. If a single power module fails, all the blade servers that are powered on will continue to operate at normal performance levels. If two or more power modules fail, the BladeCenter S chassis could power off.

  This policy is intended when you have two to four power modules installed and a single 110-volt or 220-volt AC power source. Each power module is on its own dedicated circuit.

- **Power module redundancy with blade throttling allowed**

  With this policy, the total allowable power draw is limited to one less than the number of power modules when more than one power module is present. One

power module can fail without affecting blade server operation, but multiple power module failures can cause the chassis to power off.

This policy allows you to draw more total power from the chassis. However, in case of a power module failure, the advanced management module might have to throttle down some blade servers to keep the chassis operational. Blade servers will be allowed to power on as long as the power consumed is less than or equal to the total power under this policy. If a single power module fails, processors on blade servers that are capable of throttling, will throttle in order to reduce the power consumed to less than or equal to the rated capacity of the power module. Blade servers will power up in a throttled state in some configurations. Upon restoration of power redundancy, the blade processors will return to their normal performance levels.

This policy is intended when you have two to four power modules installed and a single 110-volt or 220-volt AC power source. Each power module is on its own dedicated circuit.

- **Non-redundant**

  Blade servers will be allowed to power on as long as the power consumed is less than or equal to the total power of all installed power modules. Processors return to their normal power states when power redundancy is restored.

  Note: There may be certain configurations that might result in loss of power in the domain.

  See "Power allocation guidelines" for more information.

Power allocation guidelines

The power available to a BladeCenter S system is based on the number of power modules installed, the power being used, and the power management policy chosen.

110 V ac

The following table shows the maximum power available in a BladeCenter S system based on the number of power modules installed (connected to 110 V ac) and the power management policy chosen.

Table 5. Power module allocations at 110 V ac

Number of power modules	Maximum power	Total power available	Total power available (power module redundancy)
4	950 watts	3477 watts	2850 watts
3	950 watts	2850 watts	
2	950 watts	1900 watts	950 watts
1	950 watts	950 watts	

220 V ac

The following table shows the maximum power available in a BladeCenter S system based on the number of power modules installed (connected to 220 V ac) and the power management policy chosen.

Table 6. Power module allocations at 220 V ac

Number of power modules	Maximum power	Total power available	Total power available (power module redundancy)	Total power available (AC power source redundancy)
4	1450 watts	3562 watts	3562 watts	2900 watts
3	1450 watts	3562 watts		
2	1450 watts	2900 watts	1450 watts	1450 watts
1	1450 watts	1450 watts		

Power attachment diagrams

These power attachment diagrams show examples of how to attach to power based on whether you are using 110 V ac or 220 V ac power sources.

Power attachment diagrams - 110 V ac

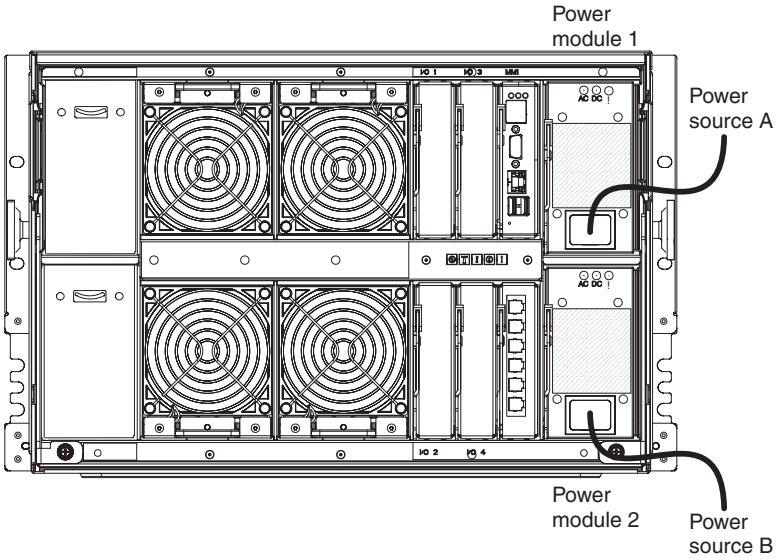
These power attachment diagrams show examples of how to attach to 110 V ac power sources.

Remember: You cannot mix 110 V ac power sources and 220 V ac power sources in the same BladeCenter S chassis.

Two power supplies attached to 110 V ac power sources

In this example, there are two power supplies that are attached to separate power sources. The power sources could be dedicated branch circuits from your circuit breaker panel:

- Power source A could be your utility provider
- Power source B could be your UPS service



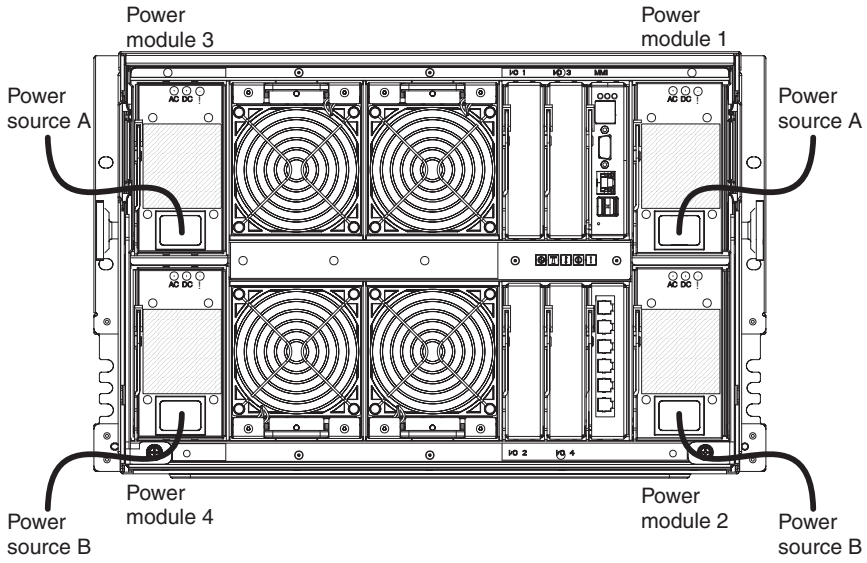
Each power supply provides up to 950 watts. Therefore, the total power available for the BladeCenter S system would be as follows:

- Non-redundant power policy: 1900 watts
- Power module redundancy power policy: 950 watts
- AC power source redundancy power policy: 950 watts

Four power supplies attached to 110 V ac power sources

In this example, there are four power supplies that are attached to two separate power sources. The power sources could each be different dedicated branch circuits from your circuit breaker panel:

- Power source A could be your utility provider
- Power source B could be your UPS service



Each power supply provides up to 950 watts. Therefore, the total power available for the BladeCenter S system would be as follows:

- Non-redundant power policy: 3477 watts
- Power module redundancy power policy: 2850 watts

Power attachment diagrams - 220 V ac

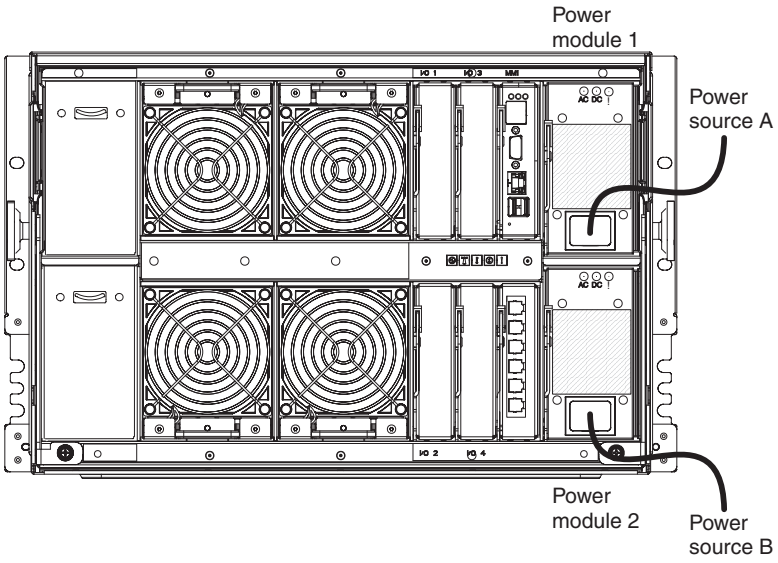
These power attachment diagrams show examples of how to attach to 220 V ac power sources

Remember: You cannot mix 110 V ac power sources and 220 V ac power sources in the same BladeCenter S chassis.

Two power supplies attached to 220 V ac power sources

In this example, there are two power supplies that are attached to separate power sources:

- Power source A could be your utility provider
- Power source B could be your UPS service



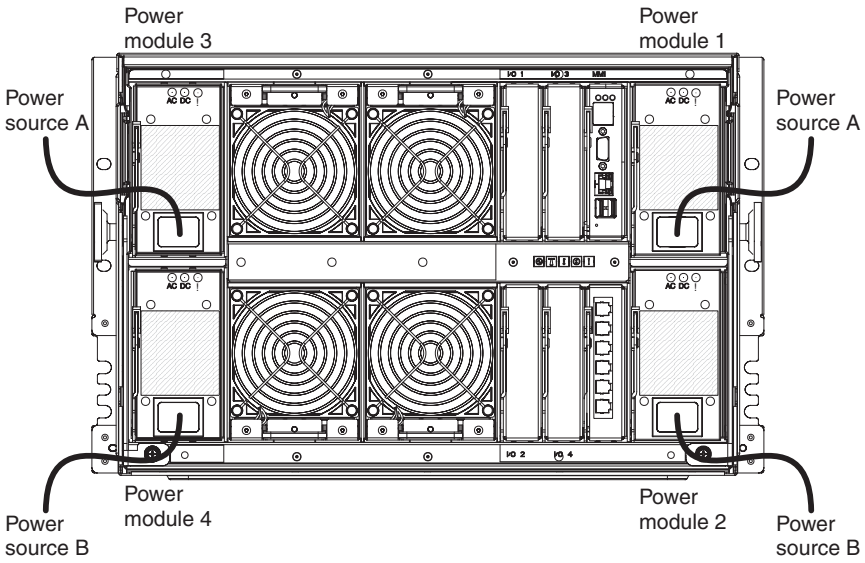
Each power supply provides up to 1450 watts. Therefore, the total power available for the BladeCenter S system would be as follows:

- Non-redundant power policy: 2900 watts
- AC power source redundancy power policy: 1450 watts

Four power supplies attached to 220 V ac power sources

In this example, there are four power supplies that are attached to two separate power sources.

- Power source A could be your utility provider
- Power source B could be your UPS service



Each power supply provides up to 1450 watts. Therefore, the total power available for the BladeCenter S system would be as follows:

- Non-redundant power policy: 3562 watts
- AC power source redundancy power policy: 2900 watts

Cooling considerations

The operating environment for BladeCenter S systems must provide sufficient temperature and humidity control to prevent BladeCenter S system thermal failures.

Air temperature and humidity

Temperature and humidity limits exist for a BladeCenter S system.

The following table describes the permissible temperatures and humidity limits for a BladeCenter S system when it is powered on.

Table 7. Temperature and humidity limits

Altitude	Temperature Range	Humidity Range
0 to 914 m (0 to 3,000 ft)	10° to 35° C (50° to 95° F)	8% to 80%
914 m to 2134 m (3,000 ft to 7,000 ft)	10° to 32° C (50° to 90° F)	8% to 80%

Airflow considerations

Air flow is critical for ensuring the operating air temperature stays within permissible limits.

- Each BladeCenter S system requires a maximum of 450 cubic feet per minute (CFM) and a minimum of 200 CFM of air circulation.
- Each BladeCenter S system has four fan modules, each containing two fans, for a total of eight fans.
- Each power supply contains fans that are used to cool the storage modules.
- Airflow direction is from front to back.
- All BladeCenter S chassis bays must be populated, either with a module, a blade server, or a filler in place of the component.
- All equipment installed in a rack with a BladeCenter S system must use front-to-back airflow to prevent warm-air-recirculation problems. Devices that use back-to-front air flow cause warm air to enter the front of the BladeCenter S chassis. This can cause reduced reliability, component failure, data loss, or blade server shutdown.
- In racks with multiple BladeCenter S systems, populate the BladeCenter S chassis starting with the bottom chassis in the rack and working up towards the top of the rack.
- Any unused rack space must be covered with a blank rack filler panel to ensure proper air circulation.

Heat output

The amount of heat output from a BladeCenter S system in British thermal units (BTUs) per hour is based on the configuration.

- Minimum configuration: 1365 Btu/hour or 400 watts
- Maximum configuration: 11942 Btu/hour or 3500 watts

Prevention of air recirculation

Consider these air recirculation factors when planning for single or multiple rack installations.

- When racks are positioned adjacent to each other, ensure that the racks fit tightly together from side to side to prevent inter-rack air recirculation from the back to the front.
- Air recirculation occurs over the top or around the side of a rack in a room that does not have a cooling system with sufficient airflow volume capacity. Ensure that the cooling system has adequate capacity for the room cooling load.

Room cooling

To prevent possible BladeCenter S system thermal failures, proper room cooling is vital.

- Ensure that the site cooling system has adequate capacity for the room cooling load.
- Ensure that cool air is provided to the front of the BladeCenter S chassis and rack.
- Ensure that the room cooling system is positioned so warm exhaust air is directed away from all BladeCenter S chassis towards the room cooling system without passing in front of a BladeCenter S chassis.
- A significant air temperature gradient can occur from the bottom to the top of a rack in a room that has a cooling system that does not have sufficient airflow

volume and cooling capacity. This may cause equipment at the top of the rack to run hot, resulting in reduced reliability, component failure, data loss, or server shutdown.

Chapter 3. Planning for deployment

Plan your BladeCenter S system network topology and determine which deployment tools to use to deploy operating system software, firmware, and drivers.

You can deploy your BladeCenter S system as an integrated solution for your enterprise. Within a single BladeCenter S chassis, you can mix and match applications and operating systems.

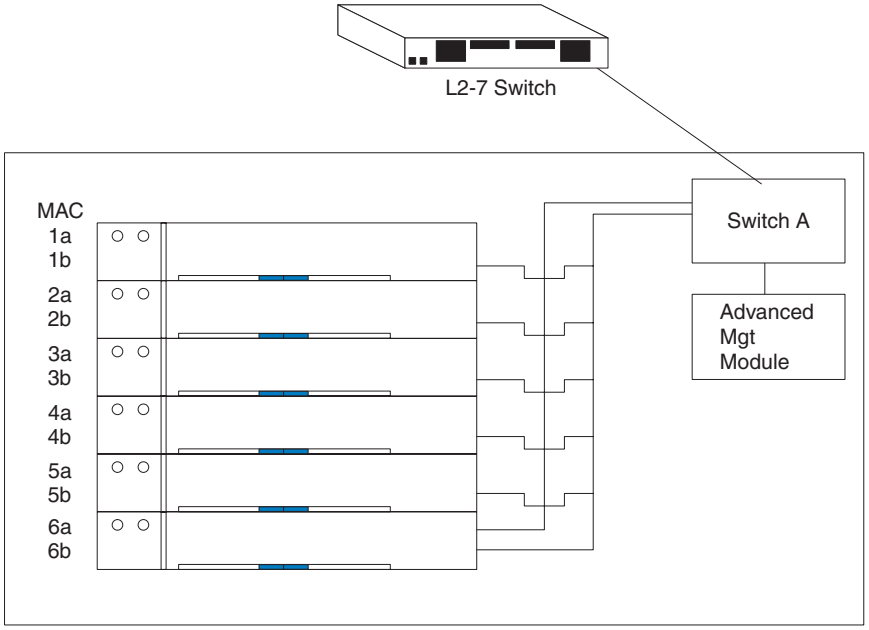
You can also get into more advanced management capabilities over the network. For example, you can use a spare blade server and the redeployment capabilities of IBM Director to implement a "blade server RAID" concept. IBM Director and Remote Deployment Manager (RDM) can automatically image a spare blade server to replace a failed blade server, increasing capacity to handle peak workloads, within seconds.

Network topology

The typical network topology for an BladeCenter S system is a single chassis with one or more blade servers. These servers communicate with devices on the external network through an I/O module that is installed in the chassis. Management of the blade servers is performed remotely through the advanced management module.

An Ethernet switch module in I/O module bay 1 of the BladeCenter S chassis can connect all of the blade servers to the external network, as shown in the following graphic.

Note: There are normally multiple linkages from the I/O module to the external network.



Deployment of the BladeCenter S system

Determine which deployment tools to use to deploy operating systems and updates of firmware, device drivers, and operating systems. Plan your infrastructure and plan how to set up your management connection.

The IBM BladeCenter Systems Management Redpaper, which is available at www.ibm.com/redbooks, also describes deploying BladeCenter S systems.

Hardware for the BladeCenter S system

Ethernet switches, SAS connectivity modules, power supplies, blade servers, storage modules, and the serial pass-thru module are all configurable at the time of your order. You can also order any of these hardware features to upgrade an existing BladeCenter S system.

I/O-module bay configuration options

Four I/O module bays in the BladeCenter S chassis are configurable with specific switches and options for each bay.

Important: You must have an I/O module filler or an I/O module installed in each I/O module bay.

See "Rear view parts listing" on page 90 for the I/O module filler part number.

I/O module bay 1 configuration options:

I/O module bay 1 is connected to both internal Ethernet ports of each blade server bay. You must install a supported Ethernet switch module or pass-thru module in this bay.

For a complete list of supported Ethernet switch modules and pass-thru modules, see the IBM ServerProven Web site at http://www-03.ibm.com/servers/eserver/serverproven/compat/us/eserver.html and select **BladeCenter S (8886)**.

I/O module bay 2 configuration options:

At the time of the BladeCenter S Type 8886 announcement and general availability, IBM does not support a switch module for I/O module bay 2. Contact your IBM sales representative or see the IBM Web site for BladeCenter to determine when a supported I/O module will be available.

You must use a filler in the bay until such time that an I/O module is available.

I/O module bays 3 and 4 configuration options:

I/O module bays 3 and 4 are connected to each blade server bay and both storage module bays in the BladeCenter S chassis. To utilize the integrated shared storage, each blade server must have a SAS expansion card installed.

If you are implementing a single SAS connectivity module, install it in I/O module bay 3.

The two bays also support Ethernet switch modules, Fibre channel switch modules or pass-thru modules (optical and copper) if the storage modules are not being used.

Important: I/O module bays 3 and 4 must both contain the same type of switch (either SAS connectivity modules, Ethernet switch modules, pass-thru modules, or Fibre-channel switches).

See "Planning for SAS connectivity module zoning" on page 50 for more information about configuring the integrated shared storage.

Deployment tools

Use deployment tools to configure chassis modules, to maintain operating system software, firmware, and drivers on blade servers, and to provision storage for your BladeCenter S system.

IBM Director

The IBM Director program is IBM's systems management product. Through the remote connection on the management module, you can use IBM Director on a management console to configure the BladeCenter S system, modify the configuration, and set up more advanced features.

To communicate with the BladeCenter S system, the IBM Director software needs a managed object (in the Group Contents pane of the IBM Director Management Console main window) that represents the BladeCenter S system. If the advanced management module IP address is known, the network administrator can create an IBM Director managed object for the BladeCenter S system. If the IP address is not known, the IBM Director software can automatically discover the BladeCenter S system (out-of-band, using the Ethernet port on the management module) and create a managed object for the system.

For the IBM Director software to discover the BladeCenter S system, your network must initially provide connectivity from the IBM Director server to the advanced management module Ethernet port. To establish connectivity, the advanced management module attempts to use DHCP to acquire its initial IP address for the Ethernet port. If the DHCP request fails, the advanced management module uses a static IP address. Therefore, the DHCP server (if used) must be on the management LAN for the BladeCenter S system.

Through the advanced management module, you can assign a new static IP address for each BladeCenter S system. If DHCP is not used and you do not assign a new static IP address for each BladeCenter S system before attempting to communicate with the IBM Director software, only one BladeCenter S system at a time can be added onto the network for discovery. Adding multiple systems to the network without a unique IP address assignment for each BladeCenter S system results in IP address conflicts.

The IBM Director management server must have IP connectivity to the advanced management module and to the blade servers (if an IBM Director agent is installed on the blade servers).

IBM Director has the capability to use the zone configurations that you create with Storage Configuration Manager. You can use Storage Configuration Manager to

create an initial zone configuration for a BladeCenter S system and use IBM Director to distribute the configuration to other BladeCenter S systems.

For information about IBM Director, refer to the IBM Director Web site at: www.ibm.com/systems/management/director. Also see the *Implementing IBM Director 5.20* redbook at http://www.redbooks.ibm.com/ for more information about using Director with BladeCenter products.

Storage Configuration Manager for the BladeCenter S system

The IBM Storage Configuration Manager is a systems management application used for managing and configuring SAS and storage devices. Use the Storage Configuration Manager for SAS connectivity module software to configure zoning for the installed SAS connectivity modules in your BladeCenter S chassis.

Storage Configuration Manager uses Web-based standards. You can install it to run as a standalone application or as an application launched from IBM Director 5.20.2 or later to manage IBM Director storage managed objects.

Storage Configuration Manager features a web based console that can communicate to remote SAS connectivity modules in the BladeCenter S chassis. You can install it to run as a standalone application or as an application launched from IBM Director 5.20.2 (or later) to manage storage resources.

The Storage Configuration Manager IBM Director extension launches Storage Configuration Manager tasks from the IBM Director Console. The Storage Configuration Manager Director Extension must be installed on both of the following systems:

- The system where the IBM Director Server is installed
- The system where the IBM Director Console is installed

Hardware requirements:

The following table lists the hardware requirements for the Storage Configuration Manager.

Table 8. Minimum hardware requirements for x86-compatible systems

Application	CPU speed	RAM	Disk space	Display
Storage Configuration Manager for SAS (only)	Pentium-class	256 MB	120 MB	256 colors (browser)
IBM Director Agent and Storage Configuration Manager Agents (future GA)	Pentium-class	128 MB	185 MB	Not applicable
IBM Director Console and SCM Director Extension	Pentium® 1.5 GHz	256 MB	170 MB	256 colors

Table 8. Minimum hardware requirements for x86-compatible systems (continued)

Application	CPU speed	RAM	Disk space	Display
IBM Director Server and Storage Configuration Manager Director Extension	Pentium 1.5 GHz	512 MB (minimum) 1024 MB (recommended)	325 MB	256 colors

Note: A single instance of the Storage Configuration Manager can support up to 8 chassis. If you need to manage devices in more than 8 chassis, you must install multiple instances of the Storage Configuration Manager. IBM Director is also recommended for environments with more than 8 chassis.

Firmware requirements:

Before installing the Storage Configuration Manager, you must ensure that your SAS connectivity module is configured with the correct firmware version.

Refer to the *IBM BladeCenter SAS Connectivity Module Installation and User's Guide* for detailed instructions.

Supported operating systems:

Storage Configuration Manager features can be installed (separately) on a variety of Windows® and Linux® systems.

The following operating systems support Storage Configuration Manager:

- Microsoft Windows 2000
  - Server
  - Advanced Server
- Microsoft Windows Server 2003 or 2003 R2
  - Enterprise Edition
  - Enterprise x64 Edition
  - Standard Edition
  - Standard x64 Edition
  - Web Edition
- Microsoft Windows XP Professional Edition
- Red Hat Enterprise Linux
  - Version 4 AS for x86/AMD64/EM64T
  - Version 4 ES for x86/AMD64/EM64T
  - Version 5 AS for x86/AMD64/EM64T
  - Version 5 ES for x86/AMD64/EM64T
- SUSE LINUX
  - Enterprise Server 9 for x86/AMD64/EM64T
  - Enterprise Server 10 for x86/AMD64/EM64T

Note: All operating system service packs must be installed.

TCP port access requirements:

Storage Configuration Manager processes require access to a number of TCP ports in the installation environment. If these ports are blocked by a firewall or used by another process, some Storage Configuration Manager functions may not work.

Table 9 lists the TCP ports used by the various Storage Configuration Manager processes. (The ⇔ symbol indicates that either component can function as the initiator or the listener.)

Table 9. TCP ports used by Storage Configuration Manager processes

Process	TCP port
Storage Configuration Manager Service ⇔ Web browser	32100
Storage Configuration Manager Service ⇔ CIM Service	15988 15989
SAS connectivity module XML API port	6641
SAS connectivity module Firmware Upload port	6643

Remote Deployment Manager

Remote Deployment Manager (RDM) is an IBM Director extension. Use RDM to install a supported Windows, Linux, or VMware ESX Server operating system or a firmware update onto a blade server remotely. RDM can also capture and deploy cloned images from one system to other systems. RDM uses ServerGuide Scripting Toolkit to provide a deep level of insulation from hardware dependencies.

IBM Director has the capability to use the zone configurations that you create with Storage Configuration Manager. IBM Director and Storage Configuration Manager enable RDM to install an operating system to one of the integrated drives by providing a remote zoning function.

Note: If you are deploying operating systems using Alteris or ServerGuide Scripting Toolkit, you must first configure the zones using Storage Configuration Manager or through the advanced management module.

See the RDM Web site at http://www-03.ibm.com/systems/management/director/extensions/rdm.html for more information about Remote Deployment Manager. See the ServerGuide Scripting toolkit Web site at http://www-03.ibm.com/systems/management/sgstk.html for more information about ServerGuide Scripting Toolkit.

Management connection

When connecting to the advanced management module, you can choose to connect through the Ethernet port, the serial port (RJ-45 connector), or the video monitor and USB ports on the back of the advanced management module.

- The Ethernet connection can be used to connect to a management station, either through an Ethernet cable, or on the network. You can use this connection to access the advanced management module Web Interface or the command-line interface (CLI).
- The video connector can be used to connect a compatible SVGA or VGA video monitor to the BladeCenter S system. In addition, you can connect a mouse and keyboard (or other USB devices).

- The serial connector can be used to configure and manage the BladeCenter components over a serial connection through the advanced management module command-line interface (CLI).

To manage blade servers, you can use the BladeCenter S system, Serial over LAN, or the serial pass-thru module.

Deployment of blade servers

Plan to meet at least the minimal hardware and software requirements for deploying blade servers, firmware, device drivers, and operating systems.

Hardware considerations for blade servers

You can order optional hardware for blade servers that will be installed in a BladeCenter S system. The optional hardware available depends on the blade server that you are installing.

You can choose to add the following types hardware options to a blade server that will be installed in a BladeCenter S system. See the documentation for the blade server that you are installing for the specific options that are available.

- Additional internal hard disk drives. Some blade servers support IDE hard disk drives, some support SCSI drives, and others support internal SAShard disk drives.
- Memory module options to increase the amount of memory in your blade server. When you install memory, you must install a pair of matched dual inline memory modules (DIMMs).
- SAS expansion card option to enable the blade servers to communicate with the SAS connectivity module and the integrated shared storage.
- Up to four microprocessors. With two microprocessors, your blade server can operate as a symmetric multiprocessing (SMP) server. To ensure proper server operation when you install an additional microprocessor, use microprocessors that have the same cache size and type, and the same clock speed. Internal and external clock frequencies must be identical.

  Note: Some blade servers, such as the IBM BladeCenter LS41, support up to four microprocessors with the addition of a multiprocessor expansion unit. With the addition of the multiprocessor expansion unit, the blade server will occupy two blade server bays.
- A SCSI storage expansion unit for using SCSI hard disk drives with your blade server. With the SCSI storage expansion unit, you can install up to two 1-inch (26 mm) slim-high, 3.5-inch, hot-swap SCSI hard disk drives. If you install the SCSI storage expansion unit, the blade server occupies two to three blade server bays, depending on the blade server.
- The PCI I/O expansion unit adds additional adapter-based functions to your blade server. The PCI I/O expansion unit allows you to add up to two full-length, full-height PCI adapters. If you install the PCI I/O expansion unit, the blade server occupies two to three blade server bays, depending on the blade server.

Operating system considerations

Several operating systems are supported for each blade server that can be installed in a BladeCenter S system.

In general, blade server families exist for each operating system platform architecture.

HC10 Intel architecture that supports:

- Microsoft Windows

HS family

Intel architecture that supports:

- Microsoft Windows
- Novell NetWare
- Novell SuSE Linux
- Red Hat Linux
- Sun Solaris 10
- The SCO Group Linux
- Turbolinux
- VMware

LS family

AMD architecture that supports:

- Microsoft Windows
- Novell NetWare
- Novell SuSE Linux
- Red Hat Linux
- Sun Solaris 10
- VMware

The ServerProven Web site at http://www-03.ibm.com/servers/eserver/serverproven/compat/us/ lists all operating systems that run on IBM BladeCenter blade servers. In addition, see the BladeCenter NOS Support Information Web site at http://www-03.ibm.com/servers/eserver/serverproven/compat/us/nos/ematrix.shtml for a matrix of supported operating systems per BladeCenter blade server.

Application considerations

Information about some of the applications that you can deploy on blade servers are provided in IBM redpieces and redpapers.

The following Redbooks Technotes, Redpieces, Redpapers, and Redbooks are available at www.ibm.com/redbooks:

- **Lotus Domino:**
  - Deploying Lotus Domino on IBM BladeCenter (November, 2003)
  - Domino for IBM eServer xSeries and BladeCenter Sizing and Performance Tuning (May, 2004)
- **Citrix:**
  - Deploying Citrix MetalFrame on IBM BladeCenter (September, 2004)
  - Automating the Deployment and Image Management of a Citrix Hosted Client Environment (May, 2005)

  - Tuning IBM System x Servers for Performance (March, 2007)
- **Microsoft Exchange:**
  - Deploying Microsoft Exchange on IBM BladeCenter (November, 2003)
  - Tuning IBM System x Servers for Performance (March, 2007)
- The Cutting Edge: IBM BladeCenter (November, 2003)
- **Virtual I/O Server (VIOS) Integrated Virtualization Manager (IVM) environment:**
  - VIOS Network Install from Linux Server (August, 2006)
  - IBM BladeCenter JS21: The POWER of Blade Innovation
- **Altiris and ServerGuide Scripting Toolkit:**

  Deployment using Altiris on IBM System x and BladeCenter Servers (September, 2006)
- **Banking:**
  - IBM Systems Solution for Branch Banking: Installation Guide (February, 2007)
  - Infrastructure Solutions: Building a Smart Bank Operating Environment (October, 2006)
- **Application switching:**

  Application Switching with Nortel Networks Layer 2-7 Gigabit Ethernet Switch Module for IBM BladeCenter (March, 2006)
- **Databases:**

  Oracle9i Real Application Clusters and PolyServe Matrix Server on IBM eServer xSeries and BladeCenter (November, 2004)

Chapter 4. Planning for configuration

During planning, you need to plan for the configuration of the advanced management module, I/O modules, blade servers, and storage.

Keyboard, video, and mouse

The advanced management module provides a set of USB connectors for attaching a keyboard and mouse, and a video connector for attaching a monitor to the BladeCenter S chassis.

The advanced management module provides a method for performing installation tasks, system management tasks and, if necessary, problem determination. You should either plan for a mobile keyboard, mouse, and monitor that can be attached to a specific BladeCenter S chassis when needed, or plan for rack space to install a keyboard, mouse, and monitor.

Planning for advanced management module configuration

The BladeCenter S system comes with a single hot-swap advanced management module located in the management module bay. Plan for configuration by making decisions and gathering information for Ethernet interfaces, alerts, login profiles, network protocols, and security.

The advanced management module is used to configure the BladeCenter S system and installed modules, such as Ethernet switch module IP addresses.

The advanced management module communicates with the service processor in each blade server for functions such as:

- Blade server power-on requests
- Blade server error and event reporting
- Blade server requests for keyboard, mouse, and video
- Blade server requests for CD-ROM drive and USB port

The advanced management module also communicates with the I/O modules, power modules, fan modules, and blade servers to detect presence or absence and any error conditions, and sending alerts when required.

Use the information provided in this section along with the “Advanced management module configuration worksheet” on page 79 to plan for the configuration of the advanced management module.

Advanced management module general settings

General settings for the advanced management module include name, contact, location, and real-time clock settings.

Make choices for the following settings:

- Advanced management module name.
- Name of the contact person responsible for the advanced management module.
- Physical location of the advanced management module.
- Real-time clock settings in the advanced management module, including network time protocol (NTP) settings for the advanced management module.
- Trespass warning text and enablement. You can choose to have a warning displayed each time users log into the advanced management module and decide what that warning should say.

Advanced management module user profile settings

You can specify up to 12 login profiles that can access the advanced management module.

For each login profile, specify:

- Login ID.
- Password.
- Role or Authority level. The role or authority level defines the command areas that a user can access, based on the access scope defined for that user. You can specify one of the following for each login ID:
  - Supervisor
  - Operator
  - Custom
- Access scope. The access scope defines where the role or user authority defined for a user is valid, such as a specific BladeCenter S chassis or a group of blade servers.

In addition, you can specify an SNMP v3 profile for each user profile that includes the following information:

- Name of the context in which this SNMP v3 user is working
- Authentication protocol used
- Privacy protocol used
- Privacy password to be used
- Access type (Get, Set, or Trap)
- Hostname/IP address for traps

Security settings

There are three levels of account security, which is set globally and applies to all user profiles:

- **Legacy security**. This level of security has the following settings:
  - No password is required.
  - No password expiration.
  - No restrictions on reusing passwords.
  - No password change frequency restrictions.
  - User accounts are locked for two minutes after five login failures.
  - Passwords must adhere to simple password rules.
  - No account inactivity monitoring.
- **High security**. This level of security has the following settings:
  - A Password is required.
  - The password for the factory default USERID must be changed on next login.
  - The password for all user IDs must be changed on first login, and passwords expire in 90 days.
  - There are restrictions on reusing passwords (last 5 passwords kept in history).
  - There is a minimum interval of 24 hours between password changes.
  - Account is locked for 60 minutes after five login failures.
  - Passwords must adhere to complex password rules (at least two degrees of difference from previous password).
  - An alert is issued on account inactivity after 120 days.
  - Accounts disabled after 180 days of inactivity.
- **Custom security**. With this level of security, you can specify the following:
  - Whether a user login password required.
  - Password expiration period.
  - Minimum password reuse cycle.
  - Minimum password change interval.
  - Maximum number of login failures.
  - Lockout period after maximum login failures.
  - Complex password rules.
  - Minimum different characters in passwords.
  - Whether the factory default 'USERID' account password must be changed on next login.
  - Whether to force users to change their password on the first login.
  - Inactivity alert period.
  - Inactivity alert and disable period.

Advanced management module alert settings

Configure who should receive critical alerts, warning alerts, and system alerts and how to transmit the alert notifications.

- Which alerts are monitored (such as critical, warning, and system alerts).
- Where to and to whom alerts are sent.
- How alerts as sent (such as SNMP, e-mail, IBM Director).
- How often to retry alert notification and the delay between retries.
- Whether to include the event log with notifications.

Advanced management module serial port settings

You can configure the communications settings for the advanced management module serial port, such as the baud rate, error checking parity, and number of stop bits.

The serial port is a RJ-45 connector located on the back of the advanced management module. Connections made using the serial port can access only the advanced management module command-line interface.

Advanced management module port assignments

Determine how to configure the ports on the advanced management module.

Typically, you will not need to change port assignments from the default values. If you do experience conflicts after initial setup, you can change the port settings at a later time.

The following advanced management module ports can be configured:

- HTTP
- HTTPS
- Telnet
- SSH
- SNMP Agent
- SNMP Traps
- FTP
- FTP Data
- TFTP
- Remote Disk
- Remote Disk-On-Card
- Remote KVM
- Storage Description Service
- TCP Command Mode
- SLP
- SMASH CLP
- Secure SMASH CLP

Advanced management module network interface settings

You can configure an external Ethernet network interface used to communicate with the remote management and console.

Determine whether or not the advanced management module will use DCHP to obtain an IP address or use a static IP address.

In addition, you can determine the IP addresses for the I/O modules (or accept the defaults).

Advanced management module network protocols settings

Determine the information to be used for each of the protocols supported by the BladeCenter S Type 8886.

You can choose to configure the following network protocols:

- Simple Network Management Protocol (SNMP)
- Domain Name Server (DNS)
- Simple Mail Transfer Protocol (SMTP)
- Lightweight Directory Access Protocol (LDAP)
- Web access (HTTP/HTTPS)
- Telnet protocol
- TCP command mode protocol
- Service Location Protocol (SLP)
- File Transfer Protocol (FTP)
- Trivial File Transfer Protocol (TFTP)
- Remote Control
- SMASH Command Line Protocol (CLP)
- Syslog protocol

Advanced management module security settings

Determine the information to be used for network security.

You can configure the following security settings:

- Data encryption. Determine whether or not to encrypt sensitive data, such as passwords and keys.
- SSL server.
- SSL client.
- SSH server.
- SSH server keys.

Ethernet switch module configuration planning

One Ethernet switch module or copper pass-thru module is required in switch module bay 1 of your BladeCenter S chassis to enable communication between the blade servers and an external Ethernet network.

There are several options to consider, depending on the Ethernet switch module that you are installing:

- Switch settings
- Port settings
- SNMP
- User accounts
- TFTP
- VLANs

  Important: The default VLAN ID 4095 is used for internal communications between the advanced management module and the blade servers. Do not remove this VLAN.
- Multicasting
- Mirroring
- Spanning tree
- Class of service
- Link aggregation
- Enable external ports for management

Note: Refer to your specific Ethernet switch documentation for more information about the various options. In addition, information about the these options is available in the *BladeCenter Products and Technology* redbook at the IBM Redbook Web site http://www.redbooks.ibm.com/.

Important: The BladeCenter S system ships with the external ports of the Ethernet Switch module set to *disabled*. Before any communication with the ports is possible, the ports must first be enabled through the advanced management module configuration panels. After the Ethernet Switch module ports are enabled, a system management workstation can communicate with the Ethernet switch module using the Web user interface or Telnet commands.

Planning for SAS connectivity module zoning

Plan for the SAS connectivity module and the zoning of SAS connectivity module ports, which enables blade servers to access specific hard disk drives.

For each SAS connectivity module, you will need to determine the following settings:

- Nickname. Description used for each SAS connectivity module.
- TCP ports to use for administration, events, and firmware download.
- Whether or not to use a Network Time Protocol (NTP) server for the date and time.

When you configure the zoning for the BladeCenter S system, you determine which disks are accessible by each of the blade servers. In addition, you determine which external ports on the SAS connectivity module are accessible by each of the blade servers.

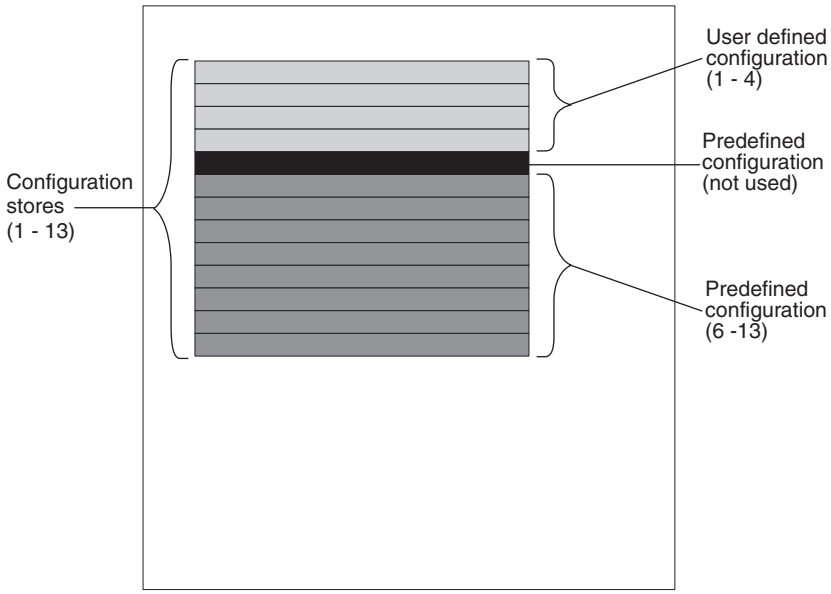
If both storage modules are installed, each blade server will typically have access to disks in each of the storage modules.

Use the "SAS connectivity module configuration worksheet" on page 87 to record your planning decisions.

Configuration stores

Each SAS connectivity module contains 13 configuration stores. It can contain up to four user-defined configurations in addition to the nine predefined configurations.

Note: Predefined configuration 01 is not intended for use with the BladeCenter S system.



Important: If you are implementing two SAS connectivity modules, make sure that you specify the same configuration (either user-defined or predefined) for both SAS connectivity modules.

User-defined configurations

You can specify up to four unique, user-defined configurations for the integrated shared storage installed in the BladeCenter S system.

There are two ways to specify your own integrated storage configuration:

- Through the SAS connectivity module, using either the Web-based user interface or the command-line interface.
- Using Storage Configuration Manager.

After specifying a configuration, you can save it and export it for use in another BladeCenter S system.

To plan for a user-defined storage configuration:

- Determine which hard disk drives in storage module 1 will be mapped to each of the blade servers in the BladeCenter S system.
- Determine which hard disk drives in storage module 2 will be mapped to each of the blade servers in the BladeCenter S system.
- Determine which external ports on the SAS connectivity module in I/O module bay 3 will be accessible by each of the blade servers.
- Determine which external ports on the SAS connectivity module in I/O module bay 4 (if installed) will be accessible by each of the blade servers.

Planning considerations

Consider the following when planning for integrated storage:

- Map a blade server to one or more disks in each of the storage modules. Then you can configure the disks as a RAID array to reduce the potential for a hard disk failure causing a blade server to lose access to the storage.

  To set up and manage RAID arrays, you can choose from these options:

  – LSI Configuration Utility, which is provided on the blade server itself.
  – MegaRAID Storage Manager, which is provided on CD-ROM with the SAS expansion option. MegaRAID Storage Manager is available for Windows and Linux, and it enables you to create and manage RAID arrays.
  – ServerGuide, which you can use to install the Microsoft Windows operating system on a blade servfer.
- Map the blade server to the same hard disks in both storage modules to reduce management complexity. For example, if you choose to map the blade server in blade server bay 1 to the hard disk drive in hard disk drive bay 1 of one storage module, map the same blade server to the hard disk drive in hard disk drive bay 1 of the second storage module.

Predefined configurations

Several predefined configurations are available to help in configuring the zoning for the SAS connectivity module.

Predefined configurations are available to support most typical environments. There are several ways to choose a predefined configuration, including:

- Storage Configuration Manager
- Advanced management module configuration wizard
- Advanced management module Web based user interface
- The SAS connectivity module command-line interface (CLI)

Note: Predefined configuration 01 is not intended to be used with the BladeCenter S system.

Predefined configurations cannot be modified. Therefore, when choosing a predefined configuration, plan for future growth. For example, if you are currently going to install a single blade server, but you intend to install additional blade servers in the future, you might consider choosing the predefined configuration that supports the total number of blade servers that will be installed. Then, when you do install additional blade servers, you will not need to modify the predefined configuration.

If you implement a predefined configuration that meets your current requirements and then change the BladeCenter S system (such as adding an additional blade server), you will need to choose a new predefined configuration that matches the BladeCenter S system setup.

Tip: You can use Storage Configuration Manager to edit a predefined configuration. However, you must save any changes that you make as one of the four user-defined configurations.

Predefined storage configuration 02

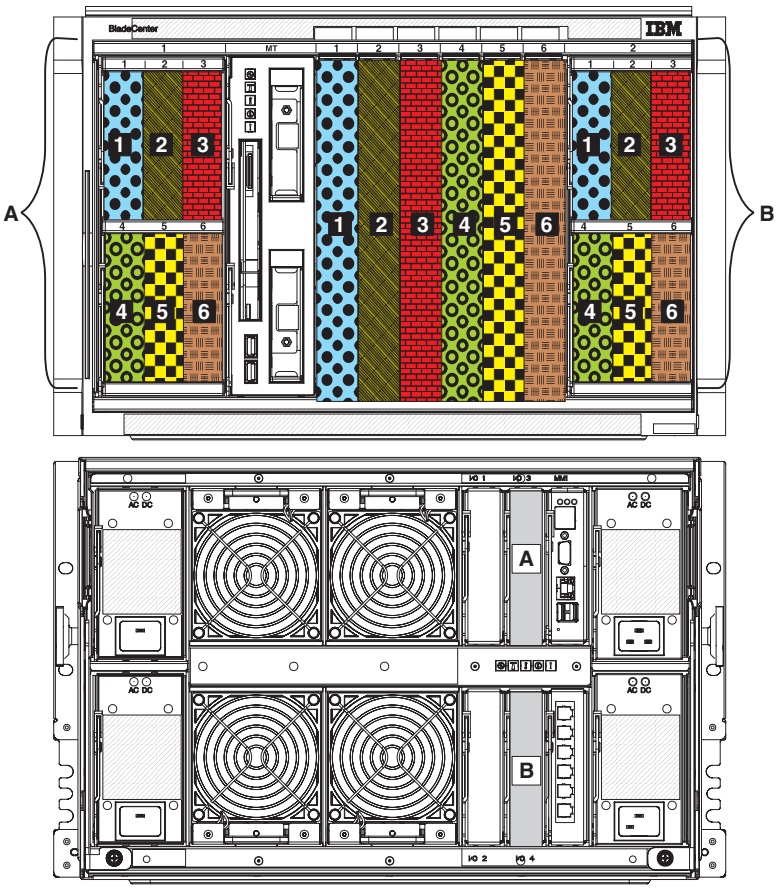
Use predefined storage configuration 02 to implement up to six blade servers, two SAS connectivity modules, and up to two storage modules, each with up to six hard disk drives. Each blade server can access one hard disk drive in each storage module and all external ports on both SAS connectivity modules.

This configuration has the following characteristics:

- Each blade server has access to a single hard disk drive in each storage module (for a maximum of two hard disk drives if you are implementing both storage modules).

  With this predefined configuration, blade server bays are mapped to hard disk drive locations in each storage module. The location of the hard disk drives in each storage module is important. For example, if you install a blade server in blade server bay 3, it can access only the hard drives located in hard drive bay 3 of each storage module.
- The SAS connectivity module in I/O module bay 3 controls access to the hard disk drives in storage module 1.
- The SAS connectivity module in I/O module bay 4 controls access to the hard disk drives in storage module 2.
- All blade servers have access to all external ports on both SAS connectivity modules.

Note: This configuration maps the hard disks to the blade servers and the blade servers to the external ports on the SAS connectivity module. You will need to use the LSI Configuration Utility, MegaRAID Storage Manager, or ServerGuide to set up mirroring.


BladeCenter
IBM
MT
A
B
1
2
3
4
5
6
AC DC
I/O 1
I/O 2
I/O 3
I/O 4
MM
A
B

Predefined storage configuration 03

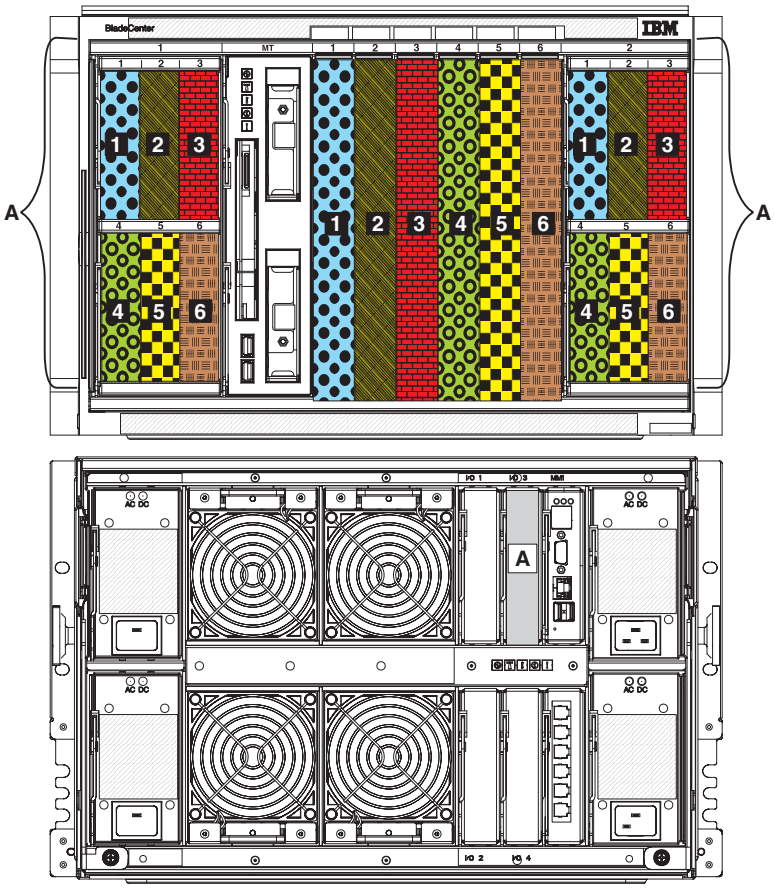
Use predefined storage configuration 03 to implement up to six blade servers, one SAS connectivity module, and up to two storage modules, each with up to six hard disk drives. Each blade server can access one hard disk drive in each storage module and all external ports on the SAS connectivity module.

This configuration has the following characteristics:

- Each blade has access to a single hard disk drive in each storage module (for a maximum of two hard disk drives if you are implementing both storage modules).

  With this predefined configuration, blade server bays are mapped to hard disk drive locations in each storage module. The location of the hard disk drives in each storage module is important. For example, if you install a blade server in blade server bay 3, it can access only the hard drives located in hard drive bay 3 of each storage module.
- The SAS connectivity module must be installed in I/O module bay 3 and controls access to the hard disk drives in both storage modules.
- All blade servers have access to all external ports on the SAS connectivity module.

Note: This configuration maps the hard disks to the blade servers and the blade servers to the external ports on the SAS connectivity module. You will need to use the LSI Configuration Utility, MegaRAID Storage Manager, or ServerGuide to set up mirroring.



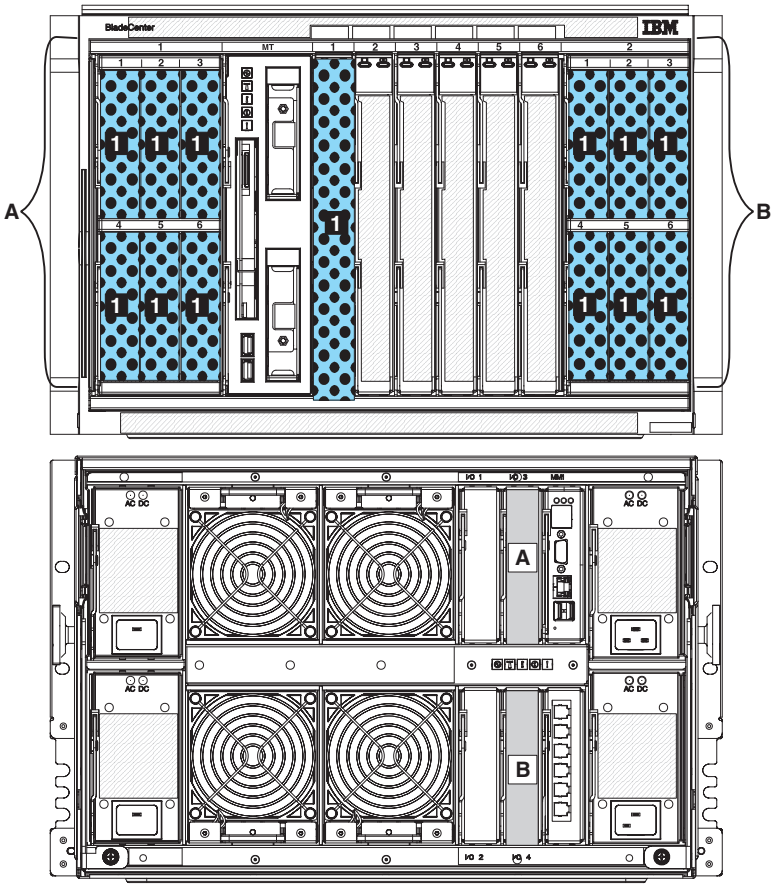
Predefined storage configuration 04

Use predefined storage configuration 04 to implement a single blade server, two SAS connectivity modules, and up to two storage modules, each with up to six hard disk drives. The blade server can access all hard disk drives in both storage modules and all external ports on both SAS connectivity modules.

This configuration has the following characteristics:

- The blade server has access to all hard disk drives in both storage modules (for a maximum of 12 hard disk drives if you are implementing both storage modules).
- The SAS connectivity module in I/O module bay 3 controls access to the hard disk drives in storage module 1.
- The SAS connectivity module in I/O module bay 4 controls access to the hard disk drives in storage module 2.
- The blade server has access to all external ports on both SAS connectivity modules.

Note: This configuration maps the hard disks to the blade servers and the blade servers to the external ports on the SAS connectivity module. You will need to use the LSI Configuration Utility, MegaRAID Storage Manager, or ServerGuide to set up mirroring.



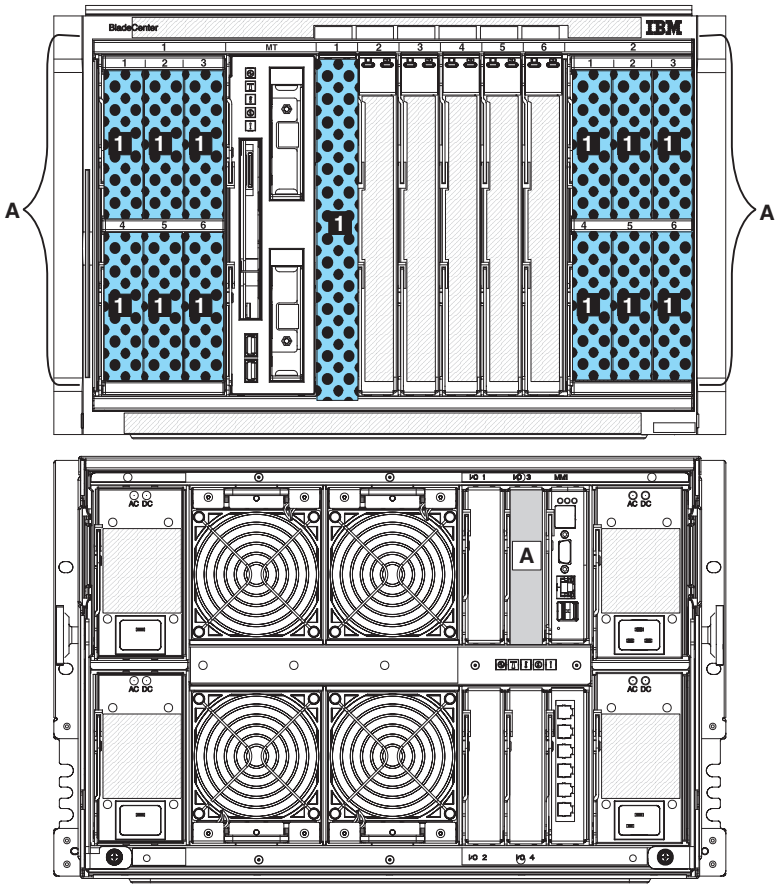
Predefined storage configuration 05

Use predefined storage configuration 05 to implement a single blade server, one SAS connectivity module, and up to two storage modules, each with up to six hard disk drives. The blade server can access all hhard disk drives in both storage modules and all external ports on the SAS connectivity module.

This configuration has the following characteristics:

- The blade server has access to all hard disk drives in both storage modules (for a maximum of 12 hard disk drives if you are implementing both storage modules).
- The SAS connectivity module must be installed in I/O module bay 3 and controls access to the hard disk drives in both storage modules.
- The blade server has access to all external ports on the SAS connectivity module.

Note: This configuration maps the hard disks to the blade servers and the blade servers to the external ports on the SAS connectivity module. You will need to use the LSI Configuration Utility, MegaRAID Storage Manager, or ServerGuide to set up mirroring.



Predefined storage configuration 06

Use predefined storage configuration 06 to implement three blade servers, two SAS connectivity modules, and up to two storage modules, each with up to six hard disk drives. Each blade server can access two hard disk drives in each storage module and all external ports on both SAS connectivity modules.

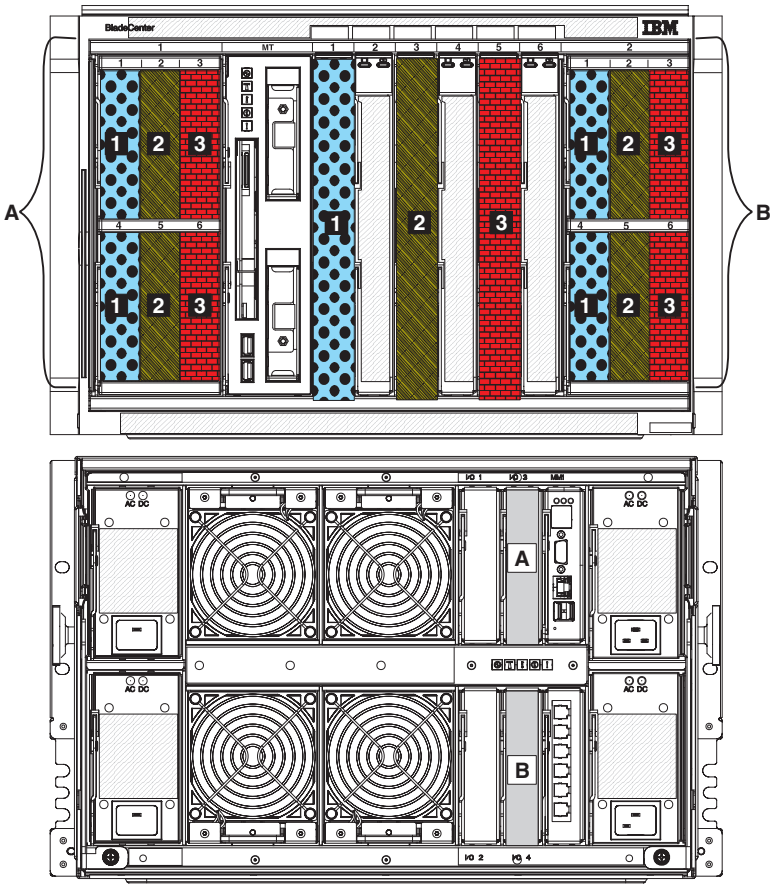
This configuration has the following characteristics:

- Each blade server can access up to twohard disk drives in each storage modules (for a maximum of four hard disk drives if you are implementing both storage modules).

  With this predefined configuration, blade server bays are mapped to hard disk drive locations in each storage module. The location of the hard disk drives in each storage module is important. For example, if you install a blade server in blade server bay 3, it can access only the hard drives located in hard drive bay 3 and hard drive bay 5 of each storage module.
- The SAS connectivity module in I/O module bay 3 controls access to the hard disk drives in storage module1.
- The SAS connectivity module in I/O module bay 4 controls access to the hard disk drives in storage module 2.
- All blade servers have access to all external ports on both SAS connectivity modules.

Note: This configuration maps the hard disks to the blade servers and the blade servers to the external ports on the SAS connectivity module. You will need to use the LSI Configuration Utility, MegaRAID Storage Manager, or ServerGuide to set up mirroring.

Required: If you are going to use this configuration, the placement of the blade servers in the BladeCenter S system is important. Blade servers **must** be installed in blade server bays 1, 3, and 5. Blade servers installed in any other blade server bay will not be able to access the integrated shared storage.



Predefined storage configuration 07

Use predefined storage configuration 07 to implement three blade servers, one SAS connectivity module, and up to two storage modules, each with up to six hard disk drives. Each blade server can access two hard disk drives in each storage module and all external ports on the SAS connectivity module.

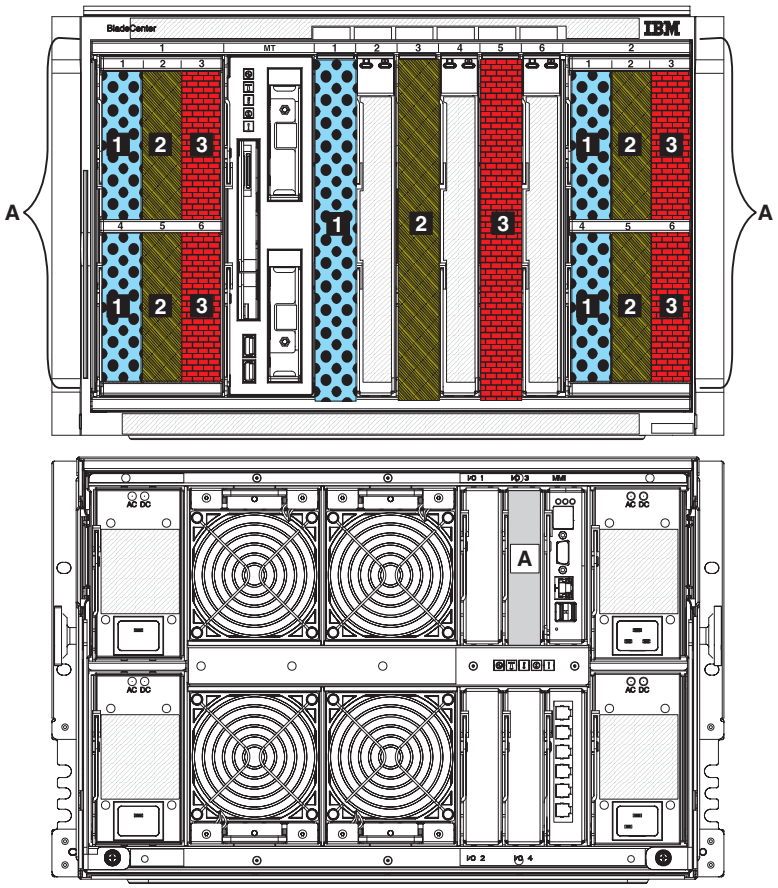
This configuration has the following characteristics:

- Each blade server can access up to two hard disk drives in each storage modules (for a maximum of four hard disk drives if you are implementing both storage modules).

  With this predefined configuration, blade server bays are mapped to hard disk drive locations in each storage module. The location of the hard disk drives in each storage module is important. For example, if you install a blade server in blade server bay 3, it can access only the hard drives located in hard drive bay 3 and hard drive bay 5 of each storage module.
- The SAS connectivity module must be installed in I/O module bay 3 and controls access to the hard disk drives in both storage modules.
- All blade servers have access to all external ports on the SAS connectivity module.

Note: This configuration maps the hard disks to the blade servers and the blade servers to the external ports on the SAS connectivity module. You will need to use the LSI Configuration Utility, MegaRAID Storage Manager, or ServerGuide to set up mirroring.

Required: If you are going to use this configuration, the placement of the blade servers in the BladeCenter S system is important. Blade servers **must** be installed in blade server bays 1, 3, and 5. Blade servers installed in any other blade server bay will not be able to access the integrated shared storage.



Predefined storage configuration 08

Use predefined storage configuration 08 to implement two blade servers, two SAS connectivity modules, and up to two storage modules, each with up to six hard disk drives. Each blade server can access three hard disk drives in each storage module and all external ports on both SAS connectivity modules.

This configuration has the following characteristics:

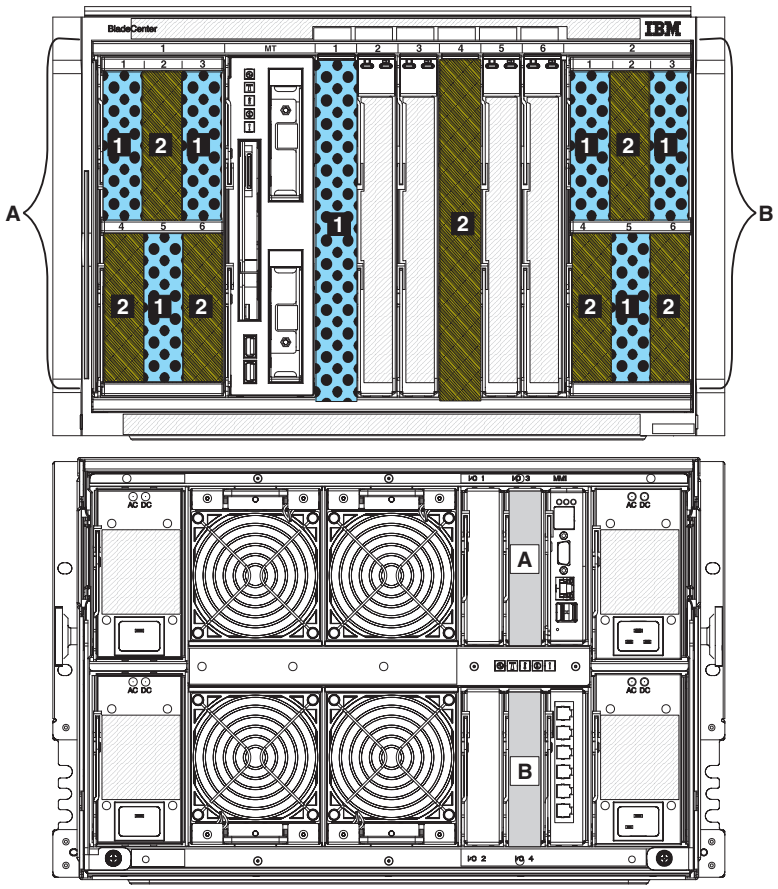
- Each blade server can access up to three hard disk drives in each storage modules (for a maximum of six hard disk drives if you are implementing both storage modules).

  With this predefined configuration, blade server bays are mapped to hard disk drive locations in each storage module. The location of the hard disk drives in each storage module is important. For example, if you install a blade server in blade server bay 4, it can access only the hard drives located in hard drive bay 2, hard drive bay 4, and hard drive bay 6 of each storage module.
- The SAS connectivity module in I/O module bay 3 controls access to the hard disk drives in storage module 1.
- The SAS connectivity module in I/O module bay 4 controls access to the hard disk drives in storage module 2.

- All blade servers have access to all external ports on both SAS connectivity modules.

Note: This configuration maps the hard disks to the blade servers and the blade servers to the external ports on the SAS connectivity module. You will need to use the LSI Configuration Utility, MegaRAID Storage Manager, or ServerGuide to set up mirroring.

Required: If you are going to use this configuration, the placement of the blade servers in the BladeCenter S system is important. Blade servers **must** be installed in blade server bays 1 and 4. Blade servers installed in any other blade server bay will not be able to access the integrated shared storage.



Predefined storage configuration 09

Use predefined storage configuration 09 to implement two blade servers, one SAS connectivity module, and up two storage modules, each with up to six hard disk drives. Each blade server can access three hard disk drives in each storage module and all external ports on the SAS connectivity module.

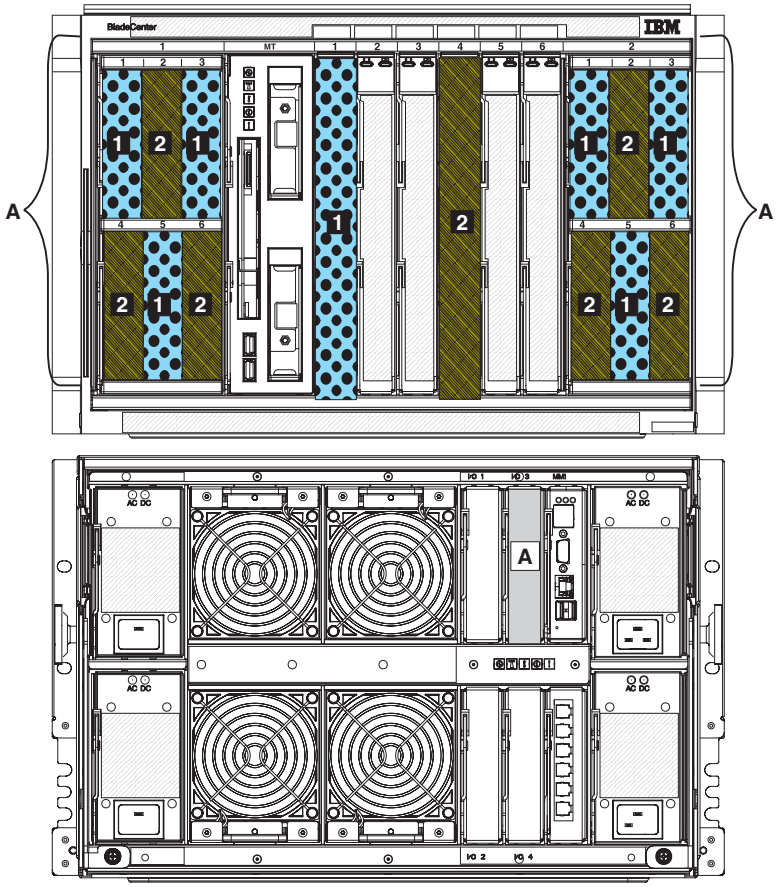
This configuration has the following characteristics:

- Each blade server can access up to three hard disk drives in each storage modules (for a maximum of six hard disk drives if you are implementing both storage modules).

  With this predefined configuration, blade server bays are mapped to hard disk drive locations in each storage module. The location of the hard disk drives in each storage module is important. For example, if you install a blade server in blade server bay 4, it can access only the hard drives located in hard drive bay 2, hard drive bay 4, and hard drive bay 6 of each storage module.
- The SAS connectivity module must be installed in I/O module bay 3 and controls access to the hard disk drives in both storage modules.
- All blade servers have access to all external ports on the SAS connectivity module.

Note: This configuration maps the hard disks to the blade servers and the blade servers to the external ports on the SAS connectivity module. You will need to use the LSI Configuration Utility, MegaRAID Storage Manager, or ServerGuide to set up mirroring.

Required: If you are going to use this configuration, the placement of the blade servers in the BladeCenter S system is important. Blade servers **must** be installed in blade server bays 1 and 4. Blade servers installed in any other blade server bay will not be able to access the integrated shared storage.



Appendix A. Installation planning worksheets

Use the installation planning worksheets to gather the information that you will need for the physical installation of the BladeCenter S system in your organization.

Blade server and workstation blade installation worksheet

Use this worksheet to describe each blade server and workstation blade that you plan to install in the BladeCenter S system. Fill out one worksheet for each blade server that you will install.

The following factors drive the choices you make when filling out a blade server worksheet:

- What applications will this server provide?
- Which operating system will the server use?
- What are the redundancy requirements for this server? Redundancy is handled at multiple levels:
  - Blade server level - a mirror image blade server that resides in the same BladeCenter S chassis or in a different BladeCenter S chassis.
  - BladeCenter S system level - a mirror image BladeCenter S system that resides in the same rack or in a different rack.
  - Rack level - a set of BladeCenter S system in a rack that mirrors a set of BladeCenter S system in a different rack.
- What are the network connectivity requirements for this server, including physical connectivity for a redundant path?

How to fill out this worksheet:

1. Record the name and purpose of this server.
2. Record the operating system on the worksheet.
3. Select an installation option for the operating system.
4. Record the applications for this server.
5. Chose the I/O module bay that this server uses to communicate with an Ethernet switch module; circle 1 , 3 , or 4. (I/O module bays 3 and 4 require an expansion card in the blade.)

   Note: At the time of the BladeCenter S Type 8886 announcement and general availability, IBM does not support a switch module for I/O module bay 2. Contact your IBM sales representative or see the BladeCenter Web site at: http://www.ibm.com/systems/bladecenter/ to determine when a supported I/O module will be available.
6. Select **Automatic through DHCP server** or **Static** and record the IP address information. (The host name can be up to 63 characters.)

Table 10. BladeCenter HC10 workstation blade worksheet

Workstation blade model: _____ Workstation blade purpose: _____ _____ _____ Operating system: _____ OS installation option: ☐ Preloaded ☐ Deployed through network management ☐ Manual install with product CD. Workstation blade IP information: ☐ Automatic through DHCP server ☐ Static: Host name _____ Subnet mask _____._____.___._____ IP address _____._____.___._____ Gateway address _____._____.___._____	Connects to I/O module I/O bay 1 _____ I/O bay 2 _____ I/O bay 3 _____ I/O bay 4 _____ Boot sequence: ___ Internal hard disk drive ___ Integrated storage drive ___ CD-ROM ___ Network Applications: 1. _____ 2. _____ 3. _____

BladeCenter S chassis blade bay location 1 2 3 4 5 6

Component	Quantity	Details	Base or optional feature
Workstation blade	1	Workstation blade with Intel™ Xeon processor	Base
Video graphics adapter	1	☐ NVIDIA Quadro FX 1600M ☐ NVIDIA Quadro NVS 120M ☐ Video pass-through	Base
Memory slots 1 and 2	2	☐ 512 MB ☐ 1 GB ☐ 2 GB	Base
Memory slots 3 and 4	2	☐ 512 MB ☐ 1 GB ☐ 2 GB	Optional
SATA internal hard disk drive	1	☐ 60 GB	Optional

Table 11. BladeCenter HS20 blade server worksheet

Blade server model: _____ Blade server purpose: _____ _____ _____ Operating system: _____ OS installation option: ☐ Preloaded ☐ Deployed through network management ☐ Manual install with product CD. Blade server IP information: ☐ Automatic through DHCP server ☐ Static: Host name _____ Subnet mask _____._____.___._____ IP address _____._____.___._____ Gateway address _____._____.___._____	Connects to I/O module I/O bay 1 _____ I/O bay 2 _____ I/O bay 3 _____ I/O bay 4 _____ Boot sequence: ___ Internal hard disk drive ___ Integrated storage drive ___ CD-ROM ___ Network Applications: 1. _____ 2. _____ 3. _____

BladeCenter S chassis blade bay location 1 2 3 4 5 6

Component	Quantity	Details	Base or optional feature
Blade server	1	Blade server with Intel™ Xeon processor	Base with either two 256 or 512 MB memories
Second processor	1	Xeon DP	Optional
Memory slots 1 and 2	2	☐ 256 MB ☐ 512 MB ☐ 1 GB ☐2 GB	Base
Optional memory choices for slots 3 and 4	2	☐ 512 MB ☐ 1 GB ☐ 2 GB	Two 256 or 512 MB base memory
EIDE hard disk drives	1 or 2	40 GB ATA 100; 5400 RPM	Optional (not supported for NEBS environment)
IDE Flash disk drive	1 or 2	☐ 1 GB ☐ 2 GB ☐ 4 GB	Optional
I/O Expansion option	1 or 2	☐ Ethernet ☐ Fibre Channel ☐ SAS	Optional
SCSI Storage Expansion option	1	Supports two additional hot-swapped SCSI hard disk drives	Optional
SCSI hard disk drive	1 or 2		Optional
PCI I/O Expansion option	1	Supports two PCI-X adapters	Optional
PCI-X adapter 1			Optional
PCI-X adapter 2			Optional

Table 12. BladeCenter HS21 blade server worksheet

Blade server model: _____ Blade server purpose: _____ _____ _____ Operating system: _____ OS installation option: ☐ Preloaded ☐ Deployed through network management ☐ Manual install with product CD. Blade server IP information: ☐ Automatic through DHCP server ☐ Static: Host name _____ Subnet mask _____._____.___._____ IP address _____._____.___._____ Gateway address _____._____.___._____	Connects to I/O module I/O bay 1 _____ I/O bay 2 _____ I/O bay 3 _____ I/O bay 4 _____ Boot sequence: ___ Internal hard disk drive ___ Integrated storage drive ___ CD-ROM ___ Network Applications: 1. _____ 2. _____ 3. _____

BladeCenter S chassis blade bay location 1 2 3 4 5 6

Component	**Quantity**	**Details**	**Base or optional feature**
Blade server	1	Blade server with Intel™ Xeon processor	Base
Second processor	1	Xeon processor	Optional
Memory slots 1 and 2	2	☐ 512 MB ☐ 1 GB ☐ 2 GB ☐ 4 GB	Base
Optional memory choices slots 3 and 4	2	☐ 512 MB ☐ 1 GB ☐ 2 GB ☐ 4 GB	Optional
cKVM feature		☐ cKVM card	Optional
SAS internal hard disk drive	1	☐ 36 GB ☐ 73 GB ☐ 146 GB	Optional
Storage and I/O Expansion blade	1	Supports three additional hot-swapped SAS hard disk drives	Optional
I/O Expansion option	1 or 2	☐ Ethernet ☐ Fibre Channel ☐ SAS	Optional

Table 13. BladeCenter HS21 XM blade server worksheet

Blade server model: _____ Blade server purpose: _____ _____ _____ Operating system: _____ OS installation option: ☐ Preloaded ☐ Deployed through network management ☐ Manual install with product CD. Blade server IP information: ☐ Automatic through DHCP server ☐ Static: Host name _____ Subnet mask _____._____.___._____ IP address _____._____.___._____ Gateway address _____._____.___._____	Connects to I/O module I/O bay 1 _____ I/O bay 2 _____ I/O bay 3 _____ I/O bay 4 _____ Boot sequence: ___ Internal hard disk drive ___ Integrated storage drive ___ CD-ROM ___ Network Applications: 1. _____ 2. _____ 3. _____

BladeCenter S chassis blade bay location 1 2 3 4 5 6

Component	Quantity	Details	Base or optional feature
Blade server	1	Blade server with Intel™ Xeon processor	Base
Second processor	1	Xeon processor	Optional
Memory slots 1 and 2	2	☐ 512 MB ☐ 2 GB ☐ 1 GB ☐ 4 GB	Base
Optional memory choices slots 3 and 4	2	☐ 512 MB ☐ 2 GB ☐ 1 GB ☐ 4 GB	Optional
Optional Memory slots 5 and 6	2	☐ 512 MB ☐ 2 GB ☐ 1 GB ☐ 4 GB	Optional
Optional memory choices slots 7 and 8	2	☐ 512 MB ☐ 2 GB ☐ 1 GB ☐ 4 GB	Optional
cKVM feature		☐ cKVM card	Optional
Modular flash drive	1	☐ 4 GB	Optional
SAS internal hard disk drive	1	☐ 36 GB ☐ 73 GB ☐ 146 GB ☐ 15 GB (solid state)	Optional
I/O Expansion option	1 or 2	☐ Ethernet ☐ Fibre Channel ☐ SAS	Optional

Table 14. BladeCenter LS20 blade server worksheet

Blade server model: _____ Blade server purpose: _____ _____ _____ Operating system: _____ OS installation option: ☐ Preloaded ☐ Deployed through network management ☐ Manual install with product CD. Blade server IP information: ☐ Automatic through DHCP server ☐ Static: Host name _____ Subnet mask _____._____.___._____ IP address _____._____.___._____ Gateway address _____._____.___._____	Connects to I/O module I/O bay 1 _____ I/O bay 2 _____ I/O bay 3 _____ I/O bay 4 _____ Boot sequence: ___ Internal hard disk drive ___ Integrated storage drive ___ CD-ROM ___ Network Applications: 1. _____ 2. _____ 3. _____

BladeCenter S chassis blade bay location 1 2 3 4 5 6

Component	**Quantity**	**Details**	**Base or optional feature**
Blade server	1	Blade server with AMD Opteron processor	Base
Second processor	1	AMD Opteron processor	Optional
Memory slots 1 and 2	2	☐ 512 MB ☐ 1 GB ☐ 2 GB ☐ 4 GB	Base
Optional memory choices slots 3 and 4	2	☐ 512 MB ☐ 1 GB ☐ 2 GB ☐ 4 GB	Optional
SCSI internal hard disk drive	1 or 2	☐ 36 GB ☐ 73 GB	Optional
I/O Expansion option	1 or 2	☐ Ethernet ☐ Fibre Channel ☐ SAS	Optional

Table 15. BladeCenter LS21 blade server worksheet

Blade server model: _____ Blade server purpose: _____ _____ _____ Operating system: _____ OS installation option: ☐ Preloaded ☐ Deployed through network management ☐ Manual install with product CD. Blade server IP information: ☐ Automatic through DHCP server ☐ Static: Host name _____ Subnet mask _____._____.___._____ IP address _____._____.___._____ Gateway address _____._____.___._____	Connects to I/O module I/O bay 1 _____ I/O bay 2 _____ I/O bay 3 _____ I/O bay 4 _____ Boot sequence: ___ Internal hard disk drive ___ Integrated storage drive ___ CD-ROM ___ Network Applications: 1. _____ 2. _____ 3. _____

BladeCenter S chassis blade bay location 1 2 3 4 5 6

Component	Quantity	Details	Base or optional feature
Blade server	1	Blade server with AMD Opteron processor	Base
Second processor	1	AMD Opteron processor	Optional
Memory slots 1 and 2	2	☐ 512 MB ☐ 2 GB ☐ 1 GB ☐ 4 GB	Base
Optional memory choices slots 3 and 4	2	☐ 512 MB ☐ 2 GB ☐ 1 GB ☐ 4 GB	Optional
Memory slots 5 and 6	2	☐ 512 MB ☐ 2 GB ☐ 1 GB ☐ 4 GB	Optional
Optional memory choices slots 7 and 8	2	☐ 512 MB ☐ 2 GB ☐ 1 GB ☐ 4 GB	Optional
cKVM feature		☐ cKVM card	Optional
SAS internal hard disk drive	1	☐ 36 GB ☐ 73 GB ☐ 146 GB	Optional
Storage and I/O Expansion blade	1	Supports three additional hot-swapped SAS hard disk drives	Optional
I/O Expansion option	1 or 2	☐ Ethernet ☐ Fibre Channel ☐ SAS	Optional

Table 16. BladeCenter LS41 blade server worksheet

Blade server model: _____ Blade server purpose: _____ _____ _____ Operating system: _____ OS installation option: ☐ Preloaded ☐ Deployed through network management ☐ Manual install with product CD. Blade server IP information: ☐ Automatic through DHCP server ☐ Static: Host name _____ Subnet mask _____._____.___._____ IP address _____._____.___._____ Gateway address _____._____.___._____	Connects to I/O module I/O bay 1 _____ I/O bay 2 _____ I/O bay 3 _____ I/O bay 4 _____ Boot sequence: ___ Internal hard disk drive ___ Integrated storage drive ___ CD-ROM ___ Network Applications: 1. _____ 2. _____ 3. _____

BladeCenter S chassis blade bay location 1 2 3 4 5 6

Component	Quantity	Details	Base or optional feature
Blade server	1	Blade server with AMD Opteron processor	Base
Second processor	1	AMD Opteron processor	Optional
Memory slots 1 and 2	2	☐ 512 MB ☐ 2 GB ☐ 1 GB ☐ 4 GB	Base
Optional memory choices slots 3 and 4	2	☐ 512 MB ☐ 2 GB ☐ 1 GB ☐ 4 GB	Optional
Memory slots 5 and 6	2	☐ 512 MB ☐ 2 GB ☐ 1 GB ☐ 4 GB	Optional
Optional memory choices slots 7 and 8	2	☐ 512 MB ☐ 2 GB ☐ 1 GB ☐ 4 GB	Optional
cKVM feature		☐ cKVM card	Optional
SAS internal hard disk drive	1	☐ 36 GB ☐ 73 GB ☐ 146 GB	Optional
Storage and I/O Expansion blade	1	Supports three additional hot-swapped SAS hard disk drives	Optional
Multiprocessor Expansion Unit	1	Supports additional processors and memory	Optional
I/O Expansion option	1 or 2	☐ Ethernet ☐ Fibre Channel ☐ SAS	Optional

BladeCenter S Type 8886 installation worksheet

Use this worksheet to plan for the BladeCenter S system location in the rack and to determine the rack weight.

When completed, the worksheet provides a total weight for up to six blade servers in the BladeCenter S chassis. Each worksheet applies to one 8886 BladeCenter S unit. Fill out a worksheet for each BladeCenter S chassis in the rack.

1. Before you can complete this worksheet, fill out an installation worksheet for each blade server (1 to 6) that you plan to install in this chassis. See "Blade server and workstation blade installation worksheet" on page 63.
2. Circle the 8886 BladeCenter S number and the BladeCenter S position in the rack.
3. Circle how many power modules are required for this BladeCenter S unit.

   Note: Four power modules on four 220-volt ac circuits provide the most power. See "Power consumption guidelines" on page 25 for more information about component power consumption and how to provide redundant power.
4. Compute and record **Subtotal 1** for the weight of these components.
5. For each blade server (1 through 6), record the weight numbers from the blade server worksheets.
6. Compute and record **Subtotal 2** for blade servers 1 through 6.
7. Record the subtotals for weight on the bottom of the worksheet. Add the subtotals to derive the total weight for this BladeCenter S unit.

Note: The fully configured weight of a BladeCenter S system with blade servers is approximately 108.86 kg (240 lbs).

Table 17. BladeCenter S Type 8886 worksheet

Rack position (BladeCenter S system is 7 U): U___ to U___
Rack number and location: _____

Component	Quantity	Weight	Base or optional feature
Chassis	1	35.38 kg (78 lb)	Base (including bezel) without modules or fillers
Power modules	2 or 4	Quantity × 1.86 kg (4.1 lb) = ___	Modules 1 and 2 are base. Modules 3 and 4 are required for more power.
Power module fillers	2 or 0	Quantity x .19 kg (.42 lb)	Base
Advanced management module	1	.82 kg (1.79 lb)	Base
I/O modules	4 maximum	Quantity × 1.5 kg (3.3 lb) = _____	Optional
I/O bay fillers	3 maximum	Quantity x .33 kg (.72 lb) = _____	Optional
Fan modules	4	4.09 kg (9.02 lb)	Base (includes all four fan modules)
Media tray	1	4.12 kg (9.07 lb)	Base
Serial Pass-Thru Module	1	.59 kg (1.31 lb)	Optional
Storage module	2	Quantity x 3.24 kg (7.15 lb) = _____	Optional

Table 17. BladeCenter S Type 8886 worksheet (continued)

Hard disk drive	12	Quantity x .91 kg (2.0 lb) = _____	Optional
Hard disk drive filler	12	Quantity x .043 kg (.095 lb) = _____	Optional
Subtotal 1 for chassis worksheet		_____	
Blade servers	6	Quantity x 5.5 kg (12 lb) = _____	Optional
Blade fillers	5	Quantity x .15 kg (.330 lb) = _____	Base
Subtotal 2 for blade servers 1 through 6		_____	
Subtotal 1 (Chassis) **Subtotal 2 (Blades)** **Total**		**Subtotal 1**_____ **Subtotal 2**_____ **==========** **Total**_____	

Rack installation worksheet

Use this worksheet to plan for the rack location of each BladeCenter S system and compute the total weight for the BladeCenter S systems and other hardware.

Each BladeCenter S chassis is seven rack units (7 U). You can install up to six BladeCenter S chassis in a 42U rack.

Fill out one worksheet for each rack.

1. Record the weight totals for each BladeCenter S system in this rack from the "BladeCenter S Type 8886 installation worksheet" on page 71.
2. Record the weight totals for other units in this rack from the "BladeCenter S Type 8886 installation worksheet" on page 71.
3. Record **Subtotal 1** for the weight.
4. Compute the weight of the rack-mounting kits and record it on the worksheet.
5. Compute the weight of the power distribution units and cables and record them on the worksheet.
6. Record **Subtotal 2** on the worksheet.
7. Add **Subtotal 1** and **2** to obtain the total rack load and record it on the worksheet.
8. Select a rack and circle the matching rack weight on the worksheet. **Verify that the weight load entered in the previous step does not exceed the weight limit for the rack**.
9. Add the rack weight to the total rack load and record it on the worksheet. **Verify that this weight does not exceed the floor load limits of the location where the rack is being installed.**

Table 18. Rack worksheet

Component	Number	Quantity	Weight
BladeCenter S systems	1	1	_____
BladeCenter S systems or others	2	1	_____
BladeCenter S systems or others	3	1	_____
BladeCenter S systems or others	4	1	_____
BladeCenter S systems or others	5	1	_____
BladeCenter S systems or others	6	1	_____
			Subtotal 1 _____
Rack-mounting kits		1 2 3 4 5 6	Quantity = ___
PDUs			Quantity = ___
Cables			Quantity = ___
			Subtotal 2 _____

Table 18. Rack worksheet (continued)

Component	Number	Quantity	Weight
Total Rack Load			**Subtotal 1 _____** **Subtotal 2 _____** **==========** **Total _____**
☐ NetBAY 42 enterprise rack ☐ NetBAY 42 enterprise expansion rack ☐ NetBAY 42 standard rack ☐ NetBAY 42 standard expansion rack ☐ NetBAY 25 standard rack ☐ NetBAY 11 standard rack			261 kg (575 lb) 235 kg (516 lb) 137 kg (301 lb) 105 kg (231 lb) 94 kg (207 lb) 34 kg (75 lb)
Total floor load			**Rack weight_____** **Total rack load _____** **==========** **Total floor load _____**

Cabling worksheet

Use this worksheet to plan for the external network cables to attach the advanced management module and Ethernet switch modules to external networks.

Fill out one worksheet for each BladeCenter S system.

On this worksheet, record:
1. The BladeCenter S chassis number (1 through 6)
2. The BladeCenter S chassis location in the rack (starting U through ending U)
3. The rack number and location
4. The **From port:** and **To:** connections.

Table 19. Cabling worksheet

BladeCenter S chassis number: ___ **Location in rack (1 through 5): starts at U ___ and ends at U ___** **Rack number and location: _____**		
Component	**From port:**	**To:**
Advanced management module (10/100 Mbps)	1	
Ethernet switch module - Bay 1. Fill in the appropriate number of ports based on whether you are using an Ethernet switch module or a copper pass-thru module	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	

Power worksheet

Use this worksheet to determine your power budget for the BladeCenter S system.

1. Record the wattage for each of the devices that you will install in the BladeCenter S chassis.

Management policy

Number of power modules installed: _____

Power source: ___ 110 V ac __ 220 V ac

Management policy to be used:

Table 20. Power management policy

	AC power source redundancy
	AC power source redundancy with blade throttling allowed
	Power module redundancy
	Power module redundancy with blade throttling allowed
	Non-redundant

See "Power management policies" on page 26 for a description of these policies.

Power consumption of BladeCenter S chassis components

Table 21. Power consumption

Component	Maximum Watts	Installed
Midplane	5W	Yes
Media tray	15W	Yes
Fans (four)	280W	Yes
Advanced management module	25W	Yes
Power modules 1 and 2	24W	Yes
Power modules 3 and 4	24W	
I/O module	45W	
SAS connectivity module	65W	
SAS connectivity module	65W	
Storage module	120W	
Storage module	120W	
Blade server bay 1		
Blade server bay 2		
Blade server bay 3		
Blade server bay 4		
Blade server bay 5		
Blade server bay 6		
Total wattage		

See “Power allocation guidelines” on page 27 to ensure that the total wattage meets the power allocation guidelines for the power policy that you are using.

Use the IBM System x and BladeCenter Power Configurator at http://www-03.ibm.com/systems/bladecenter/powerconfig/ to assist in planning for power.

Appendix B. Configuration planning worksheets

Use the configuration planning worksheets to gather the information that you will need to configure the components in the BladeCenter S chassis.

Advanced management module configuration worksheet

Use this worksheet to gather information for configuring the advanced management module.

For more information, see "Planning for advanced management module configuration" on page 45.

See the *Advanced management module Installation Guide* for more information about configuring the advanced management module.

General settings

Setting	Value
Advanced management module name	
Contact name	
Date and Time	Date: _____ Time: _____ __ Daylight Savings Time __ Use NTP server: Server Hostname/IP address: _____ Update frequency (in minutes): _____ NTP v3 authentication: ___ Enabled ___ Disabled Key index: ____ Key: _____
Trespass warning	___ Enabled ___ Disabled Text:

Login profiles

Login ID	Password	Role	Access scope

Login ID	Password	Role	Access scope

SNMP v3 user profile

Login profile ID	Context name	Authentication protocol	Privacy protocol	Access type
		___ None ___ MDA ___ SHA	___ None ___ DES ___ AES Privacy password: __________	___ Get ___ Set ___ Trap Trap hostname/IP: _________________
		___ None ___ MDA ___ SHA	___ None ___ DES ___ AES Privacy password: __________	___ Get ___ Set ___ Trap Trap hostname/IP: _________________
		___ None ___ MDA ___ SHA	___ None ___ DES ___ AES Privacy password: __________	___ Get ___ Set ___ Trap Trap hostname/IP: _________________
		___ None ___ MDA ___ SHA	___ None ___ DES ___ AES Privacy password: __________	___ Get ___ Set ___ Trap Trap hostname/IP: _________________
		___ None ___ MDA ___ SHA	___ None ___ DES ___ AES Privacy password: __________	___ Get ___ Set ___ Trap Trap hostname/IP: _________________
		___ None ___ MDA ___ SHA	___ None ___ DES ___ AES Privacy password: __________	___ Get ___ Set ___ Trap Trap hostname/IP: _________________
		___ None ___ MDA ___ SHA	___ None ___ DES ___ AES Privacy password: __________	___ Get ___ Set ___ Trap Trap hostname/IP: _________________

Login profile ID	Context name	Authentication protocol	Privacy protocol	Access type
		___ None ___ MDA ___ SHA	___ None ___ DES ___ AES Privacy password: __________	___ Get ___ Set ___ Trap Trap hostname/IP: ________________
		___ None ___ MDA ___ SHA	___ None ___ DES ___ AES Privacy password: __________	___ Get ___ Set ___ Trap Trap hostname/IP: ________________
		___ None ___ MDA ___ SHA	___ None ___ DES ___ AES Privacy password: __________	___ Get ___ Set ___ Trap Trap hostname/IP: ________________
		___ None ___ MDA ___ SHA	___ None ___ DES ___ AES Privacy password: __________	___ Get ___ Set ___ Trap Trap hostname/IP: ________________
		___ None ___ MDA ___ SHA	___ None ___ DES ___ AES Privacy password: __________	___ Get ___ Set ___ Trap Trap hostname/IP: ________________

Account Security

____ Legacy security

____ High security

____ Custom security

Custom security setting	
User login password required	___ Yes ___ No
Password expiration period	
Minimum password reuse cycle	
Minimum password change interval	
Maximum number of login failures	
Lockout period after maximum login failures	
Complex password rules	
Minimum different characters in passwords	

Custom security setting	
Require change to Factory default USERID account password at next login	___ Yes ___ No
User must change password on first login	___ Yes ___ No
Inactivity alert period	
Inactivity alert and disable period	

Alerts

Remote alert recipients			
Receives critical alerts only			
	Status		
	Notification method: ___ SNMP - hostname: _____ ___ E-mail - address: _____ ___ IBM Director - hostname: _____		
Global remote alert settings			
Remote alerts retry limit			
Delay between retries			
Include event log with e-mail alerts			___ Yes ___ No
Alerts to be monitored			
	Critical alerts	**Warning alerts**	**Informational alerts**
Chassis/System Management			
Cooling devices			
Power modules			
Blade servers			
I/O modules			
Event log			
Power On/Off			
Inventory change			
Network change			
User activity			

Serial port

Baud rate	
Parity	
Stop bits	

Port assignments

Table 22. User-configurable advanced management module ports

Port name	Default port number	Port number	Description
HTTP	80		Port used for Web server HTTP connection using UDP
HTTPS	443		Port used for SSL connection using TCP
Telnet	23		Port used for the Telnet command-line interface connection
SSH	22		Port used for the Secure Shell (SSH) command-line interface connection
SNMP Agent	161		Port used for SNMP get/set commands using UDP
SNMP Traps	162		Port used for SNMP traps using UDP
FTP	21		Port used for the listen port of the management-module FTP server.
FTP Data	20		Port used for the data port of the management-module FTP server.
TFTP	69		Port used for the management-module TFTP server.
SLP	427		Port used for the UDP Service Location Protocol (SLP) connection
Remote Disk	1044		Port used for the advanced management module remote disk server.
Remote Disk-On-Card	1045		Port used for the management-module remote disk-on-card server.
Storage Description Server	1046		Port number for the management-module storage description server.
Remote KVM	3900		Port used for the management-module remote KVM server.
TCP command mode	6090		Port used for IBM Director commands using TCP/IP. **Note:** IBM Director might not be able to locate the advanced management module if this port number is changed.
SMASH command-line processor	50023		Port used for the management-module SMASH command-line protocol over Telnet.
Secure SMASH command-line processor	50022		Port used for the management-module secure SMASH command-line protocol over SSH.

External network interface

DHCP	__ DHCP with rollover to static __ DHCP only __ Static IP only
Host name	
Static IP configuration (configure only if DHCP is disabled)	
IP address	_____._____._____._____
Subnet mask	_____._____._____._____
Gateway IP address	_____._____._____._____

I/O module IP Configuration

Note: At the time of the BladeCenter S Type 8886 announcement and general availability, IBM does not support a switch module for I/O module bay 2. Contact your IBM sales representative or see the BladeCenter support Web site at http://www.ibm.com/jct01004c/systems/support/supportsite.wss/brandmain?brandind=5000020 to determine when a supported I/O module will be available.

I/O module bay 1	
IP address (default is 192.168.70.127)	_____._____._____._____
Subnet mask	_____._____._____._____
Gateway IP address	_____._____._____._____
I/O module bay 2	
IP address (default is 192.168.70.128)	_____._____._____._____
Subnet mask	_____._____._____._____
Gateway IP address	_____._____._____._____
I/O module bay 3	
IP address (default is 192.168.70.129)	_____._____._____._____
Subnet mask	_____._____._____._____
Gateway IP address	_____._____._____._____
I/O module bay 4	
IP address (default is 192.168.70.130)	_____._____._____._____
Subnet mask	_____._____._____._____
Gateway IP address	_____._____._____._____

Network protocols

SNMP	
SNMPv1 agent	__ Enable ___ Disable
SNMPv3 agent	__ Enable ___ Disable **Note:** If you enable the SNMPv3 agent, you must configure SNMPv3 settings for active login profiles in order for the interaction between the SNMPv3 manager and SNMPv3 agent to work properly.
SNMP traps	__ Enable ___ Disable

SNMPv1 community	Name: _____
	Access Type: ___Get ___ Set ___Trap
	Host name or IP address (up to 3):
SNMPv1 community	Name: _____
	Access Type: ___Get ___ Set ___Trap
	Host name or IP address (up to 3):
SNMPv1 community	Name: _____
	Access Type: ___Get ___ Set ___Trap
	Host name or IP address (up to 3):
SNMPv1 community	Name: _____
	Access Type: ___Get ___ Set ___Trap
	Host name or IP address (up to 3):
SMTP	
Host name (or IP address)	
LDAP	
LDAP server locations	Use DNS to find LDAP servers: Domain source: _____ Search domain: _____ Service name: _____
	Use pre-configured LDAP servers: Host name or IP address (and port): _____ Host name or IP address (and port): _____ Host name or IP address (and port): _____

Parameters	Root DN: _____
	UID search attribute: _____
	Binding method: _____ Client DN: _____ Password: _____
	Enhanced role-based security for Active Directory users: ___ Enabled ___ Disabled Group filter: _____ Group search attribute: _____ Login permission attribute: _____
DNS	
DNS DNS Server IP address 1	__ Enable ___ Disable _____._____._____._____
DNS Server IP address 2	_____._____._____._____
DNS Server IP address 3	_____._____._____._____
TCP command mode	
Command mode sessions	Number of sessions (1-5): _____
Session timeout	Timeout in seconds (0-4294967295): _____ **Note:** Use 0 if you do not want the session to ever time out.
SLP	
SLP address type	___ Multicast ___ Broadcast
Multicast IP address	
FTP	
FTP server	__ Enable ___ Disable
FTP idle timeout	
TFTP	
TFTP server	__ Enable ___ Disable
Remote Control	
Remote disk	__ Enable ___ Disable
Remote disk on card	__ Enable ___ Disable
Remote video (KVM)	__ Enable ___ Disable
SMASH CLP	
SMASH CLP	__ Enable ___ Disable
Secure SMASH CLP	__ Enable ___ Disable
Syslog Protocol	
Filtering level	___ Information ___ Error ___Warning
Collector hostname/IP address	1. _____ 2. _____

Security

Data encryption	___ Enable ___ Disable **Important:** If you enable data encryption, the only way to disable it is to reset the advanced management module to the factory defaults.
Secure Sockets Layer (SSL)	___ Enable ___ Disable
Secure Shell server (SSH)	___ Enable ___ Disable SSH version: _____

SAS connectivity module configuration worksheet

Use this worksheet to plan for integrated shared storage configuration by assigning hard disk drives to blade servers and blade servers to external ports on the SAS connectivity modules.

SAS connectivity module settings

Table 23. Settings for SAS connectivity modules

	I/O Bay 3	**I/O Bay 4**
Nickname		
TCP Ports: Administration (6641) Event (6642) Firmware download (6643)	☐ Use defaults Administration: _____ Event: _____ Firmware: _____	☐ Use defaults Administration: _____ Event: _____ Firmware: _____
NTP Server IP address		

Zone the SAS storage by assigning hard disk drives to blade servers and blade servers to external ports on the SAS connectivity modules. If you are going to mirror drives between storage modules, consider assigning the same hard disk drive or hard disk drives in each storage module to a specific blade server, depending on your zoning configuration.

Table 24. SAS Zoning planning worksheet

Resource	**Blade server name**					
	1	**2**	**3**	**4**	**5**	**6**
Storage module 1						
HD 1						
HD 2						
HD 3						
HD 4						
HD 5						
HD 6						

Table 24. SAS Zoning planning worksheet (continued)

Resource	Blade server name					
	1	**2**	**3**	**4**	**5**	**6**
Storage module 2						
HD 1						
HD 2						
HD 3						
HD 4						
HD 5						
HD 6						
SAS connectivity module - I/O Bay 3						
Port 1						
Port 2						
Port 3						
Port 4						
SAS connectivity module - I/O Bay 4						
Port 1						
Port 2						
Port 3						
Port 4						

Predefined configuration #: _____

User defined configuration #: _____

Configuration name: _____

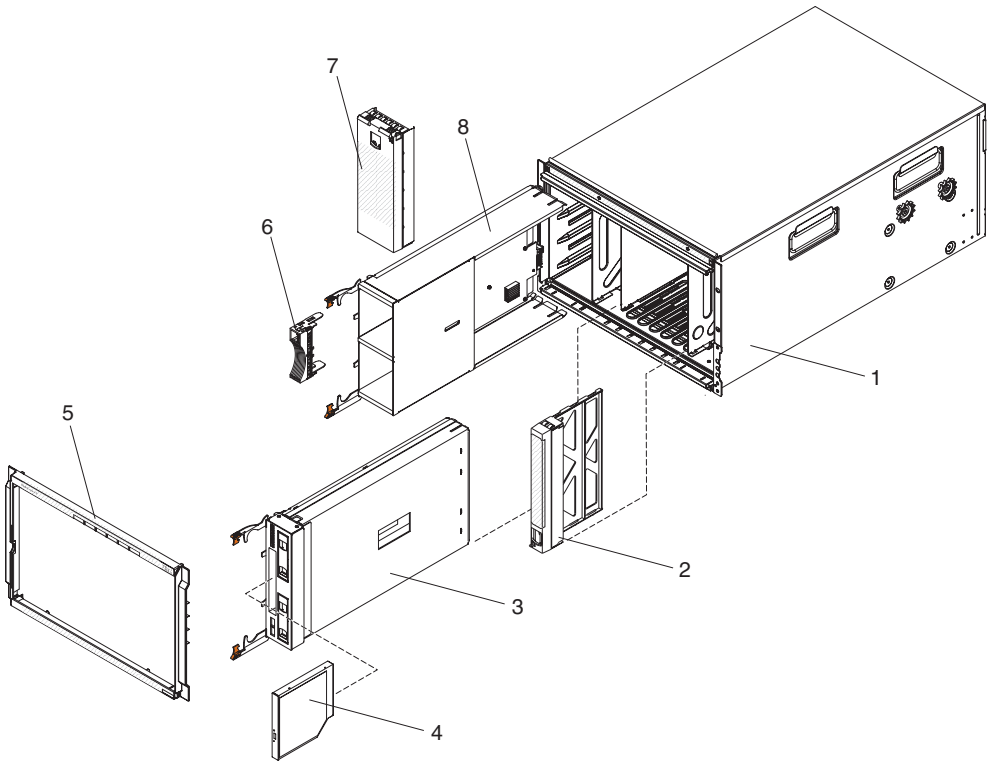
Appendix C. Parts listing

These illustrations identify the replaceable components that are available for the BladeCenter S Type 8886 unit.

- **Tier 1 customer replaceable unit (CRU).** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit.** You can install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designed for your computer.
- **Field replaceable unit (FRU).** FRUs must be installed only by trained service technicians.

Front view parts listing

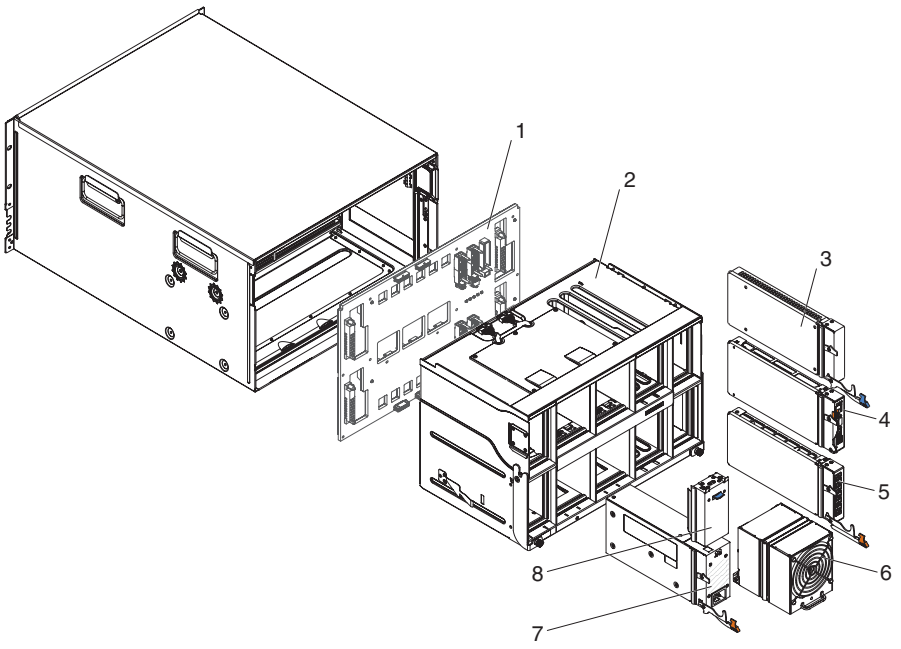
The front of the BladeCenter S Type 8886 contains components such as the media tray and bays for storage modules and blade servers.



Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Chassis shell (without shuttle)			44E8050
2	Filler, blade server	39M3317		
3	Media tray	44E8052		
4	DVD-ROM	43W4603		
5	Bezel	44E8055		
6	Filler, hard disk drive	39M4375		
7	Filler, storage module	44E8060		
8	Storage module	44E8057		

Rear view parts listing

The rear of the 8886 BladeCenter unit contains components such as the management module, fan modules, and I/O modules.



Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Midplane			43W3631
2	Shuttle (with card and cable assembly)			44E8051
3	Filler, I/O module	25R9934		
4	Advanced management module	39Y9661		
5	Serial pass-thru module		44E8054	
6	Fan module	44E8053		
7	Power supply	39Y7367		

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
8	Filler, power supply	44E8059		
	Cable, fan module to midplane			44E8061
	Miscellaneous parts kit			44E8062
	Kit, rack		39M3256	

Power cords

Several power cords are available, depending on the location in the world where the cord will be used.

The following table lists the power cord part numbers. Each option part number includes two country-specific power cords and two PDU power cords.

Note: All power cords are 4.3 meters long.

Table 25. Power cord option part numbers

Option part number	Description	Country
40K9766	Power cord, 220 V, 16 A	Europe, France, Germany
40K9767	Power cord, 220 V, 13 A	United Kingdom
40K9768	Power cord, 220 V, 16 A	Chile, Italy
40K9769	Power cord, 220 V, 16 A	Denmark
40K9770	Power cord, 220 V, 16 A	South Africa, Sri Lanka, Nepal
40K9771	Power cord, 220 V, 16 A	Israel
40K9772	Power cord, 220 V, 20 A, locking	United States
40K9773	Power cord, 220 V, 15 A	Australia, New Zealand
40K9774	Power cord, 220 V, 15 A	China
40K9775	Power cord, 110 V, 15 A	Brazil
40K9776	Power cord, 220 V, 15 A	India
41Y9222	Power cord, 110 V, 20 A, locking	United States
41Y9229	Power cord, 110 V, 16 A	Taiwan
41Y9230	Power cord, 220 V, 16 A	Taiwan
41Y9231	Power cord, 220 V, 16 A	Korea
41Y9232	Power cord, 110 V, 15 A	Japan
41Y9233	Power cord, 220 V, 15 A	Japan

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When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for approximately 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from IBM.

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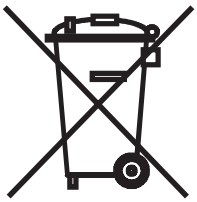

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Battery return program

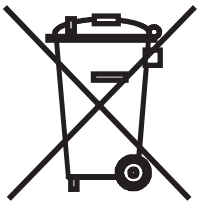
This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly.

Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to http://www.ibm.com/ibm/environment/products/index.shtml or contact your local waste disposal facility.

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

For Taiwan: Please recycle batteries.

For the European Union:



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Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueur dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

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For California:

Perchlorate material – special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

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Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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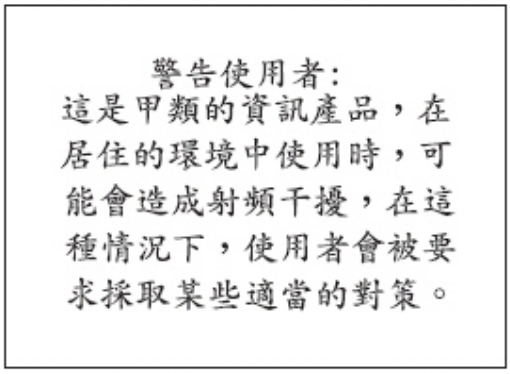
Taiwanese Class A warning statement



Chinese Class A warning statement

声　　明

此为 A 级产品。在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Japanese Voluntary Control Council for Interference (FCS) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

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