IBM

BladeCenter T
Types 8720 and 8730

Planning and Installation Guide

GA27-4339-01

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Note

Before using this information and the product it supports, read the general information in Appendix C, "Notices," on page 121.

Preface

This guide is intended for anyone who plans for the physical installation and configuration of an IBM® BladeCenter® T unit. This book is organized as follows and should be used for these tasks:

- Use Chapter 1, "Introducing the BladeCenter T units," on page 1 to understand the overall purpose and usage of BladeCenter T units and blade servers.
- Use Chapter 2, "BladeCenter T unit components," on page 13 to learn about the physical components that make up a BladeCenter T unit.
- Use Chapter 3, "Deployment considerations," on page 39 to learn about network topology considerations and deployment considerations.
- Use Chapter 4, "Installation considerations," on page 51 and Appendix A, "Planning worksheets," on page 93 to plan for the physical environment for installing BladeCenter T units. This includes space, power, cooling, and cabling requirements. The worksheets provide the basis for selecting the features and options for each blade server, where the blade server is installed in a BladeCenter T unit and a rack location for each BladeCenter T unit.
- Use Chapter 5, "Configuration considerations," on page 79 and Appendix B, "Configuration worksheets," on page 105 to plan for the configuration of the:
  - Management module
  - I/O modules
  - Fibre Channel switch modules
  - Blade servers

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Chapter 1. Introducing the BladeCenter T units

This guide provides physical planning information for the IBM BladeCenter T, Types 8720 and 8730. It describes the BladeCenter T unit components, explains deployment and installation considerations, and provides worksheets that you can use to determine the BladeCenter T unit hardware configuration. From these worksheets, you can determine the configuration, power, weight, and cabling requirements for the BladeCenter T unit. In addition, you can use these worksheets as a basis for placing an order.

Hereinafter, *unit* will refer to both types unless there are specific differences; then, each type will be described separately.

Why choose the BladeCenter T technology?

The IBM BladeCenter T Types 8720 and 8730 are based on the IBM Enterprise X-Architecture™ Technology.[1]

The BladeCenter T unit is a rack-mounted, high-density, high-performance blade-server system developed for Network Equipment Building System (NEBS) telecommunications network applications and other applications requiring additional physical robustness. The BladeCenter T uses blades, switches, and other components that are common to the award-winning IBM BladeCenter product line. This common component strategy makes it ideal for applications in telecommunications networks that need high levels of computer power and access to common off-the-shelf middleware packages otherwise used in IT data centers.

Figure 1 represents the BladeCenter T unit.
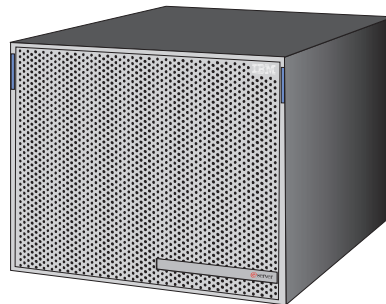
Figure 1. BladeCenter T unit

The BladeCenter T supports up to eight blade servers, making it ideally suited for networking environments that require a large number of high-performance servers in a small amount of space. The BladeCenter T system provides common resources that are shared by the blade servers, such as power, cooling, system management, network connections, and I/O (CD-ROM drive, ports for universal serial bus (USB), keyboard, video, mouse, and network interfaces). The use of common resources enables small size in the blade servers, allows minimal cabling, and eliminates resources sitting idle.

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1. IBM Enterprise X-Architecture Technology takes full advantage of existing IBM technologies to build powerful, scalable, and reliable Intel® processor-based servers. For more information about IBM Enterprise X-Architecture Technology, go to www.ibm.com/servers/ eserver/xseries/xarchitecture/enterprise/.

1

Performance, ease of use, reliability (NEBS3/ETSI compliance), and expansion capabilities were key considerations during the design of the BladeCenter T system. These design features make it possible for you to customize the system hardware to meet your needs today, while providing flexible expansion capabilities for the future.

What the BladeCenter T unit offers

The design of the BladeCenter T unit takes advantage of advances in server technology. It provides up to eight functionally separate servers and their shared resources combined in a single center. The BladeCenter T unit with blade servers has the following features:

- **IBM Enterprise X-Architecture Technology**

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

- **Expansion capabilities**

  Blades can be added to the BladeCenter T unit as needed, up to a maximum of eight blades.

  Note: If any blade server or option is in blade bays 5 through 8 or if an I/O module is in I/O-module bays 3 and 4, power modules must be present in all four power-module bays.

  Some blade servers have connectors for options that can be used to add capabilities to the blade server, such as an I/O expansion card to add a network interface or a storage expansion unit to add SCSI hard disk drives.

- **Hot-swap capabilities**

  The front bays on the BladeCenter T unit are hot-swap blade, power module, and management module bays; the rear bays on the BladeCenter T unit are hot-swap I/O, keyboard, video, and mouse (KVM), LAN, and blower-module bays. You can add, remove, or replace blades servers or power, management, I/O, KVM, LAN, and blower modules in hot-swap bays within specific time limits and without removing power from the BladeCenter T unit.

  Attention: To maintain proper system cooling, each unoccupied bay must contain a filler blade or filler module.

- **Redundancy capabilities**

  The redundant components in the BladeCenter T unit enable continued operation if one of the components fails.

  – Power modules: In normal operation, the redundant power modules provide redundant power feeds to share the system load. If one of the power modules fails, the working power module handles the entire load. You can then replace the failed power module without shutting down the BladeCenter T unit.

  – Blowers: In normal operation, the redundant blower modules share the system load. If one of the blowers fails, the other three working blowers handle the entire load. You can then replace the failed blower without shutting down the BladeCenter T unit.

  – Management module: Only one management module is active at a time. If a second management module has been installed, and the active management module fails, then the secondary (redundant) management module becomes the active management module containing the current BladeCenter T configuration and status information. You can then replace the failed management module without shutting down the BladeCenter T unit.

- – BladeCenter T backplane characteristics: The backplane has the following redundancy characteristics:
  - - Hot-pluggable connectors for the following components:
    - • Eight blades servers
    - • Four I/O modules
    - • Two management modules
    - • Four power supplies
    - • Four blowers
  - - Redundant high-speed serialize/deserialize (SERDES) interconnects between blades and switches
  - - Support for redundant management modules
  - - Redundant 12C communications between the management modules and all modules (except the blade servers)
  - - Redundant RS-485 (EIA 485) communications between management modules and blade servers
  - - Redundant analog video connections from blades to management modules
  - - Redundant USB connections between blades and management modules
  - - Redundant secure Ethernet management port between switches and management modules

- **Redundant network connection capabilities**

  Configuring a pair of Ethernet switch modules in I/O-module bays 1 and 2 provides support for Ethernet failover configured on blade servers. If the I/O expansion options can be configured for failover, configuring a pair of switch modules in I/O-module bays 3 and 4 provides support for the failover configured on the I/O expansion options. See the documentation that comes with your I/O expansion and switch module options for more information about configuring for redundant network connections.

  Note: A system configuration with I/O expansion options in I/O-module bays 3 and 4 requires a unit configuration with power supplies in power-module bays 3 and 4.

  Other network-interface I/O expansion options, such as the IBM BladeCenter T Fibre Channel Expansion Card, can have similar capability for redundant network connections. See the documentation that comes with your I/O expansion module and I/O module options for more information about configuring for redundant network connections.

- **System-management capabilities**

  The BladeCenter T unit comes with a service processor in the management module. This service processor in the management module, the system-management firmware that is provided with the BladeCenter T unit, and the service processor in each blade server, enable you to remotely manage the BladeCenter T unit, its components, and the blade servers. The management module also multiplexes the keyboard, mouse, video ports, and the USB port across all blade servers.

  The service processor in each blade server provides blade server system monitoring, event recording, and alert capability.

- **Network environment support**

  The BladeCenter T unit supports up to two Ethernet-compatible I/O modules (switch modules or pass-through modules), for blade server integrated Ethernet controller communication with the network. Each I/O module provides one internal connection to each blade server, with up to eight internal connections per I/O module. In addition, each Ethernet-compatible I/O module provides four external connections to the user's network infrastructure. These connections support LAGs, VLANs, and other network protocols dependent on the model installed.

  The BladeCenter T unit also supports up to two additional I/O modules for a total of four I/O modules. The two additional I/O modules support the network interface on the optional I/O expansion card installed on one or more blade servers in the BladeCenter T unit.

  Note: The two additional I/O modules must be compatible with the network interface on the optional I/O expansion cards in the blade servers.

  Each of these two additional I/O modules provides one internal connection to the optional I/O expansion card, with up to eight internal connections per I/O module.

Reliability, availability, and serviceability

Three of the most important features in server design are reliability, availability, and serviceability (RAS). These factors help to ensure the integrity of the data stored on the blade server; that the blade server is available when you want to use it; and that should a failure occur, you can easily diagnose and repair the failure with minimal inconvenience.

The BladeCenter T unit has the following RAS features:

- Shared key components, such as power, cooling, backplane, and I/O
- All components serviced from the front or rear of the BladeCenter T unit
- Automatic error retry and recovery
- Automatic restart after a power failure
- Built-in monitoring for blower, power, temperature, and voltage
- Built-in monitoring for module redundancy
- Customer support center 24 hours a day, 7 days a week[2]
- Error codes and messages
- Fault-resistant startup
- Remote system management through the management module
- Remote management module firmware upgrade
- Remote upgrade of blade server service processor microcode
- Built-in self-test (BIST)
- Predictive Failure Analysis (PFA) alerts
- Redundant components
  - Blowers with speed-sensing capability
  - Power modules
  - Management modules
  - I/O modules
- Redundant system features in the backplane
- Hot-swap components
  - Blade servers
  - Blowers with speed-sensing capability
  - I/O modules
  - KVM module
  - LAN module
  - Management module
  - Media tray
  - Power modules
- System automatic inventory at startup
- System error logging

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2. Service availability will vary by country. Response time varies; may exclude holidays.

Features and specifications for the BladeCenter T Type 8720

Table 1 provides a summary of the features and specifications for the BladeCenter T Type 8720 that is a dc-powered system.

Table 1. BladeCenter T Type 8720 features and specifications

Media tray (on front):
- DVD/CD-RW drive: slim IDE
- Two USB V2.0 Full Speed ports
- System-status panel

Module bays (on front):
- Eight hot-swap blade bays
- Four hot-swap power-module bays
- Two hot-swap management-module bays

Module bays (on rear):
- Four hot-swap I/O module bays
- Four hot-swap blower bays
- One hot-swap KVM module
- One hot-swap LAN module

Power modules:
- Standard: Two 1300-watt or greater hot-swap -48 V dc (-48 to -60 V dc) power modules
  - Power modules 1 and 2 supply power to:
    - Blade bays 1 through 4
    - Management modules 1 and 2
    - I/O modules 1 and 2
    - Media tray
    - All KVM, LAN, and alarm interfaces
    - All four blower modules
  - Power modules 1 and 2 provide redundancy to each other
- Maximum: Four 1300-watt or greater hot-swap -48 V dc (-48 to -60 V dc) power modules
  - Power modules 3 and 4 supply power to:
    - Blade bays 5 through 8
    - I/O modules 3 and 4
  - Power modules 3 and 4 provide redundancy to each other
  - Blowers are powered by all four power modules

LAN module:
- Two 10/100-Mbps Ethernet remote management connections
- One DSUB 15P alarm connector

KVM module:
- Video port (analog)
- IBM PS/2® keyboard port
- PS/2 mouse port
- System-status panel

I/O modules:
- Standard: None
- Maximum: Four
  - Two hot-swap 1-GB Ethernet four-port switch modules
  - Two hot-swap switch modules of another network-communication standard, such as Fibre Channel

Management module:
- Standard: One hot-swap management module providing system-management functions for the BladeCenter T unit
- Maximum: Two hot-swap management modules (one active, one redundant)

Redundant cooling:
- Four variable-speed hot-swap blowers

Front bezel with changeable filter

Upgradeable microcode:
- Management-module firmware
- I/O module firmware (not all I/O module types)
- Blade server service processor firmware (BIOS, service processor)

Size (8U):
- Height: 349.25 mm (13.75 in. or 8 U)
- Depth: 508 mm (20 in.) from front of chassis to rear I/O connector plane Maximum depth: 600 mm (23.62 in.) including bezel, handles, and cable bend radius
- Width: 442 mm (17.4 in.)
- Weight:
  - Fully configured with modules and blades: approximately 86.64 kg (191 lb)
  - Fully configured without blades: approximately 44.45 kg (98 lb)

Security features:
- Login password for remote connection
- Secure shell (SSH) for command line interface
- Secure Sockets Layer (SSL) security for remote Web management access

Predictive Failure Analysis (PFA) alerts:
- Blowers
- Blade-dependent features
- Power supplies

Declared acoustical noise emission levels for normal operations:
- Sound-power levels (upper-limit): 7.5 bels
- Sound-pressure levels (average) for four one-meter bystander positions: 59 dBA

The noise emission levels stated are the declared upper limit sound-power levels, in bels, for a random sample of machines. All measurements made in accordance with ISO 7779 and reported in conformance with ISO 9296.

Environment:
- Air temperature:
  - Altitude: -60 to 1800 m (-197 ft to 6000 ft)
    - BladeCenter T on: 5° to 40° C (41° to 104° F)
    - BladeCenter T on (short term): -5° to 55° C (23° to 131° F)
  - Altitude: 1800 m to 4000 (6000 ft to 13000 ft)
    - BladeCenter T on: 5° to 30° C (41° to 86° F)
    - BladeCenter T on (short term): -5° to 45° C (23° to 113° F)
  - System unit off: uncontrolled
- Rate of temperature change: 30° C/hour (54° F/hour)
- Humidity:
  - BladeCenter T unit on: 5% to 85%
  - BladeCenter T on (short term): 5% to 90% not to exceed 0.024 water/kg of dry air
  - BladeCenter T unit off: uncontrolled

Electrical input:
- dc power
- Input voltage: -38 V dc to -75 V dc (-48 V nominal)
- Input current:
  - Chassis: 70 amp maximum
  - Single power-supply feed: 70 amp maximum

Heat output:
- Input kilovolt-amperes (kVA) approximately
  - Minimum configuration: 0.2 kVA
  - Maximum configuration: 3.3 kVA
- BTU output
  - Ship configuration: 673 BTU/hour (197 watts)
  - Full configuration: 11229 BTU/hour (3291 watts)

Features and specifications for the BladeCenter T Type 8730

Table 2 provides a summary of the features and specifications for the BladeCenter T Type 8730 that is an ac-powered system.

Table 2. BladeCenter T Type 8730 features and specifications

Media tray (on front):
- DVD/CD-RW drive: slim IDE
- Two USB V2.0 Full Speed ports
- System-status panel

Module bays (on front):
- Eight hot-swap blade bays
- Four hot-swap power-module bays
- Two hot-swap management-module bays

Module bays (on rear):
- Four hot-swap I/O module bays
- Four hot-swap blower bays
- One hot-swap KVM module
- One hot-swap LAN module

Power modules:
- Standard: Two 1300-watt or greater 220-volt (200-240 V ac) hot-swap power modules
  - Power modules 1 and 2 supply power to:
    - Blade bays through 1 and 4
    - Management modules 1 and 2
    - I/O modules 1 and 2
    - Media tray
    - All KVM, LAN, and alarm interfaces
    - All four blower modules
  - Power modules 1 and 2 provide redundancy to each other
- Maximum: Four 1300-watt or greater 220-volt (200-240 V ac) hot-swap power modules
  - Power modules 3 and 4 supply power to
    - Blade bays 5 through 8
    - I/O modules 3 and 4
  - Power modules 3 and 4 provide redundancy to each other
  - Blowers are powered by all four power modules

LAN module:
- Two 10/100-Mbps Ethernet remote management connections
- One DSUB 15P alarm connector

KVM module:
- Video port (analog)
- PS/2 keyboard port
- PS/2 mouse port
- System-status panel

I/O modules:
- Standard: None
- Maximum: Four
  - Two hot-swap 1-GB Ethernet four-port switch modules
  - Two hot-swap switch modules of another network-communication standard, such as Fibre Channel

Management module:
- Standard: One hot-swap management module providing system-management functions for the BladeCenter T unit
- Maximum: Two hot-swap management modules: one active, one redundant

Redundant cooling:
  Four variable-speed hot-swap blowers

Front bezel with changeable filter

Upgradeable microcode:
- Management-module firmware
- I/O module firmware (not all I/O module types)
- Blade server service processor firmware (BIOS, service processor)

Size (8U):
- Height: 349.25 mm (13.75 in. or 8 U)
- Depth: 508 mm (20 in.) from front of chassis to rear I/O connector plane. Maximum depth: 600 mm (23.62 in.) including bezel, handles, and cable bend radius.
- Width: 442 mm (17.4 in.)
- Weight:
  - Fully configured with modules and blades: approximately 86.64 kg (191 lb)
  - Fully configured without blades: approximately 44.45 kg (98 lb)

Security features:
- Login password for remote connection
- Secure shell (SSH) for command line interface
- Secure socket layer (SSL) security for remote Web management access

Predictive Failure Analysis (PFA) alerts:
- Blowers
- Blade-dependent features
- Power supplies

Declared acoustical noise emission levels for normal operations:
- Sound-power levels (upper-limit): 6.7 bels
- Sound-pressure levels (average) for four one-meter bystander positions: 57 dBA

The noise emission levels stated are the declared upper limit sound-power level, in bels, for a random sample of machines. All measurements made in accordance with ISO 7779 and reported in conformance with ISO 9296.

Environment:
- Air temperature:
  - Altitude: -60 to 1800 m (-197 ft to 6000 ft)
    - BladeCenter T on: 5° to 40° C (41° to 104° F)
    - BladeCenter T on (short term): -5° to 55° C (23° to 131° F)
  - Altitude: 1800 m to 4000 (6000 ft to 13000 ft)
    - BladeCenter T on: 5° to 30° C (41° to 86° F)
    - BladeCenter T on (short term): -5° to 45° C (23° to 113° F)
  - System unit off: uncontrolled
- Rate of temperature change: 30° C/hour (54° F/hour)
- Humidity:
  - BladeCenter T unit on: 5% to 85%
  - BladeCenter T on (short term): 5% to 90% not to exceed 0.024 water/kg of dry air
  - BladeCenter T unit off: uncontrolled

Electrical input:
- Sine-wave input (50 or 60 Hz single-phase) required
- Input voltage:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Input current:
  - Chassis: 18 amp maximum
  - Single power-supply feed: 9 amp

Heat output:
- Input kilovolt-amperes (kVA) approximately
  - Minimum configuration: 0.2 kVA
  - Maximum configuration: 3.1 kVA
- BTU output
  - Ship configuration: 673 BTU/hour (197 watts)
  - Full configuration: 10440 BTU/hour (3060 watts)

Why blade servers?

As organizations look to physically consolidate servers, they are looking to replace bulky server towers with 1U or 2U rack systems. These systems take less space and put the enterprise server infrastructure within easy reach of the administrator. However, these rack systems also introduce certain issues.

Each 1U or 2U server requires its own infrastructure, including power cables, Ethernet or fibre-channel switches, systems management, power distribution units (PDUs), and keyboard/video/mouse (KVM) switches. A rack of 42 1U servers can have hundreds of cables strung throughout the rack, making it difficult to determine where cables are attached and increasing the complexity of adding or removing servers from the rack.

A blade server is a rack-optimized server architecture designed to provide the consolidation benefits of 1U and 2U rack systems while eliminating the complications associated with these systems. A server blade is an independent server containing one or more processors, memory, disk storage, and network controllers. A server blade runs its own operating system and applications.

Each server blade is inserted into a slot at the front of the BladeCenter T unit and connects to the midplane. The midplane provides a connection to shared infrastructure components that include power, blowers, CD-ROM, integrated Ethernet and fibre-channel switches, and the management module.

Blade server benefits

BladeCenter T is a robust, highly available architecture designed to integrate the latest server processors, storage, and networking technology together into the domain of the telecommunications central office and other rugged environments. Benefits of the blade server architecture include:

- Modular scalability. Unlike traditional 8- or 16-way servers, blade servers are designed to scale out rather than up. Adding a new server typically involves simply sliding a new single- or dual-processor blade into an open bay in a BladeCenter T unit. There is no need to physically install and cable individual servers.

  Option modules allow shared infrastructure features, such as Gigabit Ethernet switches and fibre-channel switches, to be included inside the BladeCenter T unit rather than externally attached. Power modules are also integrated into the unit, thus eliminating many of the power cables and power distribution units that conventional servers require. This design along with its support for network attached storage (NAS) and storage area networks (SANs) allows the BladeCenter T to integrate into a scalable storage solution with enhanced manageability features.

- Flexibility. Unlike conventional server designs, the blade design does not impose a limit of only one type of processor per server. Advanced chassis designs with sophisticated cooling and power technologies can support a mix of blades containing different types and speeds of processors. Each blade is a self-contained server, running its own operating system and software. This flexibility eliminates the need for stand alone servers to perform specific functions. You can consolidate your workloads in one BladeCenter T unit, regardless of whether an application requires a high-performance 64-bit processor or a 32-bit processor.

- Performance. You can get the same high-performance processor technologies in the BladeCenter T processor platform as in 1U rack-optimized servers. High

performance and scalability are powered by Intel DP Xeon™ 2W/800 MHz FSB and Intel MP Xeon 4W/400 MHz FSB processors with 533 MHz front-side bus speed. Other high-performance features include high-speed 512 MB Double Data Rate ECC SDRAM memory, featuring optional Chipkill™ memory for reliability, duel Gigabit Ethernet controllers with teaming and failover support, integrated service processor, and connections for SCSI hard disk drives.

- Density. You get double the density versus IBM carrier-grade rack-mount servers at a potentially lower cost. Up to 80 processors can be integrated into an 84-inch Telco rack. Blades can be used for control plane applications such as VoIP/softswitch, transport plane applications such as signalling, wireless and media gateways, service plane applications such as provisioning and network management, and application plane applications such as unified communications, IP centrex, and billing.

- High availability and ease of serviceability. Blade server designs include high-availability features similar to those found in conventional rack servers, such as redundant and hot-swap components (even the hot swapping of the blade servers themselves). Removing a server for maintenance involves simply sliding a blade out of the BladeCenter T unit, which makes a policy of hot-spare servers effective to implement. In addition, you can configure blades to fail over to one another in the event of a failure.

- Systems management and deployment. In blade servers, integrated systems management processors monitor the status of blades and modules all at once. In the event of an alert, the processors can signal the systems management software, which can then notify the administrator by e-mail or pager at any hour of the day or night. In addition, the software is able to run system diagnostics and integrate with enterprise-wide systems management software.

The ability to slide server blades in and out of the BladeCenter T unit makes new server deployment more efficient. When you insert a blade into an open bay, it is connected to all infrastructure components in the BladeCenter T unit. There is typically no need to plug multiple cables into each server as it is installed. For example, instead of having to attach a KVM cable, power cable, Ethernet cable, and systems management cable per server, you need to attach only one of each cable per BladeCenter T unit, which contains multiple servers.

Deployment scenarios

The IBM BladeCenter T unit can be deployed to support a variety of networking goals and environments, such as:

- **Central Office (CO) environment**

  IBM BladeCenter T is ideally suited for telecom or carrier-grade environments that require maximum equipment operability.

- **Server consolidation**

  The IBM BladeCenter T unit can be used by organizations with multiple server locations that need to centralize or physically consolidate servers to increase flexibility, reduce maintenance costs, and reduce human resources.

- **e-business infrastructure**

  The IBM BladeCenter T unit can be used by companies that need to deploy new e-commerce and e-business applications and infrastructure quickly to minimize time to market, while at the same time ensuring flexibility, scalability, and availability.

- **Enterprise infrastructure**

  The IBM BladeCenter T unit can support an enterprise infrastructure through:

File and print: For organizations with decentralized or departmental file and print servers that need to reduce the cost of ownership, increase reliability, and provide flexibility for growth.

Collaboration: For customers needing a cost-effective and reliable corporate solution for e-mail, calendar, and other collaboration capabilities.

- **High-performance computing**

  The IBM BladeCenter T unit can be used by customers with compute-intensive applications needing highly available clustered solutions to achieve significantly higher degrees of scalability and performance, all managed at a low cost.

Where to go for more information

The following publications and Web sites provide additional information about the installation, configuration, and operation of your IBM BladeCenter T unit.

BladeCenter T documentation and operating system installation instructions

Publications available for the BladeCenter T products are listed in the following sections. Unless noted otherwise, all documents are available for download from the IBM Support Web page at www.ibm.com/pc/support/. From this Web page, select **Servers**, then select **Online publications** and choose a machine type of BladeCenter T or BladeCenter T HS20 from the Family drop-down list.

You can obtain up-to-date information about the BladeCenter T unit, blade server, and other IBM server products at www.ibm.com/eserver/xseries/

Hardware documentation

Publications available for BladeCenter T products include:

- *IBM BladeCenter T Products FAQ Hints and Tips*

  This document contains information based on technical observations and is intended to supplement the IBM BladeCenter T publications provided with the BladeCenter T products.

- *IBM BladeCenter T Types 8720 and 8730 Installation and User's Guide*

  This document contains general information about the BladeCenter T Types 8720 and 8730, including information about features, how to configure the BladeCenter T unit, and how to get help.

- *IBM BladeCenter T Types 8720 and 8730 Hardware Maintenance Manual and Troubleshooting Guide*

  This document contains the information to help you solve BladeCenter T problems and information for service technicians.

- *IBM BladeCenter HS20 Type 8832 Installation and User's Guide*

  This document contains instructions for setting up a BladeCenter HS20 Type 8832 blade server and basic instructions for installing options. It also contains general information about the blade server.

- *IBM BladeCenter HS20 Type 8832 Hardware Maintenance Manual and Troubleshooting Guide*

  This document contains the information to help you solve BladeCenter HS20 Type 8832 problems and information for service technicians.

- *IBM BladeCenter HS40 Type 8839 Installation and User's Guide*

  This document contains instructions for setting up a BladeCenter HS40 Type 8839 blade server and basic instructions for installing options. It also contains general information about the blade server.

- *IBM BladeCenter HS40 Type 8839 Hardware Maintenance Manual and Troubleshooting Guide*

  This document contains the information to help you solve BladeCenter HS40 Type 8839 problems and information for service technicians.
- *IBM BladeCenter T 2-Post Rack Installation Instructions*

  This document contains instructions for installing BladeCenter T units in a 2-post rack.
- *IBM BladeCenter T 4-Post Rack Installation Instructions*

  This document contains instructions for installing BladeCenter T units in a 4-post rack.
- *IBM BladeCenter T Advanced Management Module User's Guide*

  This document contains detailed information about the Management Module that comes with the BladeCenter T unit.
- *IBM BladeCenter T Advanced Management Module Installation Guide*

  This document contains instructions for installing the Management Module that comes with the BladeCenter T unit.
- *IBM BladeCenter T 4-Port Fibre Channel Switch Module User's Guide*

  This document contains information about setting up and installing the 4-port Fibre Channel switch module.
- *IBM BladeCenter SCSI Storage Expansion Unit*

  This document contains instructions for installing the optional SCSI storage expansion unit on a blade server.
- *IBM Microprocessor Option*

  This document contains instructions for installing the optional microprocessor in a blade server.
- *IBM BladeCenter T Type 8720 DC Power Supply Modules*

  This document contains instructions for installing the optional dc power supply modules in a BladeCenter T unit.
- *IBM BladeCenter T Type 8730 AC Power Supply Modules*

  This document contains instructions for installing the optional ac power supply modules in a BladeCenter T unit.
- *IBM Director 4.2 Installation and Configuration Guide* and *IBM Director 4.2 Systems Management Guide.*

  These documents are available for download from the IBM Support Web page at http://www.ibm.com/pc/support/. From this Web page, select **Servers**, then select **Online publications** and choose IBM Director from the **Online publications by category** drop-down list. These guides contain instructions for using IBM Director 4.2 to perform installation, configuration, and systems management tasks on the BladeCenter T products.

Redbooks publications

The following publications are available from the IBM Redbooks™ Web site at www.ibm.com/redbooks. From this Web site, search for **BladeCenter**.

- *The Cutting Edge: IBM BladeCenter* (REDP3581): This document contains an introduction to the IBM BladeCenter unit and presents the advantages of blade servers. It also looks at various installation methods that are available and important items to consider before performing an installation.
- *IBM BladeCenter Systems Management* (REDP3582) : This document contains an overview of the IBM BladeCenter management tools and describes the management module integrated Web graphical user interface (GUI).

- *Deploying Citrix Metaframe on IBM BladeCenter* (REDP3583): This document describes the installation, functionality, and advantages of Citrix Metaframe on the HS20 blade server.
- *Deploying Lotus® Domino® on IBM BladeCenter* (REDP3584): This document helps you set up and configure IBM BladeCenter products to run IBM Lotus Domino 6 on Microsoft® Windows® 2000 Advanced Server. It also helps you tune Lotus Domino 6 for better performance while running in an IBM BladeCenter T environment.
- *Deploying Microsoft Exchange on IBM BladeCenter* (REDP3585): This document describes how to set up and configure Microsoft Exchange 2000 on the IBM BladeCenter unit. It also describes BladeCenter functionality in this type of environment.
- *Deploying Apache on IBM BladeCenter* (REDP3588): This document helps you set up and configure IBM BladeCenter products to run Linux® and Apache. It also provides tips on the applications to use for managing the installation.
- *Deploying Samba on IBM BladeCenter* (REDP3595): This document helps you set up and configure IBM BladeCenter products to run Linux and Samba. It also provides tips for managing the installation.

Operating system installation instructions

Instructions for installing operating systems on a blade server are on the IBM Support Web page at www.ibm.com/pc/support/. From the IBM Support Web page select **Servers**; then, select **OS installation** and choose the operating system to install from the Operating system installation by category drop-down list.

Web sites

You can find information about the BladeCenter T unit from this Web site: www.ibm.com/systems/bladecenter/literature/solutions_lit.html

These sites provide information related to installation of the BladeCenter T unit:

- Information about IBM Director is available at this Web site: www.ibm.com/servers/eserver/xseries/systems_management/ibm_director/
- Information about Remote Deployment Manager (RDM) is available at this Web site:

www.ibm.com/servers/eserver/xseries/systems_management/ibm_director/extensions/rdm.html

- Information about IBM Cluster Systems Management (CSM) for Linux is available at this Web site: www.ibm.com/servers/eserver/clusters/software/
- Information about installing Linux is available at this Web site: www.ibm.com/servers/eserver/linux/xseries/
- You can link to configuration tools and information (such as the Rack Configurator and the Configuration Options Guide) from this site: www.ibm.com/pc/us/eserver/xseries/library/configtools
- You can find out about the training offered by IBM for the BladeCenter T unit at this Web site: www.ibm.com/systems/bladecenter/bladet/index.html

Chapter 2. BladeCenter T unit components

Figure 2 shows the locations of major components in the BladeCenter T unit.
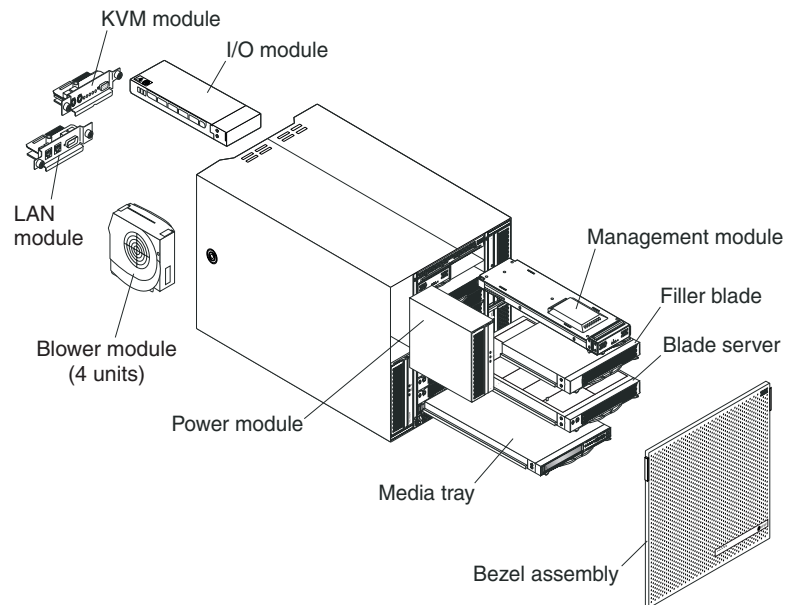
Figure 2. Major BladeCenter T components

Attention: To maintain proper system cooling, each module bay must contain either a module or a filler module, and each blade bay must contain either a blade or a filler blade.

Chassis

The BladeCenter T unit houses all components, including:
* Blade servers
* Management modules
* Power modules
* Blower modules
* I/O modules
* KVM modules
* LAN modules
* Media tray

Front view

Figure 3 identifies the components on the front of the BladeCenter T Types 8720 and 8730 units.
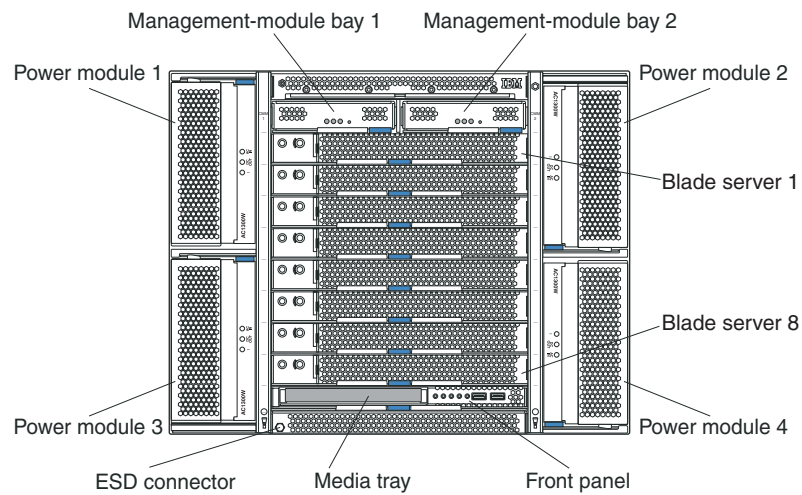
Figure 3. BladeCenter T front view

Rear view of the BladeCenter T unit

Figure 4 identifies the components on the rear of the BladeCenter T unit.
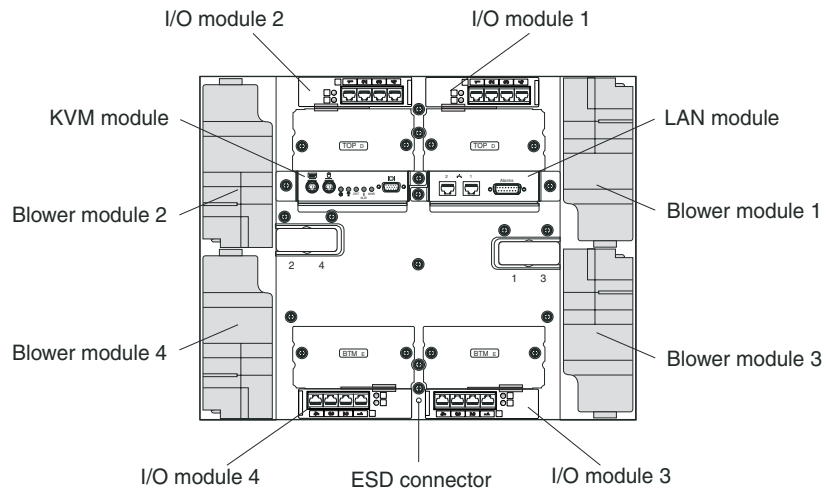
Figure 4. Components on the rear of the BladeCenter T unit

Input/output connectors

The BladeCenter T unit has the following ports:

Video

The BladeCenter T management module contains one standard video connector. The integrated video controller on each blade server is compatible with SVGA and VGA and communicates through this video port. Use this connector to connect a video monitor.

Keyboard

Use this connector to connect an IBM PS/2 keyboard to the BladeCenter T unit.

PS/2 mouse

Use this connector to connect a PS/2 mouse to the BladeCenter T unit.

Two USB connectors on the front of the BladeCenter T unit

The BladeCenter T unit has two USB connectors on the front panel of the BladeCenter T unit.

These USB ports permit the direct connection of two USB peripherals without an external hub. If more devices are required, an external hub can be connected to any of the built-in ports. USB technology transfers data at up to 12 Mb per second (Mbps) with a maximum of 127 devices and a maximum signal distance of 5 m (16 ft) per segment. Using Plug and Play technology, USB devices are configured automatically.

Two 10/100-Mbps Ethernet connectors for remote management and console

The BladeCenter T LAN module contains two 10/100-Mbps Ethernet ports that provide the remote connection to the system management station on the network, driven from each management module, to the network management station on the network.

Use these ports for remote management and remote console.

The network management station, through these connectors, can access control functions running in the management module, the service processor on each blade server, or within each I/O module. However, it cannot use these ports to communicate with application programs running in the blade servers. The network management station must direct those communications through a network connected to the external ports in the I/O modules in the BladeCenter T unit.

Four 10/100/1000-Mbps Ethernet connectors on each Ethernet switch module

Each Ethernet switch module contains four Ethernet connectors.

Connect a Category 3, 4, 5, or higher unshielded twisted-pair (UTP) cable to this connector. The 100BASE-TX and 1000BASE-T Fast Ethernet standards require Category 5 or higher.

Figure 5 shows the I/O connectors on the rear of the BladeCenter T Type 8720.
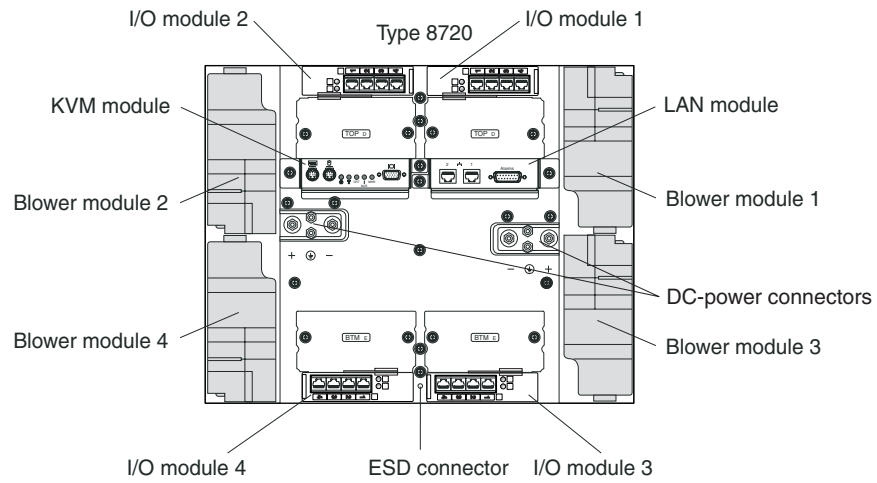
Figure 5. BladeCenter T Type 8720 rear view - I/O connectors

Figure 6 shows the I/O connectors on the rear of the BladeCenter T Type 8730.
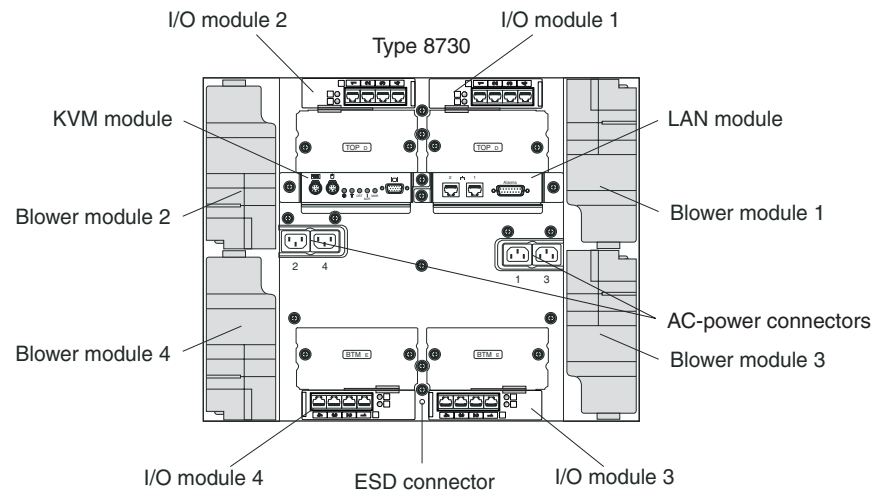
Figure 6. BladeCenter T Type 8730 rear view - I/O connectors

2-way blade servers

The BladeCenter HS20 Type 8843 is high-performance 2-way blade server that is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and reliable data storage (see Figure 7).

The BladeCenter blade server will have one of the bezels shown in Figure 7.

Note: The illustration might differ slightly from your hardware.
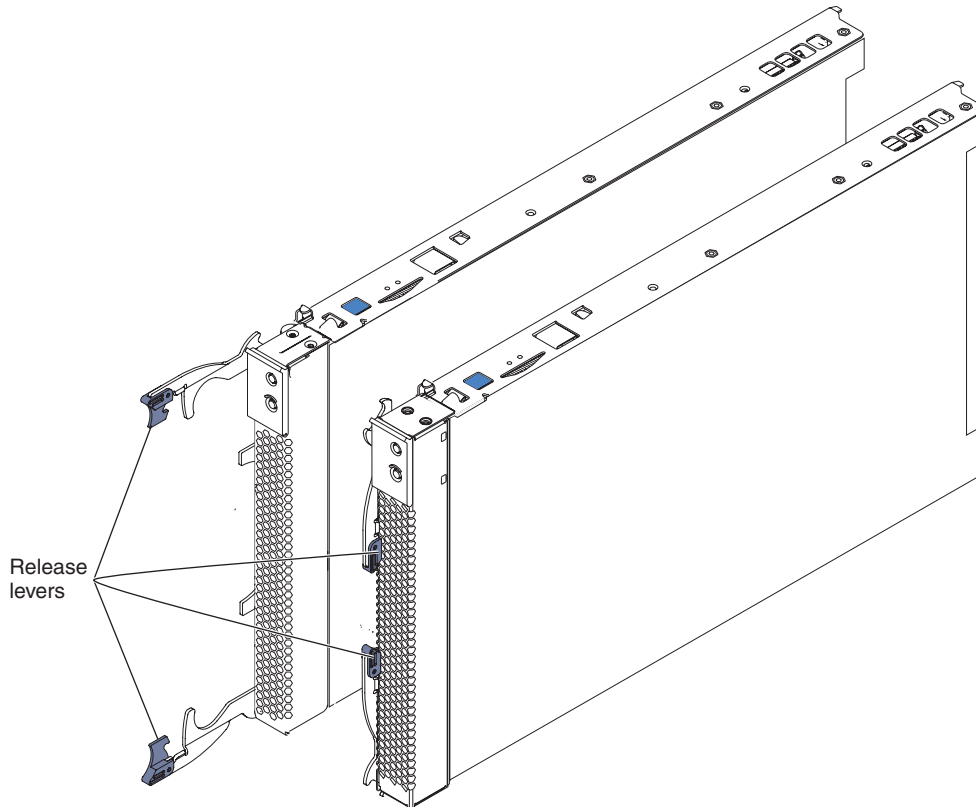
Figure 7. BladeCenter HS20 Type 8843

The IBM BladeCenter HS20 Type 8843 blade server is based on the IBM Enterprise X-Architecture Technology.[3]

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3. IBM Enterprise X-Architecture Technology takes full advantage of existing IBM technologies to build powerful, scalable, and reliable Intel processor-based servers. For more information about IBM Enterprise X-Architecture Technology, go to www.ibm.com/servers/ eserver/xseries/xarchitecture/enterprise/.

Features and specifications for the HS20 Type 8843 for a non-NEBS/ETSI environment

Table 3 provides a summary of the features and specifications of the BladeCenter HS20 Type 8843 blade server operating in a non-NEBS/ESI environment.

Note: Power, cooling, removable media drives, external ports, and advanced system management are provided by the BladeCenter T Types 8720 and 8730 units.

Table 3. 8843 Features and specifications

Microprocessor:
 	
Supports up to 2 microprocessors
• Intel Xeon DP processor
• 1 MB ECC L2 cache
• 800 MHz front-side bus (FSB)
 	
Memory:
• Four double data rate (DDR) PC1600 sockets
• Minimum: 512 MB
• Maximum: 8 GB
• Type: 2-way interleaved, DDR, PC3200, ECC SDRAM registered x4 (Chipkill) dual inline memory modules (DIMMs) only
 	
  Notes:
  1. PC3200 DIMMs are backward-compatible and can function in the PC1600 sockets
  2. Chipkill is available for DIMMs with 512 MB or greater
• Supports 512 MB, 1 GB, 2 GB, and 4 GB DIMMs
 	
Drives:
• Support for up to two Ultra320 SCSI hot-swap hard disk drives available in the optional SCSI storage expansion unit
	Size:
	• Height: 24.5 cm (9.7 inches)
	• Depth: 44.6 cm (17.6 inches)
	• Width: 2.9 cm (1.14 inches)
	• Maximum weight: 5.4 kg (12 lb)
	
	Integrated functions:
	• Two Gigabit Ethernet controllers
	• ATI Rage XL video controller
	• Light path diagnostics
	• Local service processor
	• IDE drive controller
	• RS-485 interface for communication with the management module
	• USB buses for communication with keyboard, mouse, CD-ROM drive, and external diskette drive.
	
	Predictive Failure Analysis (PFA) alerts:
	• Microprocessor
	• Memory
	• Hard disk drives
	
	Electrical input:
	• Input voltage: 12 V dc
		Environment:
		• Air temperature:
		  – Blade server on: 10° to 35° C (50° to 95° F). Altitude: 0 to 914 m (2998.69 ft)
		  – Blade server on: 10° to 32° C (50° to 95° F). Altitude: 914 m to 2134 m (2998.69 ft to 7000 ft)
		  – Blade server off: -40° to 60° C (-40° to 140° F)
		• Humidity:
		  – Blade server on: 8% to 80%
		  – Blade server off: 5% to 80%

Note: The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard, mouse, CD-ROM, and external diskette drive. The BladeCenter T unit uses USB for communications with these devices.

Features and specifications for the HS20 Type 8843 for a NEBS/ETSI environments

Table 4 provides a summary of the features and specifications of the BladeCenter HS20 Type 8843 blade server operating in a NEBS/ETSI environment.

Note: Power, cooling, removable media drives, external ports, and advanced system management are provided by the BladeCenter T Type 8720 unit.

Table 4. 8843 Features and specifications

Microprocessor:	Size:	Environment (NEBS):

Supports up to 2 microprocessors
• Intel Xeon DP processor
• 512 KB ECC L2 cache
• 533 MHz front-side bus (FSB)
 	
Memory:
• Four double data rate (DDR) PC3200 sockets
• Minimum: 1 GB
• Maximum: 8 GB
• Type: 2-way interleaved, DDR, PC2100, ECC SDRAM registered x4 (Chipkill) dual inline memory modules (DIMMs) only
 	
Notes:
1. PC2100 DIMMs are backward-compatible and can function in the PC1600 sockets
2. Chipkill is available for DIMMs with 512 MB or greater
• Supports 512 MB, 1 GB, and 2 GB DIMMs
 	
Drives:
• Support for up to two internal IDE 2.5-inch flash drives (NEBS application requires flash-based IDE drives)
• Support for up to two Ultra320 SCSI hot-swap hard disk drives available in the optional SCSI storage expansion unit
	• Height: 24.5 cm (9.7 inches)
	• Depth: 44.6 cm (17.6 inches)
	• Width: 2.9 cm (1.14 inches)
	• Maximum weight: 5.4 kg (12 lb)
	
	Integrated functions:
	• Two Gigabit Ethernet controllers
	• ATI Rage XL video controller
	• Light path diagnostics
	• Local service processor
	• IDE drive controller
	• RS-485 interface for communication with the management module
	• USB buses for communication with keyboard, mouse, CD-ROM drive, and external diskette drive.
	
	Predictive Failure Analysis (PFA) alerts:
	• Microprocessor
	• Memory
	
	Electrical input:
	• Input voltage: 12 V dc
		• Air temperature:
		  – Blade server on: 5° to 40° C (41° to 104° F). Altitude: -60 to 1800 m (-197 to 6000 ft)
		  – Blade server on (short term): -5° to 55° C (23° to 131° F). Altitude: -60 to 1800 m (-197 to 6000 ft)
		  – Blade server on: 5° to 30° C (41° to 86° F). Altitude: 1800 to 4000 m (6000 to 13000 ft)
		  – Blade server on (short term): -5° to 45°C (23° to 113° F). Altitude: 1800 to 4000 m (6000 to 13000 ft)
		  – Blade server off: -40° to 70° C (-40° to 158° F)
		• Humidity:
		  – Blade server on: 5% to 80%
		  – Blade server on (short term): 5% to 90%, but not to exceed 0.024 kg water/kg of dry air
		  – Blade server off: uncontrolled
		    Note: ″Short term″ refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year. (This refers to a total of 360 hours in any given year, but no more than 15 occurrences during that 1-year period.)

Note: The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard, mouse, CD-ROM, and an external diskette drive. The BladeCenter T unit uses USB for communications with these devices.

4-way blade server

The BladeCenter HS40 Type 8839 is high-performance 4-way blade server that is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and reliable data storage.

The BladeCenter blade server will have one of the bezels shown in Figure 8.

**Note:** The illustration might differ slightly from your hardware.
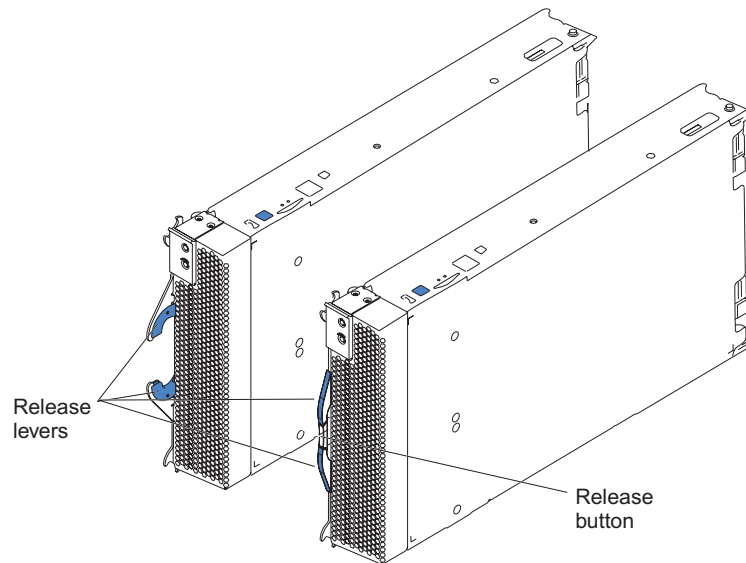
Figure 8. BladeCenter HS40 Type 8839 blade server

The IBM BladeCenter HS40 Type 8839 blade server is based on the IBM Enterprise X-Architecture Technology.[4]

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[4]. IBM Enterprise X-Architecture Technology takes full advantage of existing IBM technologies to build powerful, scalable, and reliable Intel processor-based servers. For more information about IBM Enterprise X-Architecture Technology, go to www.ibm.com/servers/eserver/xseries/xarchitecture/enterprise/.

BladeCenter HS40 Type 8839 features and specifications for non-NEBSI/ETSI environment

Table 5 provides a summary of the features and specifications of the BladeCenter HS40 Type 8839 blade server operating in a non-NEBS/ETSI environment.

Note: Power, cooling, removable media drives, external ports, and advanced system management are provided by the BladeCenter T Types 8720 and 8730.

Table 5. HS40 features and specifications for a non-NEBSI/ETSI environment

Microprocessor:	Size:	Predictive Failure Analysis (PFA) alerts:

Supports up to 4 microprocessors
• Intel Xeon 2.0 GHz or faster
• L2 and L3 caches, size dependent on microprocessor
 	
Memory:
• Eight double data rate (DDR) PC2100 184-pin DIMM sockets
• Minimum: 512 MB
• Maximum: 16 GB[1]
• Type: 2-way interleaved, DDR, PC2100, ECC SDRAM registered x4 (Chipkill) dual inline memory modules (DIMMs) only
• Supports 256-MB, 512-MB, 1-GB, and 2-GB DIMMs
• Hot spare memory
 	
Expansion:
• Two I/0 expansion card connectors
 	
Drives:
• Support for up to two Ultra320 SCSI hot-swap hard disk drives available in an optional SCSI storage expansion unit
	• Height: 24.5 cm (9.7 inches)
	• Depth: 44.6 cm (17.6 inches)
	• Width: 5.9 cm (2.32 inches)
	• Maximum weight: 7.0 kg (15.4 lb)
	
	Integrated functions:
	• Four Gigabit Ethernet controllers
	• ATI Radeon 7000 video controller
	• Light path diagnostics
	• Local service processor
	• IDE controller
	• RS-485 interface for communication with the management module
	• Integrated Baseboard Management Controller
	• USB V2.0 Full Speed ports for communication with keyboard, mouse, external diskette drive, and CD-ROM drive[2]
	• Serial over LAN (SOL) management interface
	
	Electrical input:
	• Input voltage: 12 V dc
		• Microprocessor
		• Memory
		• Hard disk drives
		
		Environment:
		• Air temperature:
		  – Blade server on: 10° to 35° C (50° to 95° F). Altitude: 0 to 914 m (2998.69 ft)
		  – Blade server on: 10° to 32° C (50° to 95° F). Altitude: 914 m to 2134 m (2998.69 ft to 7000 ft)
		  – Blade server off: -40° to 60° C (-40° to 140° F)
		• Humidity:
		  – Blade server on: 8% to 80%
		  – Blade server off: 5% to 80%

Notes:

1. You might have to enable large-memory support for your operating system to access all of the memory that is installed in your blade server. See the documentation for your operating system for information.

2. The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard, mouse, external diskette drive, and CD-ROM drive. The BladeCenter T unit uses USB for internal communications with these devices.

BladeCenter HS40 Type 8839 features and specifications for a NEBS/ETSI environment

Table 6 provides a summary of the features and specifications of the BladeCenter HS40 Type 8839 blade server operating in a NEBS/ETSI environment.

Note: Power, cooling, removable media drives, external ports, and advanced system management are provided by the BladeCenter T Types 8720 and 8730.

Table 6. HS40 features and specifications for a NEBS/ETSI environment

| Microprocessor:

Supports up to 4 microprocessors
• Intel Xeon 2.0 GHz or faster
• L2 and L3 caches, size dependent on microprocessor

Memory:
• Eight DDR PC2100 184-pin DIMM sockets
• Minimum: 1 GB
• Maximum: 16 GB[1]
• Type: 2-way interleaved, DDR, PC2100, ECC SDRAM registered x4 (Chipkill) dual inline memory modules (DIMMs) only
• Supports 512-MB, 1-GB, and 2-GB DIMMs
• Hot spare memory

Expansion:
• Two I/0 expansion card connectors

Drives:
• Support for up to two Ultra320 SCSI hot-swap hard disk drives available in an optional SCSI storage expansion unit | **Size:**
• Height: 24.5 cm (9.7 inches)
• Depth: 44.6 cm (17.6 inches)
• Width: 5.9 cm (2.32 inches)
• Maximum weight: 7.0 kg (15.4 lb)

Integrated functions:
• Four Gigabit Ethernet controllers
• ATI Radeon 7000 video controller
• Light path diagnostics
• Local service processor
• IDE controller
• RS-485 interface for communication with the management module
• Integrated Baseboard Management Controller
• V2.0 Full Speed ports for communication with keyboard, mouse, external diskette drive, and CD-ROM drive[2]
• Serial over LAN (SOL) management interface

Electrical input:
• Input power: 12 V dc | **Predictive Failure Analysis (PFA) alerts:**
• Microprocessor
• Memory
• Hard disk drives

Environment:
• Air temperature:
  – Blade server on: 5° to 40° C (41° to 104° F). Altitude: -60 to 1800 m (-197 to 6000 ft)
  – Blade server on (short term): -5° to 55° C (23° to 131° F). Altitude: -60 to 1800 m (-197 to 6000 ft)
  – Blade server on (short term): 5° to 30° C (41° to 86° F). Altitude: 1800 to 4000 m (6000 to 13000 ft)
    Blade server on (short term): -5° to 45° C (23° to 113° F). Altitude: 1800 to 4000 m (6000 to 13000 ft)
  – Blade server off: -40° to 70° C (-40° to 158° F)
• Humidity:
  – Blade server on: 5% to 80%
  – Blade server on (short term): 5% to 90% but not to exceed 0.024 kg water/kg of dry air
  – Blade server off: uncontrolled

Note: *Short term* refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year. (This refers to a total of 360 hours in any given year, but no more than 15 concurrences during that 1-year period. |

Notes:

1. You might have to enable large-memory support for your operating system to access all of the memory that is installed in your blade server. See the documentation for your operating system for information.

2. The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard, mouse, external diskette drive, and CD-ROM drive. The BladeCenter T unit uses USB for internal communications with these devices.

Media tray

The media tray is a hot-swap unit that installs in the front of the BladeCenter T unit and contains the system-status panel, two USB ports, and the CD-ROM drive (see Figure 9).
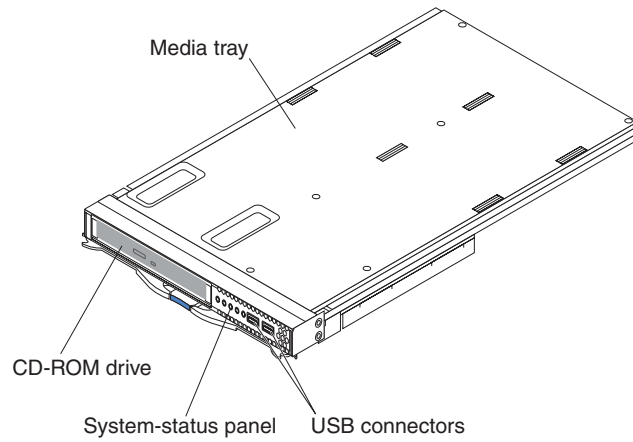
Figure 9. BladeCenter T media tray

Management module

The BladeCenter T unit comes with one hot-swap Advanced Management Module in management bay 1. An additional management module can be added in management-module bay 2. Only one of these management modules can be active at one time, functioning as the primary management module; a second management module, if present, provides redundancy. The secondary management module remains inactive until it is switched to act as primary.

When two management modules are installed in the BladeCenter T unit, both management modules must have the same level of firmware, at a level that supports redundant management-module function. This helps ensure a smooth changeover of control from the active management module to the redundant management module. The latest level of management-module firmware is available at the IBM Support Web site at www.ibm.com/pc/support/.

The management module functions as a service processor and a KVM multiplexor for all of the blade servers installed in the BladeCenter T unit. It controls the KVM-module external connections for use by a local console. The management module also controls three LAN-module external connections: two RJ-45 connectors for 10/100-Mbps Ethernet remote management connection and an alarms connector that can be used for monitoring BladeCenter T unit status.

The service processor in the management module communicates with the service processor 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 T shared-media tray (CD-ROM drive and USB port)

The BladeCenter T components are configured using the management module. The management module communicates with all components in the BladeCenter T unit, detecting their presence or absence, reporting their status, and sending alerts for error conditions when they are required (see Figure 10 on page 26).

Release button

Management module

Release latch

Serial port   MAC address
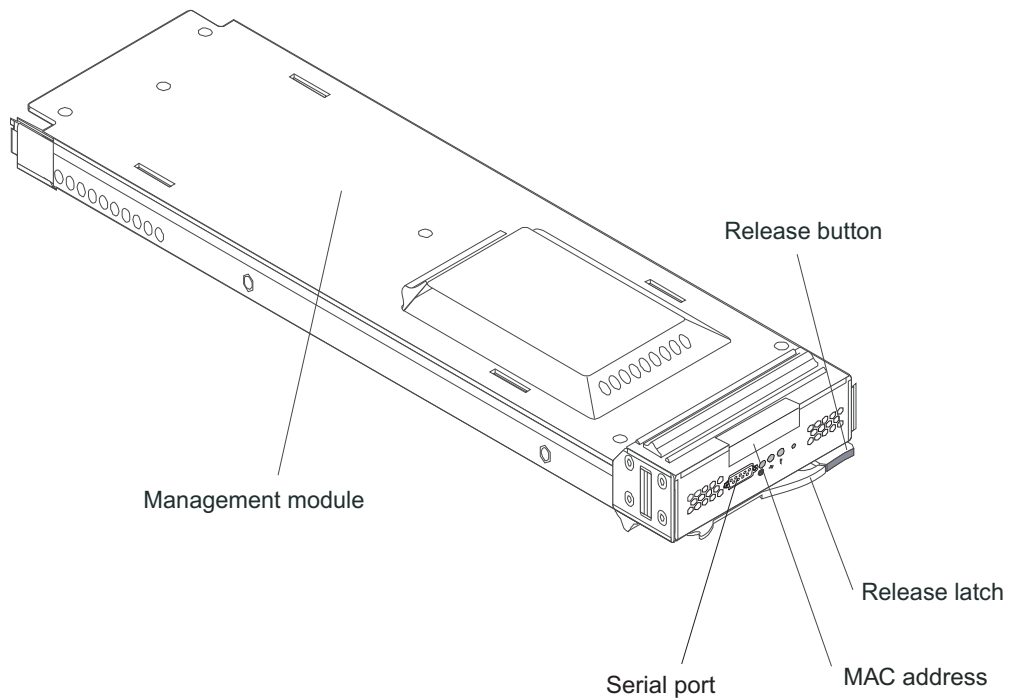
Figure 10. BladeCenter T advanced management module

Figure 11 shows the serial port connector on the management module. Table 7 shows the pinouts for the serial port connector.
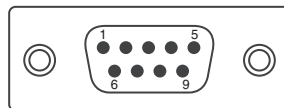
Figure 11. Serial port connector

Table 7. Pinouts for the serial port connector

Pin Number	Description
1	DCD
2	RxD in
3	TxD out
4	DTR out
5	GND
6	DSR in
7	RTS out
8	CTS in
9	n/a
Note: n/a = Not applicable	

You can use a serial cable to connect the management module to an external serial port. Figure 12 on page 27 shows the serial cable. Table 8 on page 27 shows the pin assignments for both ends of the serial cable. Connect the end labeled P1 to

the serial port on the management module, and connect the end labeled P2 to the external serial port.
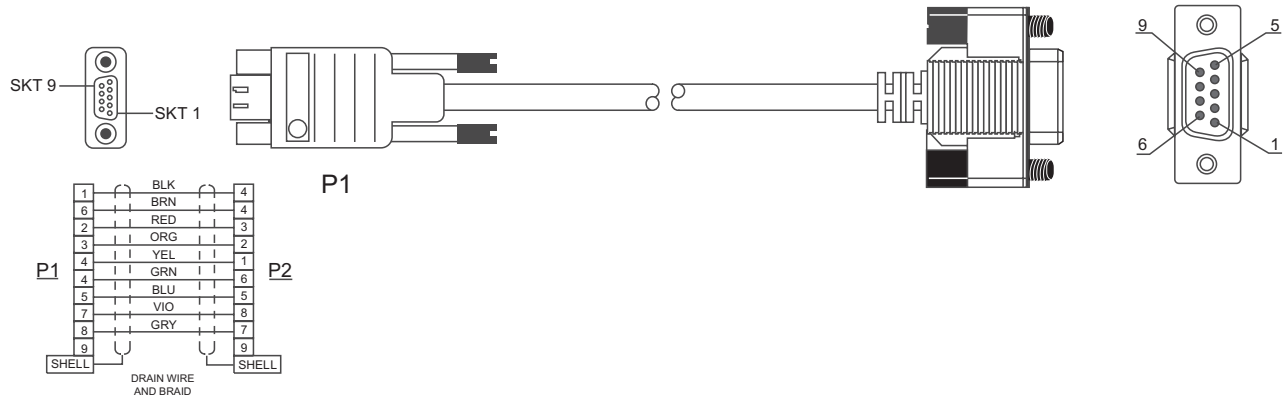
Figure 12. Optional serial cable for connecting the management module to an external serial port

Table 8. Pin assignments for the optional serial cable

Description	Serial Cable (P1)	Serial Cable (P2)
DCD	1	4
RxD in	2	3
TxD out	3	2
DTR out	4	1,6
GND	5	5
DSR in	6	4
RTS out	7	8
CTS in	8	7

Keyboard, video, and mouse module

The KVM module is a hot-swap unit that is installed in the rear of the BladeCenter T unit. This module contains two PS/2 connectors for the keyboard and mouse, a system-status panel, and an HD-15 video connector. (see Figure 13).
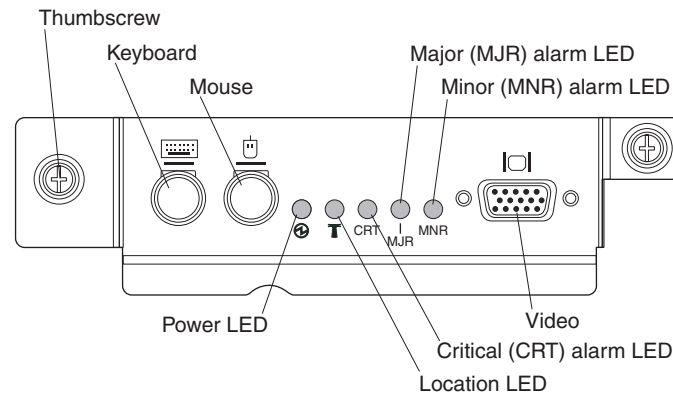
Figure 13. BladeCenter T KVM module

System-status LEDs: These LEDs provide status information for the BladeCenter T unit:

- **Power:** When continuously lit, this green LED indicates the presence of power in the BladeCenter T unit. The LED turns off when the power source is interrupted.

  Attention: If the power LED is off, it does not mean electrical power is not present in the BladeCenter T unit. The LED might be burned out. To remove all electrical power from the BladeCenter T unit, you must disconnect all power cords from all power modules.

- **Location LED:** This blue LED is for system identification. A system administrator or service representative uses this LED to locate a specific BladeCenter T unit for service or repair.

Alarm LEDs: These LEDs provide alarm notifications for the BladeCenter T unit.

- **CRT (Critical alarm, amber (default) or red):** When continuously lit, this LED indicates the presence of a critical system fault.
- **MJR (Major alarm, amber (default) or red:** When continuously lit, this LED indicates the presence of a major fault.
- **MNR (Minor alarm, amber:** When continuously lit, this LED indicates the presence of a minor system fault.

Connectors: The KVM module has the following I/O connectors:

- **Keyboard connector:** The BladeCenter T KVM module contains one PS/2 keyboard connector (see Figure 14).

   Use this connector to connect a PS/2 keyboard to the BladeCenter T unit.
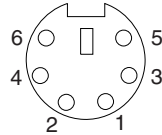
Figure 14. BladeCenter T Keyboard connector

- **Mouse connector:** The Blade Center T KVM module contains one PS/2 mouse connector (see Figure 15).

   Use this connector to connect a PS/2 mouse to the BladeCenter T unit.
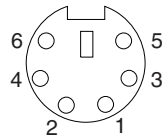
Figure 15. BladeCenter T Mouse connector

- **Video connector:** The BladeCenter T KVM module contains one standard video connector. The integrated video controller on each blade server is compatible with SVGA and UGA and communicates through this video port.

   Use this connector to connect a video monitor to the BladeCenter T unit. (See Figure 16.)
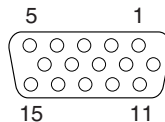
Figure 16. BladeCenter T Video connector

LAN module indicators and input/output connectors

The LAN module is a hot-swap module located on the back of the BladeCenter T unit. It provides the electrical and mechanical interface to the BladeCenter T unit for the two LAN (Ethernet) connections as driven from each management module and the Telco external alarms. This module contains two RJ-45 connectors with LEDs for the management interface and one DSUB 15P Telco alarm connector (see Figure 17).
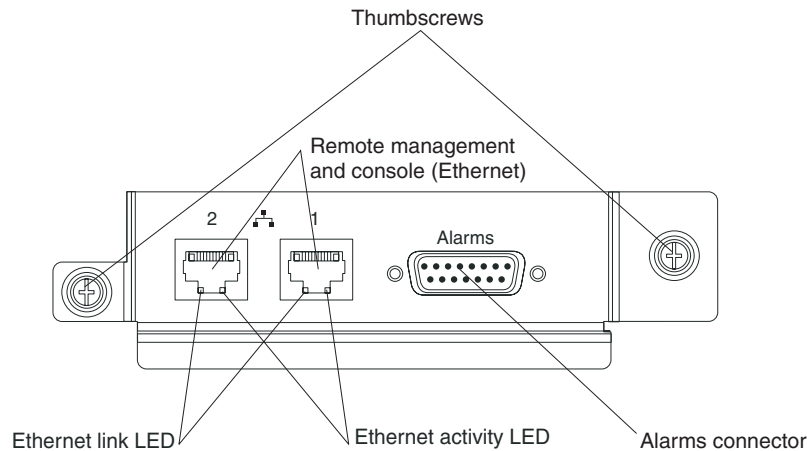
Figure 17. BladeCenter T LAN module

LAN-module LEDs: These LEDs provide status information about the LAN connection:

- **Ethernet link:** When this green LED is lit, there is an active connection through the port to the network.
- **Ethernet activity:** When this green LED is flashing, it indicates that there is activity through the port over the network link.

LAN-module connectors:

- **Remote management and console (Ethernet) connectors:** The LAN module provides two Ethernet RJ-45 connectors.

  The BladeCenter T LAN module contains two 10/100-Mb Ethernet connectors that provide the remote connections, driven from each management module, to the network management station on the network.

  Use these ports for remote management and remote console.

  The network management station, through these connectors, can access control functions running in the management module, the service processor on each blade server, or within each I/O module. However, it cannot use the ports to communicate with application programs running in the blade servers. The network management station must direct those communications through a network connected to the external ports in the I/O modules in the BladeCenter T unit.

- **Alarm connectors:** The LAN module provides one Telco DB15 alarms connector (male) for critical, major, and minor Telco alarms. Each of the alarms has a relay that enables system alarm indicators to be daisy-chained together. Table 9 shows the pinouts for the Telco alarms connector.

  Figure 18 shows the alarms connector.
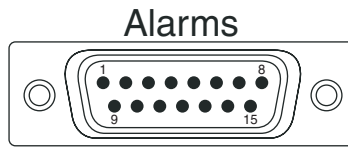
Alarms

Figure 18. Alarms connector

> **Note:** The service processor, management module, or systems-management function must monitor the alarm reset inputs to maintain the fault condition that is set for the unit. The alarm reset inputs can be voltages in excess of standard logic levels, so they need to be electrically or optically isolated from the monitoring logic.

Table 9. Pinouts for Telco alarms connector

Pin Number	Description	I/O	Pin Number	Description	I/O
1	Minor alarm reset +	I	9	Minor alarm normally closed	O
2	Minor alarm reset -	I	10	Minor alarm common	O
3	Major alarm reset +	I	11	Major alarm normally open	O
4	Major alarm reset -	I	12	Major alarm normally closed	O
5	Critical alarm normally open	O	13	Major alarm common	O
6	Critical alarm normally closed	O	14	Reserved	O
7	Critical alarm common	O	15	Reserved	O
8	Minor alarm normally open	O			

I/O modules

The BladeCenter T unit supports from up to four hot-swap I/O modules. Table 10 on page 33 identifies the types of I/O modules that you can install in each I/O-module bay. Go to the IBM Support Web site at www.ibm.com/pc/support/ to see the list of supported I/O modules.

The BladeCenter T unit supports a minimum of one hot-swap Ethernet switch module or pass-through module, in I/O-module bay 1 or 2. This I/O module provides an internal connection to an integrated Ethernet controller in all the blade servers in the BladeCenter T unit, up to 8 internal connections per I/O module. To provide an internal connection for the second integrated Ethernet controller in each blade server, install an Ethernet switch module or pass-through module in the available I/O-module bay of the pair (I/O-module bay 1 or bay 2). The management modules connect to the switch module through the backplane using a transformerless 100-Mbps connection and an I2C interface.

The BladeCenter T unit supports two additional I/O modules in I/O-module bays 3 and 4. Each of these I/O modules provides an internal connection to one of the two network-interface controllers on each of the I/O expansion options that are installed on blade servers in the BladeCenter T unit. The I/O module must be compatible with the network interface on each of the I/O expansion options. For example, if you install a Fibre Channel I/O expansion option on a blade server, the I/O modules that you install in I/O-module bays 3 and 4 must be Fibre Channel switch modules or pass-through modules.

Important: The switch modules in I/O module bays 3 and 4, and all blade server interface options in the BladeCenter T unit, must use the same interface type. For example, if you install an Ethernet interface option on a blade server, the switch modules that you install in I/O module bays 3 and 4 must be Ethernet. All other interface options in the BladeCenter T unit must also be Ethernet interface options.

Note: You can use a pass-through module in any I/O-module bay, provided the associated controller in the blade servers or I/O expansion option is compatible with it.

Table 10 summarizes the types of modules that can be used in each I/O-module bay.

Table 10. I/O Modules

Bays	I/O-module function	Permissible I/O module
1 and 2	Network connections 1 and 2 (Ethernet) for all blade servers in the BladeCenter T unit	One of the following combinations: • Two Ethernet switch modules • Two pass-through modules • One Ethernet switch module and one pass-through module
3 and 4	Network connections 3 and 4 (for all I/O expansion options on blade servers in the BladeCenter T unit)	One of the following combinations: • Two Ethernet switch modules • Two fibre-channel switch modules • Two pass-through modules **Important:** • The modules used must support the network interface used on the I/O expansion options. • The I/O modules in bays 3 and 4 must the same type.

Notes:

1. The enumeration of the Ethernet controllers in a blade server is operating-system dependent. You can verify the Ethernet controller designations a blade server uses through your operating system settings.

2. The routing of an Ethernet controller to a particular I/O-module bay depends on the type of blade server. You can verify which Ethernet controller is routed to which I/O-module bay by using the following test:

   • Install only one Ethernet switch module or pass-through module, in I/O-module bay 1.

   • Make sure the ports on the switch module or pass-through module are enabled (**I/O Module Tasks ▶ Management Advanced ▶ Management** in the management module Web-based user interface).

   • Enable only one of the Ethernet controllers on the blade server. Note the designation the blade server operating system has for the controller.

   • Ping an external computer on the network connected to the switch module or pass-though module.

   If you can ping the external computer, the Ethernet controller you enabled is associated with the I/O module in I/O-module bay 1. The other Ethernet controller in the blade server is associated with the I/O module in I/O-module bay 2.

3. If you have installed an I/O expansion option on a blade server, communications from the option are routed to I/O-module bays 3 and 4. You can verify which controller on the option is routed to which I/O-module bay by performing the test in note 2, using a controller on the I/O expansion option and a compatible switch module or pass-through module in I/O-module bay 3 or 4.

The BladeCenter T unit supports a minimum of one hot-swap Ethernet switch module in switch-module bay 1. All Ethernet and fibre channel switches that are supported in the BladeCenter chassis are supported in the BladeCenter T chassis.

Power modules for Type 8720

The BladeCenter T Type 8720 unit comes with one pair of -48 to -60 V dc hot-swap power modules in power bays 1 and 2. Each active power module supplies 12-volt power to the blade bay that it services. The BladeCenter T supports a second pair of power-modules in power bays 3 and 4. See Figure 19.

Power modules are not needed in bays 3 and 4 until you begin installing blades or options in blade bays 5 through 8, or I/O modules in I/O-module bays 3 or 4.

Important: Nonredundant power is not supported in BladeCenter T units. Power modules must always be present in power bays 1 and 2. When any blade server or option is in blade bay 5 through 8 or I/O modules are in switch bays 3 or 4, power modules must be present in all four power-module bays.

If a power module fails or a loss of dc power occurs, the BladeCenter T unit configured for redundant power operation will operate in a nonredundant mode, and the blower modules will run at full speed. You must replace the failing power module or restore system input power as soon as possible to regain redundant power operation and to reset the blower modules to their normal operating speeds.
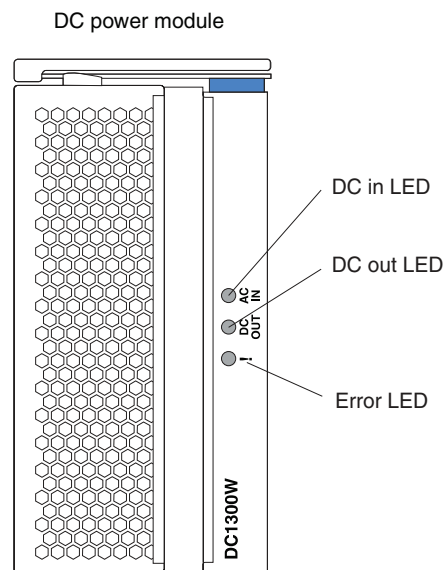
Figure 19. BladeCenter T power module for Type 8720

Power modules for Type 8730

The BladeCenter T Type 8730 unit comes with one pair of 220-volt hot-swap ac power modules in power-module bays 1 and 2. The BladeCenter T unit supports a second pair of power modules in power-module bays 3 and 4. Each active power module supplies 12-volt power to the blade bays it services (see Figure 20).

Power modules are not needed in bays 3 and 4 until you begin installing blades or options in blade bays 5 through 8.

Important: Nonredundant power is not supported in BladeCenter T units. Power modules must always be present in power bays 1 and 2. When any blade server or option is in blade bay 5 through 8 or if I/O modules are in I/O-module bay 3 or 4, power modules must be present in all four power-module bays.

If a power module fails or a loss of ac power occurs, BladeCenter T units configured for redundant power operation will operate in a nonredundant mode, and the blower modules will run at full speed. You must replace the failing power module or restore system input power as soon as possible to regain redundant power operation and to reset the blower modules to their normal operating speeds.
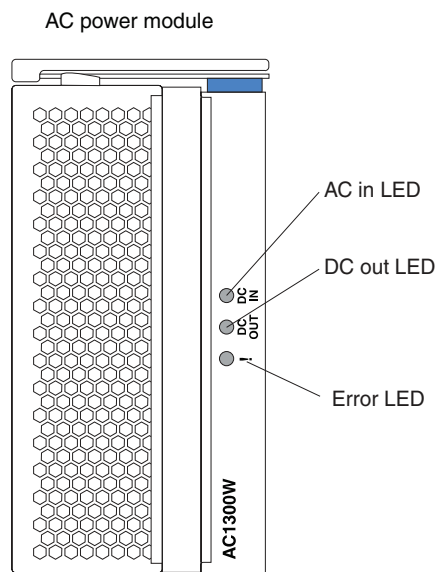
Figure 20. BladeCenter T power module for Type 8730

Blowers

The BladeCenter T unit comes with four hot-swap blowers for cooling redundancy. The blowers are installed at the rear of the system. The blower speeds vary depending on the ambient air temperature at the front of the BladeCenter T unit. If a blower fails, the remaining blowers increase their speed to cool the BladeCenter T unit and blade servers (see Figure 21).

All four blowers are required for redundant system operation. Power for all four blowers is shared by all installed power modules. One failed blower creates a nonredundant configuration. A failing blower must be replaced as soon as possible to avoid potential thermal problems.

Note: Each power module has cooling fans that are independent of the system cooling.
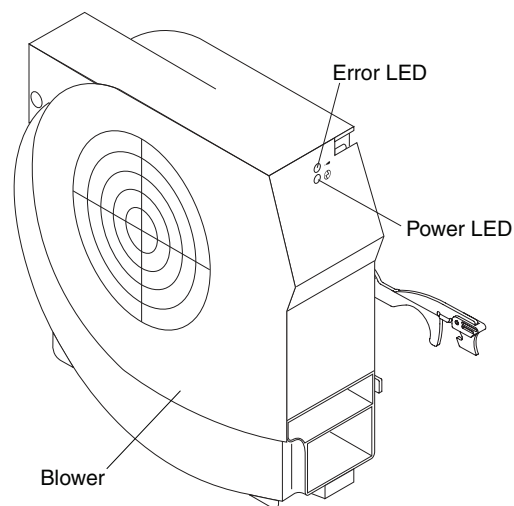
Figure 21. BladeCenter T blower module

Blade servers

The BladeCenter T unit supports up to eight high-performance blade servers. Each blade server is an enclosure that contains microprocessors, memory, a control chip set, an I/O bus, Ethernet controllers, hard disk drives or flash drives, and user-interface controls, and connectors for expansion options. The blade server receives its power, network connection, and I/O devices (CD-ROM, keyboard, mouse, and video ports, USB port, and remote monitoring port) from the BladeCenter T unit, reducing the number of cables needed.

Blade server expansion options

Some blade servers contain connectors for options that add capabilities to the blade server. You can add these options before installing the blade server in the BladeCenter T unit.

Go to www.ibm.com/pc/compat/ for a list of available options for your IBM blade server.

I/O expansion option

Some blade servers have connectors for adding an I/O expansion option, such as the IBM BladeCenter T Fibre Channel Expansion Card. The BladeCenter T unit routes network communication signals from the I/O expansion option to I/O modules 3 and 4 on the BladeCenter T unit. The I/O expansion option is attached directly to the blade server but does not occupy an additional blade bay.

Note: If an I/O expansion option is installed on any blade server, I/O modules that are compatible with that network interface must be installed in I/O-module bays 3 and 4 on the BladeCenter T unit.

Expansion unit option

You can install an optional BladeCenter SCSI Storage Expansion Unit or Peripheral Card Interface (PCI) I/O Expansion Unit II on your blade server.

Storage Expansion Unit option: Some blade servers have a connector for adding an expansion unit, such as the IBM BladeCenter SCSI Storage Expansion option. The storage expansion option supports up to two hot-swap SCSI hard disk drives. The expansion option is attached directly to the blade server and occupies an additional blade server blade.

PCI I/O-expansion Unit option: Some blade servers have a connector for adding an expansion unit, such as an IBM BladeCenter PCI I/O II Expansion option. The PCI I/O II Expansion option supports up to two PCI-X adapters. The expansion option is attached directly to the blade server and occupies an additional blade server bay.

Chapter 3. Deployment considerations

This chapter describes the information you need to plan for your BladeCenter T deployment. For additional information about the deployment of your BladeCenter T unit, refer to *IBM BladeCenter Systems Management*, which is available at www.ibm.com/redbooks.

Network topologies

You can deploy the BladeCenter T unit in a variety of network topologies. This section describes some of these topologies and explains deployment considerations for each topology. These topologies include:

- Integrated infrastructure
- Network infrastructure

Integrated infrastructure

The BladeCenter T unit can be deployed as part of a single-chassis or multi-chassis solution for an integrated infrastructure.

Single BladeCenter T chassis

You can deploy your BladeCenter T unit as an integrated solution for your business. Within a single BladeCenter T unit, you can mix and match applications and operating systems. In addition, using a spare blade and the redeployment capabilities of IBM Director enables you to implement a ″Blade RAID″ concept. You can set up IBM Director and RDM to automatically image a spare blade to replace a failed server, increasing capacity to handle peak workloads, within seconds (see Figure 22 on page 40).
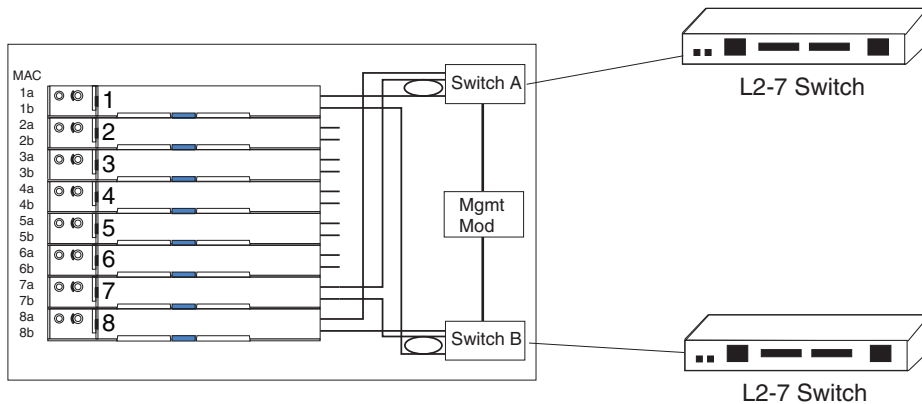
Blade 1: Control plane solution (core network)
  • Media gateway controller

Blades 2-4: Transport plane solution (I/O)
  • Media gateway
  • Signalling gateway
  • PCI I/O expansion unit II

Blade 5: Management plane solution
  • Management (OSS) gateway

Blades 6-8: Services plane solution
  • Database server
  • Application server
  • Blade storage expansion unit

Figure 22. Single BladeCenter T chassis

In this solution, the blades are configured as follows:

- Blade 1: Control plane solution (core network) consisting of:
    – Media gateway controller
- Blades 2–4: Transport plane solution (I/O)
    – Media gateway
    – Signalling gateway
    – PCI I/O expansion units
- Blade 5: Management plane solution consisting of
    – Management (OSS) gateway
- Blades 6–8: Services plane solution consisting of :
    – Application server
    – Database server
    – Blade storage expansion unit

Multiple BladeCenter T chassis

You can deploy a series of BladeCenter T units as a network infrastructure solution (see Figure 23).
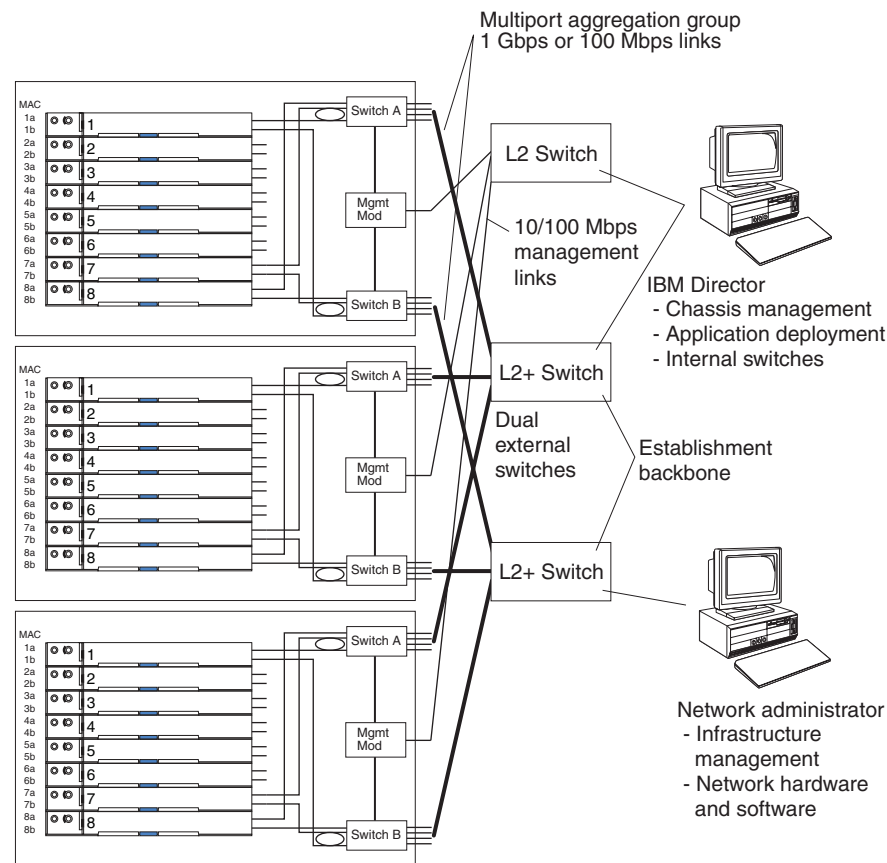
Figure 23. Multiple BladeCenter T units as a network infrastructure

In this configuration, each BladeCenter T unit contains two Ethernet switch modules and one management module. The external ports on the switch modules are configured for multiport link aggregation groups or trunks, as are the corresponding ports on the attached external LAN switches. Additionally, every port in the switch module in I/O-module bay 1 (switch A in this illustration) in the BladeCenter T units is connected to the same external LAN switch and every port in the switch module in I/O-module bay 2 (switch B in this illustration) in the BladeCenter T units is connected to another external LAN switch.

Observe the following guidelines when creating this topology:

1. The external ports on the BladeCenter T I/O modules are designed for point-to-point, full-duplex operation to a compatible LAN switch or router. Configure a corresponding multiport link aggregation group, or trunk, in both the switch module and the attached LAN switch before installing the cables. The connection options are as follows, in order of preference:

   • Multiport link aggregation group or trunk, 1 Gbps (1000 Mbps) per port

   • Single-uplink port, 1 Gbps

   • Multiport link aggregation group or trunk, 100 Mbps per port

2. Connect the management module 10/100-Mbps Ethernet port to a separate layer 2 network for security. If a separate network is not available, connect the Ethernet ports of the management modules and switch modules to the same layer 2 network.

3. Avoid network configurations that could lead to data loops, if possible. Loops are created when you connect multiple ports from the same switch module to the same layer 2 network device without first enabling link aggregation. If you implement configurations that include data loops, the spanning tree protocol on the switch-module external ports must remain enabled.

Using Remote Deployment Manager Version 4.11 Update 3 or later

You can use the Remote Deployment Manager (RDM) Version 4.11 Update 3 (or later) program to install a supported Microsoft Windows operating system or a BIOS update onto a blader server. Follow the instructions in the documentation that comes with the RDM program to install a supported Microsoft Windows operating system, supported Red Hat Advanced server 2.1, or BIOS code update.

Go to the following Web site for updated information about the RDM program and information about how to purchase the software or download an updated:

www.ibm.com/servers/eserver/xseries/systems_management/ibm_director/extensions/rdm.html

Using IBM Director

For a complete list of operating systems that support IBM Director, see the IBM Director compatibility document. This PDF document is at: www.ibm.com/servers/eserver/xseries/systems_management/ibm_director/agent/. This document is updated every 6 to 8 weeks.

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

Notes:

1. Some tasks, such as software distribution, require an in-band connection from IBM Director Server through a campus (public) LAN to a switch-module port.

2. See the IBM Support Web site at: www.ibm.com/pc/support/ for the version of IBM Director software that you can use to manage redundant management modules.

Communicating with the IBM Director software

For a complete list of operating systems that support IBM Director, see the IBM Director compatibility document. This PDF document is at: www.ibm.com/servers/eserver/xseries/systems_management/ibm_director/agent/. It is updated every 6 to 8 weeks.

Note: See Figure 23 on page 41 for an example of a typical network configuration.

To communicate with the BladeCenter T unit, 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 T unit. If the BladeCenter T management-module IP address is known, the network administrator can create an IBM Director managed object for the unit. If the IP address is not known, the IBM

Director software can automatically discover the BladeCenter T unit (out-of-band, using the Ethernet port on the management module) and create a managed object for the unit.

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

Notes:

1. All management modules are preconfigured with the same static IP address. You can use the management-module Web interface to assign a new static IP address for each BladeCenter T unit. If DHCP is not used and you do not assign a new static IP address for each BladeCenter T unit before attempting to communicate with the IBM Director software, only one BladeCenter T unit at a time can be added onto the network for discovery. Adding multiple units to the network with a unique IP address assignment for each BladeCenter T unit results in IP address conflicts.

2. For switch communication with the IBM Director server through the management-module external Ethernet port, the switch-module internal network interface and the management-module internal and external interfaces must be on the same subnet.

Preparing for BladeCenter T deployment

To configure your BladeCenter T unit, you need to:

- Determine which deployment tools you are going to use
- Set up your deployment infrastructure
- Configure your BladeCenter T unit:
  - Configure the management module
  - Set the chassis policies
  - Configure the I/O modules

This section provides information about the available deployment tools and setting up your deployment infrastructure.

Deployment tools

Before you can begin using the BladeCenter T unit, you must configure each of the components (management modules, I/O modules, and blade servers). You have a variety of options available to configure these components. For example, you can access the firmware that is embedded into each of the components to configure the component using either of these options:

- Through a Web browser. To access the components through a Web browser, point the browser to the IP address for the component. The Web browser you use must meet the following requirements:
  - Support for Java™
  - Support for JavaScript™ 1.2
  - Minimum screen resolution of 800x600 with 256 colors.

If you point to the management module, you will see the System Status menu after logging in. From this menu, you can perform management module

configuration, I/O module configuration, and blade server configuration. In addition, you can point your browser to the IP address of the switch modules or the blade server to configure those components directly.

- Through a Telnet interface. The Telnet interface provides a command line interface through the Management module, external Ethernet connection (out of band), or external Fibre Channel connection (in band). The command-line interface includes a Help menu, port display and configuration, general switch status and configuration, and Fibre Channel zoning capability.

Instructions for using the Web browser interface and Telnet are provided in the *BladeCenter T Types 8720 and 8730 Installation and User's Guide*.

You can also configure BladeCenter T unit components using these deployment tools:

- IBM Director 4.2. You can use IBM Director 4.2, which includes a BladeCenter Assistant Task to manage your BladeCenter units. Within the BladeCenter Assistant there are three subtasks:

  1. BladeCenter Configuration
  2. BladeCenter Management
  3. Switch Management launch pad

  Use the first two subtasks for BladeCenter unit configuration and the Switch Management launch pad to start vendor software to manage your switches. Refer to the *IBM Director System Management Guide* for more information.

  For a complete list of operating systems that support IBM Director, see the IBM Director compatibility document. This document is in PDF at: www.ibm.com/servers/eserver/xseries/systems_management/ibm_director/agent/. This document is updated every 6 to 8 weeks.

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

  Notes:
  1. Some tasks, such as software distribution, require an in-band connection from IBM Director server through a campus (public) LAN to switch-module port.
  2. See the IBM Support Web site at: www.ibm.com/pc/support/ for the version of IBM Director software that you can use to manage redundant management modules.

- Remote Deployment Manager (RDM) 4.11 update 3 or later. RDM provides an easy-to-use interface that allows you to quickly load your Windows operating system or a BIOS update onto a blade server. Follow the instructions in the documentation that comes with RDM program to install a supported Microsoft Windows operating system, supported, Red Hat Advanced server 2.1, or BIOS code update.

  For updated information about the RDM program and information about how to purchase the software or download an update go to:

  www.ibm.com/servers/eserver/xseries/systems_management/ibm_director/extensions/ rdm.html

- IBM Cluster Systems Management for Linux. CSM allows you to perform Linux installations over a network. An IBM licensed program, CSM provides a

distributed systems management solution for nodes of a cluster running Red Hat 7.1 (as distributed and supported by Red Hat). More information about using CSM is available at the following Web site: www.ibm.com/servers/eserver/ clusters/software/.

IBM Director 4.2 and RDM 4.11 update 3 provide an easy way to configure the components of the BladeCenter T unit and allows you to quickly reconfigure your servers to meet workload and hardware availability requirements. Instructions for using IBM Director 4.2 and RDM 4.11 update 3 are provided in the *BladeCenter T Types 8720 and 8730 Installation and User's Guide*.

Deployment infrastructure

Although the deployment of the BladeCenter T unit does not require you to do so, you should consider setting up a separate management network to configure and manage your BladeCenter T unit. By separating the LAN segment used for production from the LAN segment to which the BladeCenter T management module (as well as the IBM Director and RDM server, if present) is connected, you can ensure that unauthorized connections are not possible. Only the administrators' systems would be connected to this LAN segment.

You should also consider the use of a DHCP server to lease IP addresses on the management LAN. When powered on, the management module by default searches for a DHCP server and sets a default static IP address if a DHCP server is not found. Because the default static IP address is the same for all management modules, IP address conflicts can result if you do not use a DHCP server.

Figure 24 on page 46 shows an example network that might be used to configure and manage your BladeCenter T.
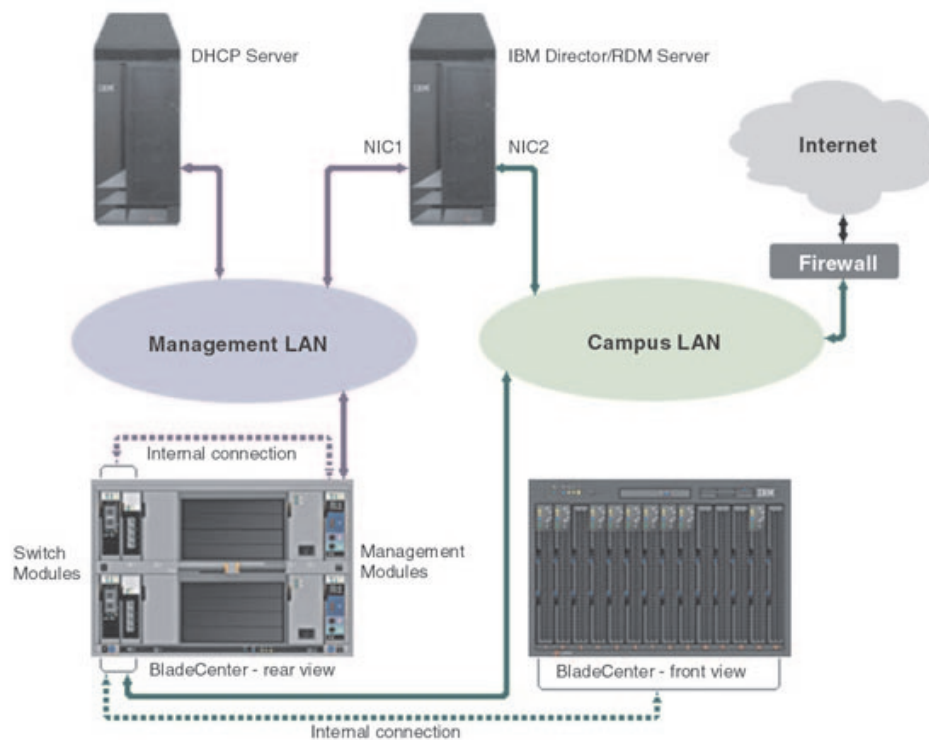
Figure 24. Management network diagram

Setting up the management connection

To configure and manage the BladeCenter T unit and blade servers, you must first set up the remote connection through an Ethernet port on the LAN module. The LAN module is on the rear of the BladeCenter T unit at the top-right side (see Figure 25).
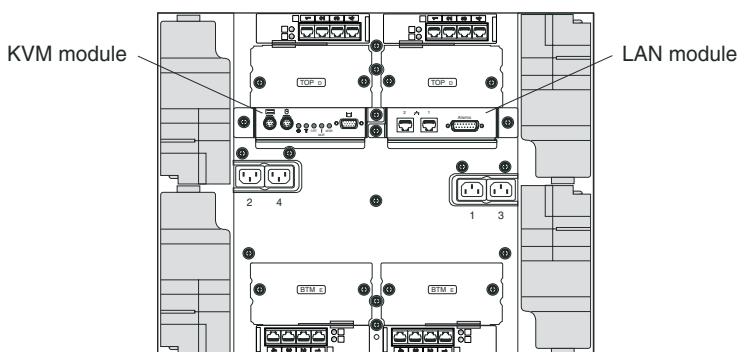
Figure 25. Location of the LAN module

Cabling the Ethernet port

You can connect to an Ethernet port directly from a PC using a crossover cable, or you can make the connection through an Ethernet switch.

The right Ethernet port on the LAN module is driven by management module 1, and the left Ethernet port of the LAN module is driven by management module 2.

Complete the following steps to connect the Ethernet cable to the management module (see Figure 26).
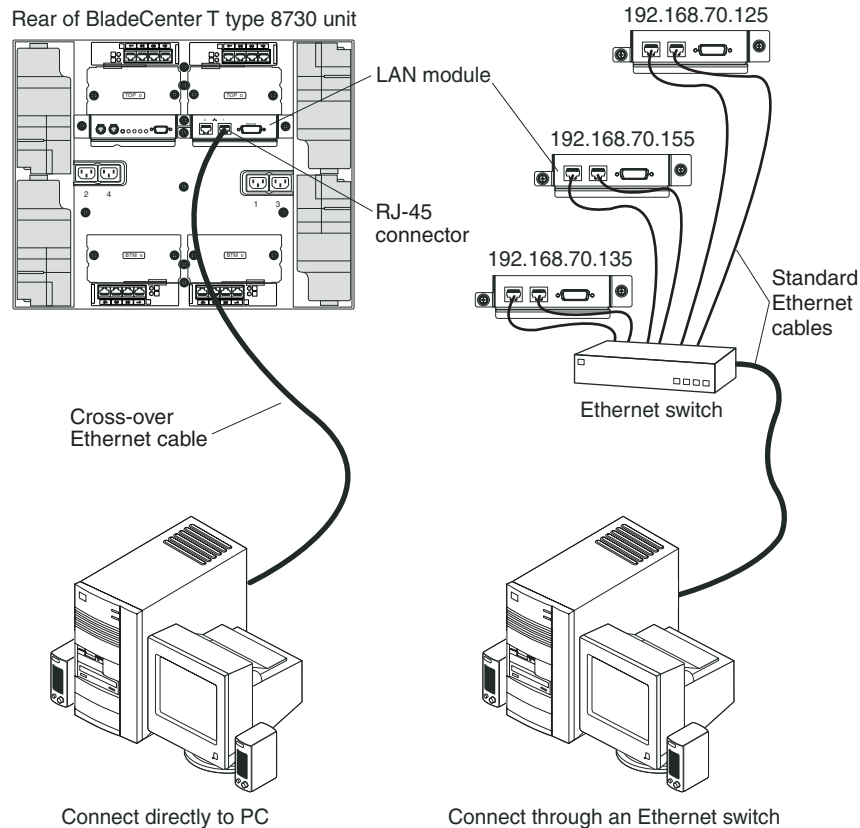
Figure 26. Cabling the Ethernet port

1. Connect one end of a Category 5 or higher Ethernet cable to an Ethernet connector on the LAN module. Connect the other end of an Ethernet cable to the network.
2. Check the Ethernet LEDs to make sure that the network connection is working. Figure 27 on page 48 shows the location of the Ethernet LEDs on the LAN module.

Ethernet link   Ethernet activity
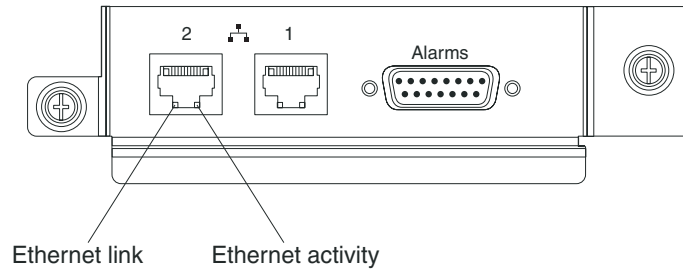
Figure 27. Ethernet LEDs

Ethernet link LED
> When this green LED is lit, there is an active connection through the port to the network.

Ethernet activity LED
> When this green LED is flashing, it indicates that there is activity through the port over the network link.

After you connect the management module to the network, the Ethernet port connection is configured and enabled in one of the following ways:

- If you have an accessible, active, and configured dynamic host configuration protocol (DHCP) server on the network, the host name, IP address, gateway address, subnet mask, and DNS server IP address are set automatically.
- If the DHCP server does not respond within two minutes after the port is connected, the management module uses the static IP address and subnet address.

If you do not want to use the default static values, you can configure the static IP address, host name, and subnet mask for the management module through the Web interface. The default IP address is 192.168.70.125, the default subnet address is 255.255.255.0, and the default host name is MM*xxxxxxxxxxxx*, where *xxxxxxxxxxxx* is the burned-in medium access control (MAC) address. The MAC address is on a label on the management module, below the IP reset button.

Note: If the IP configuration is assigned by the DHCP server, the network administrator can use the MAC address of the management module network interface to find out what IP address and host name are assigned.

If you do not want to use DHCP, configure the static IP address, then disable the DHCP client.

Deployment

To deploy and configure your BladeCenter T unit using IBM Director with or without a DHCP server or using the web-based interface go to the following Web site: www.ibm.com/servers/eserver/xseries/systems_management/ibm_director/agent/.

Preparing for blade server deployment

This section describes the considerations for deploying a blade server.

Hardware considerations

You can choose to add the following hardware options to a blade server:

- Up to two optional 2.5-inch IDE hard 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).
- 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.
- A Fibre Channel I/O expansion option provides the blade server with two additional network connections for communicating on a network. If you add a Fibre Channel I/O expansion option, you must make sure the I/O module in I/O module bays 3 and 4 on the BladeCenter T unit use the Fibre Channel interface. In addition, the I/O expansion option occupies the same location on the blade server as the second 2.5-inch IDE hard disk drive. Therefore, you can install only one 2.5-inch IDE hard disk drive.
- SCSI storage expansion unit to use 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 blade bays when connected to an HS20 blade server and three blade bays when connected to an HS40 blade server in the BladeCenter T unit.
- 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 blade bays when connected to an HS20 blade server and three blade bays when connected to an HS40 blade server.

Firmware considerations

You can download the latest firmware for a blade server at www.ibm.com/pc/support/. After downloading the latest firmware, use the BladeCenter T management module Web interface to flash the system-management module. The Web interface is described in the *IBM BladeCenter T Installation and User's Guide* on the *IBM BladeCenter T Documentation* CD.

Operating system considerations

The following operating systems are supported on a blade server:

Microsoft	Windows 2003ES	Windows Server 2003, Enterprise Edition
Microsoft	Windows 2003SS	Windows Server 2003, Standard Edition
Microsoft	Windows 2003Web	Windows Server 2003, Web Edition
Red Hat	RHEL3AS	Red Hat Enterprise Linux 3 Advanced Server
Red Hat	RHEL3ES	Red Hat Enterprise Linux 3 Edge Server
Red Hat	RHEL3WS	Red Hat Enterprise Linux WS (v.3 for x86)
SUSE	SLES8 and SLES9	SUSE LINUX Enterprise Server 8 and 9 (UL 1.0 Based)
TurboLinux	TurboLinux ES 8	Turbolinux Enterprise Server 8 (UL 1.0 Based)

For more information about your operating system go to the following Web site: www.ibm.com/pc/support.

Device driver considerations

Some of the options available for the BladeCenter T unit have device drivers that you need to install. See the documentation that comes with your option for information about installing any required device drivers.

For example, Ethernet controllers are integrated on each blade server system board. The Ethernet controllers provide 1000-Mbps full-duplex capability only, which enables simultaneous transmission and reception of data to the external ports on the Ethernet switches. You do not need to set any jumpers or configure the controller for the blade server operating system. However, you must install a device driver in the blade server to enable the blade server operating system to address the Ethernet controller.

Application considerations

Information about some of the applications including system management are provided in these redpieces and redpapers available at www.ibm.com/redbooks:
- *Deploying Lotus Domino on IBM BladeCenter*
- *Deploying Citrix MetalFrame on IBM BladeCenter*
- *Deploying Microsoft Exchange IBM BladeCenter*
- *The Cutting Edge: IBM BladeCenter*

Chapter 4. Installation considerations

This chapter describes the installation site physical requirements that must be in place to be able to complete the installation of a BladeCenter T unit. The following topics are discussed:

- "Physical planning" describes chassis dimensions, weight, floor space, and noise considerations.
- "Rack considerations" on page 54 describes weight and space limits for the IBM NetBAY rack, Universal Telecom Framework rack, and the Seismic two-post rack.
- "Power considerations for Type 8720" on page 56 describes rack and BladeCenter T unit power requirements.
- "Power considerations for Type 8730" on page 57 describes rack and BladeCenter T unit power requirements.
- "Cooling considerations" on page 62 describes temperature and humidity, air flow, room cooling, and heat output for the BladeCenter T unit.
- "Power connections for Type 8720" on page 64 provides guidelines for power and cabling for Type 8720.
- "Power connections for Type 8730" on page 65 provides diagram examples for power and cabling for Type 8730.
- "Physical installation time" on page 77 shows approximate times for installing BladeCenter T units, blade servers, and other components.

For access to configuration tools and additional information, (such as the Rack Configurator and the Configuration Options Guide), go to: www.pc.ibm.com/us/ eserver/xseries/library/configtools

Physical planning

This section describes dimensions, weight, floor space, and noise considerations.

Dimensions

A BladeCenter T unit has the following dimensions:

Width: 442 mm (17.4 in.)
Height: 349.25 mm (13.75 in.)
Depth: 508 mm (20 in.) from front of chassis to rear I/O connector plane
Maximum depth: 600 mm (23.62 in.) including bezel, handles, and cable bend radius

Weight considerations

The following factors are important when planning for the physical installation of BladeCenter T units:

- Racks have a maximum weight load limit.
- Floors, particularly raised floors, have maximum weight limits.

Floor space

Figure 28 shows the required floor space for an IBM NetBAY rack. This diagram shows the space needed to allow enough clearance in the front and rear of the rack to be able to open the doors to access the equipment. Front clearance is needed to have access to the blade servers and the BladeCenter T media tray. Rear clearance is needed to access power supplies, blowers, network cable connections, and attachment of a local monitor, keyboard, and mouse to the management module.


```
                                                       914 mm
                                                       35.98"

3438 mm
135.35"        NetBay   NetBay   NetBay
               Rack C   Rack B   Rack A

                                                       1524 mm
                                                       60.00"
                         Front

                        3850 mm
                        151.57"
```
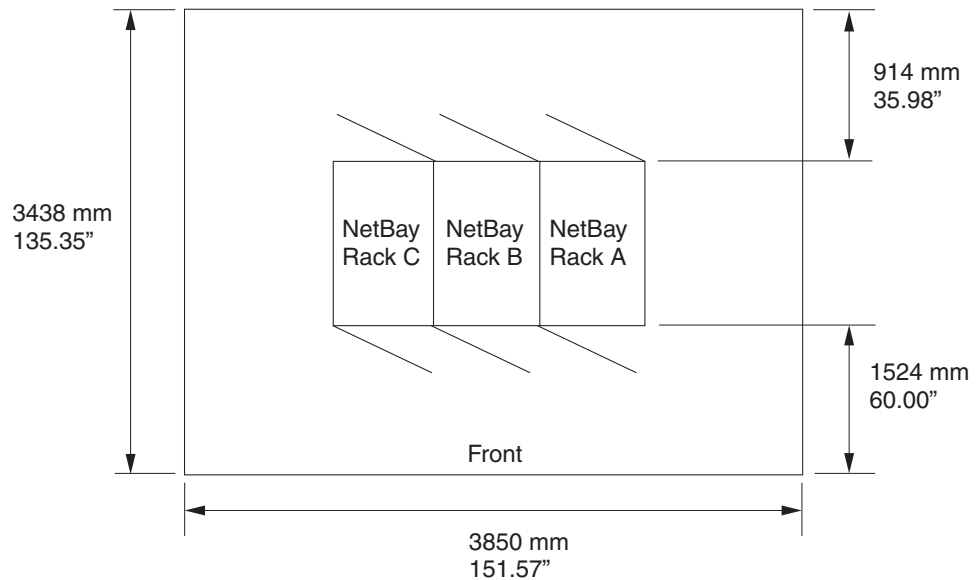
Figure 28. Operational clearances for NetBAY 42 Enterprise rack

Notes:

1. For floor planning for NEBS environment refer to the Telcordia Specification GR-63-CORE, ″Special Requirements″.
2. For floor planning for the Universal Telco Framework refer to the manufacturing specifications.

Noise considerations

Each BladeCenter T unit has four blowers for cooling. Table 11 shows the maximum sound levels emitted by BladeCenter T units. This represents the minimum and maximum number of BladeCenter T units that can be installed in a 42U rack.

Table 11. BladeCenter T noise emissions for Types 8720 and 8730

Number of BladeCenter T units per rack	Maximum sound power operating and power idling for Type 8720	Maximum sound power operating and power idling for Type 8730
1	6.7 bels	7.5 bels
2	7.0 bels	7.8 bels
3	7.2 bels	8.0 bels
4	7.3 bels	8.1 bels
5	7.4 bels	8.2 bels

Attention: 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. 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. It is recommended that a qualified person, such as an industrial hygienist, be consulted to determine whether the sound-pressure levels to which employees may be exposed exceed regulatory limits.

Rack considerations

This section provides information for IBM NetBay and non-IBM racks.

IBM NetBAY and non-IBM racks

When planning for racks the following factors must be considered:

- Floor space that provides adequate access to the front and rear of the rack, and space on both sides of the rack or a row of racks for ventilation and walk through space. See Figure 28 on page 52.
- Rack weight load limits and floor weight load limits. See Table 12 on page 55.
- Rack height – each BladeCenter T unit requires 8U, also consider the space needed for other equipment that might be installed in the same rack with the BladeCenter T units. See Table 12 on page 55.

Table 12 on page 55 shows the maximum weight limits for IBM NetBAY racks, other non-IBM racks, and expansion cabinets that are recommended for use with BladeCenter T units. The table shows the maximum number of BladeCenter T units that can be installed in the various racks when the rack is either:

- Installed in placed and sitting on the rack-leveling pads
- Being relocated and is sitting on the rack casters
- Is being shipped on a pallet

Note: For the on-site relocation, rack on casters, column the maximum number of BladeCenter T units (including the PDUs to support the configuration) is based on a 14-degree stability requirement established under IBM safety guidelines.

Table 12. Rack weight load limits

Rack	Rack weight	Maximum allowable rack weight load	Maximum fully loaded BladeCenter T units with rack on leveling pads or bolted to the floor	On-site relocation, rack on casters, maximum number of BladeCenter T units
NetBAY 42 Enterprise Rack	261 kg (575 lb)	932 kg (2050 lb)	5	3
NetBAY 42 Enterprise Expansion Cabinet	235 kg (516 lb)	932 kg (2050 lb)	5	3
NetBAY 42 Standard Rack	137 kg (301 lb)	909 kg (2000 lb)	5	3
NetBAY 42 Standard Expansion Cabinet	105 kg (231 lb)	909 kg (2000 lb)	5	3
NetBAY 25 Standard Rack	94 kg (207 lb)	568 kg (1250 lb)	3	3
NetBAY 11 Standard Rack	34 kg (75 lb)	185 kg (407 lb)	1	1
Universal Telco Framework[1]	113.4 kg (250 lb)	544.3 kg (1200 lb) dynamic	5	N/A
Seismic 2-post rack[1]	52.2 kg (115 lb) without doors	385.6 kg (850 lb) dynamic	5	N/A
Seismic 4-post rack[1]	217.7 kg (480 lb) with doors 181.4 kg (400® lb) without doors	567 kg (1250 lb) dynamic	5	N/A

Notes:

1. The weight values for the Universal Telco Framework and Seismic 2- and 4-post racks are for predefined racks; other specific rack part numbers or manufacturers may vary in their weight limitations. Refer to Telcordia GR-63-CORE standard.
2. These racks have not been NEBS-tested with the BladeCenter T installed.

When determining your floor load limits, use the combined weight of the rack, populated BladeCenter T units, power distribution units 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 at your site. Worksheets are provided in Appendix A, "Planning worksheets," on page 93.

Moving IBM NetBAY racks safely

It is very important to ensure that you move racks safely. For 42U racks, all equipment installed above 22U in the rack must be removed before a rack can be moved to another location. Before moving a rack, be sure to carefully read the instructions that are provided with your rack.

General requirements for racks

If you intend to install BladeCenter T units in a rack other than an IBM NetBAY rack, verify that the rack meets these requirements:

- The rack-mounting flanges have holes and clearances per EIA-310-D.
- Sufficient room in front of the front EIA flange to provide bezel clearance. EIA-310-D requires this space to be a minimum of 49 mm deep.
- Sufficient room behind the rear of the rear EIA flanges to provide room for cable management and routing.
- Rack should provide an adequate flow of cooling air and prevent recirculation of warm air from the rear to the front.
- Racks doors must be perforated.
- Rack weight-handling capacity should be sufficient for the aggregate weight of the BladeCenter T units, blade servers, power distribution units, and power cables.
- Racks need to be stabilized so that the rack does not become unstable when fully loaded.

Notes:

1. IBM has tested and offers rack kits for NEBS and ETSI Seismic racks. Do not place racks directly against a wall because, if service is needed, the service representative will need access to the back of the BladeCenter T unit.

2. All equipment installed in a UTF or 2- or 4-post racks has to be removed from the rack, and then the rack can be moved to its new location. These racks must be bolted to the floor and then the equipment can be installed in the racks again.

Power considerations for Type 8720

The BladeCenter T Type 8720 has redundant power modules. DC power resources must be adequate to not only supply the required voltage and amperage, but should also be designed to take advantage of the power redundancy provided by the BladeCenter T unit. Table 13 on page 57 shows how power is provided to the BladeCenter T components.

Table 13. BladeCenter T power modules

Component	Power module bays
Blade server bays 1 through 4 I/O modules Management modules Media tray Blowers 1 through 4	1 ,2 1, 2 1, 2 1, 2 1, 2
Blade server bays 5 through 8	3, 4
I/O modules	3, 4
Blowers	3 ,4

To take advantage of the BladeCenter T power redundancy, power modules 1 and 3 should be connected to different dc power sources than power modules 2 and 4. The power sources could be:

- Building dc power sources
- Front-end PDUs
- Rack PDUs

Rack requirements for Type 8720

Each BladeCenter T unit has a minimum of two or a maximum of four power modules. It also has two separate dc power feeds. Each feed must be capable of supplying up to 70 amps. Under normal operation with four power supplies and eight blades, the maximum current per feed is only 35 amps. But if one of the redundant power feeds to the system fails, the other must be able to provide all of the current for the system.

When planning for dc rack power distribution, be sure to plan for enough individual power feeds and PDUs to take advantage of the redundant BladeCenter T power supplies. When adding a dc PDU to a rack configuration, make sure to comply with the customer's standard practices.

When installing Blade Center T into a rack, allow enough space to provide for a dc PDU. Each dc feed (BCT has two) must be capable of providing 70 amps. Thus, you would need a circuit breaker of at least 90 amps, although local and customer requirements might require a higher value.

Power considerations for Type 8730

The BladeCenter T Type 8730 has redundant power modules. AC power resources must be adequate to not only supply the required voltage and amperage, but should also be designed to take advantage of the power redundancy provided by the BladeCenter T unit. Table 14 shows how power is provided to the BladeCenter T components.

Table 14. BladeCenter T power modules

Component	Power module bays
Blade server bays 1 through 4 Ethernet switch modules 1 and 2 Management modules 1 and 2 Media tray Blowers 1 through 4	1, 2 1, 2 1, 2 1, 2 1
Blade server bays 5 through 8	3, 4
Switch modules 3 and 4	3, 4

To take advantage of the BladeCenter T power redundancy, power modules 1 and 3 should be connected to different ac power sources than power modules 2 and 4. These power sources could be:

- Building ac power sources
- Front-end PDUs
- Rack PDUs

Rack requirements for Type 8730

Depending on how many BladeCenter T units are installed in a rack and the total number of power modules, 2 to 10 PDUs are required. A maximum of five BladeCenter T units can be installed in a NetBAY 42U standard rack.

Power distribution units

Each BladeCenter T unit has a minimum of two or a maximum of four power modules.

When planning for ac rack power distribution, be sure to plan for enough individual power feeds and PDUs to take advantage of the redundant BladeCenter T power supplies.

Each BladeCenter T unit requires:

- Two to four ac power cords, one per power module
- Each power module should be powered from separate high-voltage ac resources.
- 200 to 240 Vac 50 or 60 Hz

Table 15 on page 59, Table 16 on page 59, and Table 17 on page 59 show the part numbers and the number of power distribution units required to provide power source for one to five BladeCenter T units in a 42U standard or Enterprise rack.

Notes:

1. A maximum of 12 DPI® or 6 HD DPI PDUs can be mounted in the zero U space of the 42U standard rack. A maximum of 16 DPI or 8 HD DPI PDUs can be mounted in the zero U space of the 42U Enterprise rack.
2. There are no PDUs available that support the plug an 1800-W power supply requires.

Table 15. PDUs for 30 or 32 Amp ac feeds

Number of BladeCenter T units	With 1300-W Power Supplies	
	24 Amp United States	32 Amp International
1	2 PDUs PN 32P1766	2 PDUs PN 32P1752
2	4 PDUs PN 32P1766	4 PDUs PN 32P1752
3	4 PDUs PN 32P1766	4 PDUs PN 32P1752
4	6 PDUs PN 32P1766	6 PDUs PN 32P1752
5	8 PDUs PN 32P1766	8 PDUs PN 32P1752

Table 16. PDUs for 60 or 63 Amp AC feeds

Number of BladeCenter T units	With 1300-W Power Supplies	
	48 Amp United States	63 Amp International
1	2 PDUs PN 32P1767 or 2 PDUs PN 73P5855	2 PDUs PN 32P1754 or 2 PDUs PN 73P5856
2	4 PDUs PN 32P1767 or 2 PDUs PN 73P5855	4 PDUs PN 32P1754 or 2 PDUs PN 73P5856
3	4 PDUs PN 32P1767 or 2 PDUs PN 73P5855	4 PDUs PN 32P1754 or 2 PDUs PN 73P5856
4	6 PDUs PN 32P1767 or 4 PDUs PN 73P5855	6 PDUs PN 32P1754 or 2 PDUs PN 73P5856
5	8 PDUs PN 32P1767 or 4 PDUs PN 73P5855	8 PDUs PN 32P1754 or 4 PDUs PN 73P5856

Table 17. PDUs for 32- or 60-Amp 3-phase ac feeds

Number of BladeCenter T units	With 1300-W Power Supplies	
	48 Amp 3-phase Delta (United States) 28 Amp/phase	32 Amp 3-phase WYE (International) 32 Amp/phase
1	2 PDUs PN 73P5847	2 PDUs PN 73P5844
2	2 PDUs PN 73P5847	2 PDUs PN 73P5844
3	2 PDUs PN 73P5847	2 PDUs PN 73P5844
4	2 PDUs PN 73P5847	2 PDUs PN 73P5844
5	4 PDUs PN 73P5847	2 PDUs PN 73P5844

Table 18. PDUs for 60-Amp 3-phase ac feeds

Number of BladeCenter T units	With 1300-W power supplies
1	Not supported (see note)
2	Not supported (see note)
3	Not supported (see note)
4	Not supported (see note)
5	Not supported (see note)
Note: 1300-W power supplies do not ship with the required cable to connect to a 60-A 3-phase feed.	

For recommended ways of providing power sources to BladeCenter T racks, see "Power connections for Type 8730" on page 65. This section provides diagrams that show different ways to provide redundant power sources to one or more BladeCenter T units. These diagrams are based on using IBM NetBAY Enterprise racks.

Wall and floor power drop requirements

Figure 29 through Figure 33 on page 61 shows ac power connectors that can be used for attachment of power feeds to the rack PDUs.
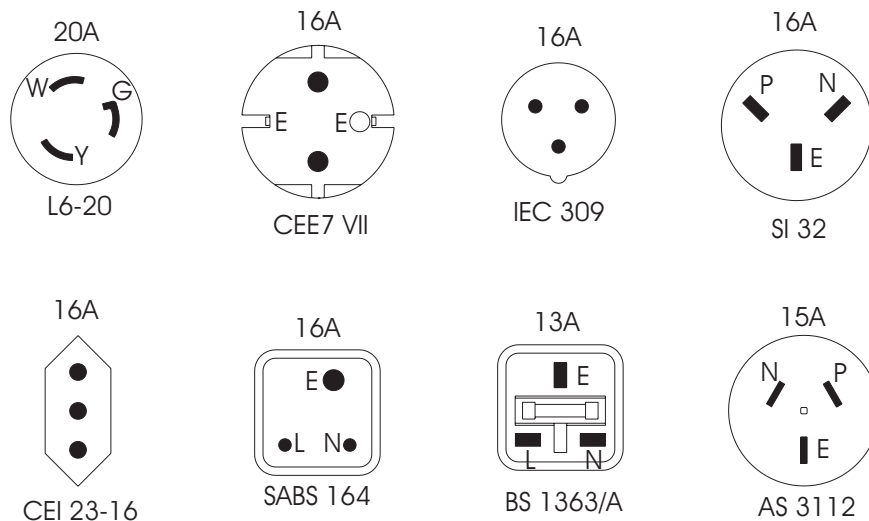
Figure 29. Rack PDU — 20-A single phase
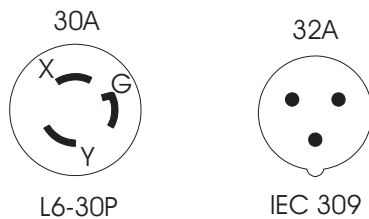
Figure 30. Rack PDU — 30-A and 32-A single phase

32A

IEC 309
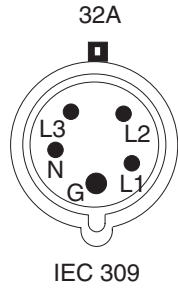
Figure 31. Rack PDU — 32-A 3-phase (3-phase + neutral + ground)

60/63A

IEC 309

Figure 32. Rack PDU — 60-A single phase

60A

IEC 309
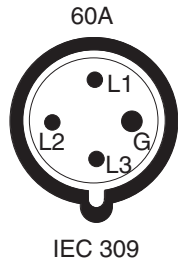
Figure 33. Rack PDU — 60-A 3-phase (3-phase + ground)

Keyboard, video, and mouse

The management module provides a set of connectors for attaching a keyboard, monitor, and mouse to the BladeCenter T unit. This provides a method for performing local 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 T unit when needed, or plan for rack space for installing a keyboard, mouse, and monitor.

Note: Go to the IBM Support Web site at www.ibm.com/pc/support/ to see the list of supported devices.

Electrical input for Type 8720

The BladeCenter T Type 8720 requires the following electrical input:

- Input voltage:
  - Minimum: -38 V dc
  - Maximum: -75 V dc
  - Nominal: -48 V dc

Electrical input for Type 8730

The BladeCenter T Type 8730 requires the following electrical input:

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

Cooling considerations

The operating environment for BladeCenter T units must provide sufficient temperature and humidity control to ensure BladeCenter T thermal failures do not occur. Key requirements are:

- Air temperature and humidity
- Air flow
- Installation into a rack
- Prevention of air recirculation
- Room cooling

Air temperature and humidity for Telecom/NEBS environment

See Table 19 for the permissible temperatures and humidity limits for a BladeCenter T Type 8720.

Table 19. BladeCenter T Type 8720 temperature and humidity limits

BladeCenter T Power	Altitude	Temperature range	Humidity range
On	-60 to 1800 m (-197 ft to 6000 ft)	5° to 40° C (41° to 104° F)	5% to 85%
On (short term)	-60 to 1800 m (-197 ft to 6000 ft)	-5° to 55° C (23° to 131° F)	5% to 90% not to exceed 0.024 water/kg of dry air
On	1800 m to 4000 m (6000 to 13,000 ft)	5° to 30° C (41° to 86° F)	5% to 85%
On (short term)	1800 m to 4000 m (6000 to 13,000 ft)	-5° to 45° C (23° to 113° F)	5% to 90% not to exceed 0.024 water/kg of dry air
Off	Uncontrolled	Uncontrolled	Uncontrolled

Air temperature and humidity for non-NEBS environment

See Table 20 on page 63 for the permissible temperatures and humidity limits for a BladeCenter T Type 8730.

Table 20. BladeCenter T Type 8730 temperature and humidity limits

BladeCenter T Power	Altitude	Temperature range	Humidity range
On	-60 to 1800 m (-197 ft to 6000 ft)	5° to 35° C (41° to 95° F)	5% to 85%
On	1800 m to 4000 m (6000 to 13,000 ft)	5° to 32° C (41° to 90° F)	5% to 85%
Off	Uncontrolled	Uncontrolled	Uncontrolled

Airflow considerations

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

- Each BladeCenter T unit requires a maximum of 450 cubic feet per minute (CFM) and a minimum of 200 CFM of air circulation
- Each BladeCenter T unit has four blowers.
- Airflow direction is from front to back.
- All BladeCenter T chassis bays must be populated, either with a module, a blade server, or a filler in place of the component. A removed hot-swap module or drive must be replaced within 1 minute of removal or performance degradation or thermal failures may occur. A removed hot-swap blade must be replaced within 20 minutes while the BladeCenter T unit is operating or performance degradation or thermal failures may occur.
- All equipment installed in a rack with a BladeCenter T unit must use front-to-back airflow to prevent warm-air-recirculation problems. Devices that use back-to-front air flow causes warm air to enter the front of the BladeCenter T unit. This can cause reduced reliability, component failure, data loss, or server shutdown.
- In racks with multiple BladeCenter T units, populate the BladeCenter T 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 for Types 8720 and 8730

The amount of heat output of a BladeCenter T Type 8720 in BTU per hour is as follows:

- Minimum configuration: 673 BTU/hour (197 W)
- Maximum configuration: Varies depending on the type of power supplies installed:
    - Four 1300-W power supplies: 11229 BTU/hour (3291 W)

The amount of heat output of a BladeCenter T Type 8730 in BTU per hour is as follows:

- Minimum configuration: 673 BTU/hour (197 W)
- Maximum configuration: Varies depending on the type of power supplies installed:
    - Four 1300-W power supplies: 10440 BTU/hour (3060 W)

For all other power supplies, see the documentation that comes with the power supply.

Prevention of air recirculation

Attention: Consider these 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.

Air filtration

The BladeCenter T unit comes with a bezel assembly containing a removable and replaceable air filter. There are software features in the management-module that detect a clogged filter and generate system alerts based on the severity of the airflow reduction. The typical service interval for the filter is approximately three to six months depending on your environment.

Room cooling

Attention: To prevent possible BladeCenter T 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 T unit and rack.
- Ensure that the room cooling system is positioned so warm exhaust air is directed away from all BladeCenter T units towards the room cooling system without passing in front of a BladeCenter T unit.
- 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.

Power connections for Type 8720

The BladeCenter T Type 8720 unit has two dc-power terminal connectors each powering two power modules. The left connection (looking from the rear) supplies power to power-module bays 2 and 4, and the connection on the right supplies power to power-module bays 1 and 3. Each dc terminal has four #M6 (0.25-inch) studs, one for -48 V dc, one for RETURN, and two for connecting the safety ground wire. The following guidelines are provided for connecting to the -48 V dc power source:

- DC wire rating of 4AWG (7x7x34/36 TC), 105C, 300V UL 10198, CSA approved and VW1 rated.
- Ring terminal designed for M6 stud, 4AWG wire, wire size (circular Mil area) of 33100–52600, and a wire insulation diameter of 12.8 mm to 13.1 mm.
- A two-lug ring terminal, required by NEBS for connecting the single safety ground wire.

To provide true redundant power, BladeCenter T power modules 1 and 3 must be connected to a different power source than power modules 2 and 4.

When installing one or more dc chassis into a rack, a dc PDU is required. When planning for rack space, make sure to leave room for installing such a unit. Various manufacturers supply dc PDUs. However, your own company requirements might determine which manufacturer you can select. For redundant operation, you must plan on the maximum current for each feed of the BCT. Figure 34 shows a typical dc PDU.
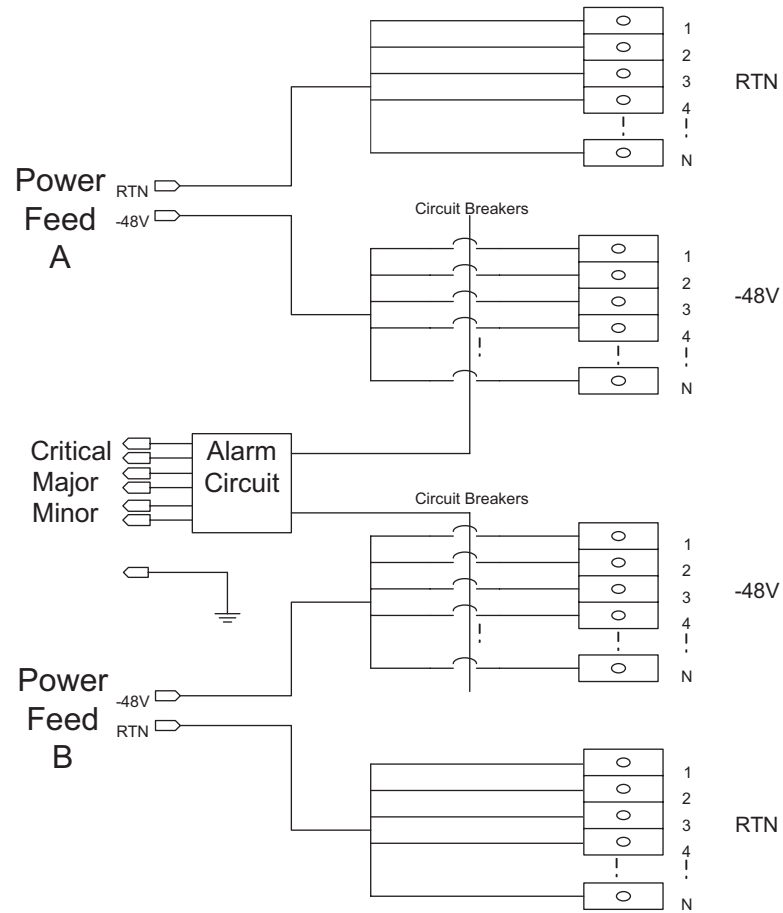
Figure 34. Typical dc PDU for a single BladeCenter T Type 8720

Power connections for Type 8730

This section provides examples of power diagrams. The examples represent various ways of providing redundant power sources to BladeCenter T units with four power supplies. All examples assume IBM Enterprise NetBAY racks are being used. Use the ac power jumper cords provided with your product, power supply option, or upgrade kit.

Table 21 lists the power jumper cord part numbers required to attach to each of the PDUs in the following examples.

Table 21. Power jumper cord part numbers

Power Supply	When attaching directly to North American PDUs			
1300 Watt	24 A - 32P1766	48 A - 32P1767	48 A - 73P5855	48 A 3-phase - 73P5847
	Use line cord part number:			
	74P4430[1]	74P4430[2]	74P4430[3]	74P4430[5]
	When attaching directly to international PDUs			
	32 A - 32P1752	63 A - 32P1754	63 A - 73P5856	32 A 3-phase - 73P5844
	Use line cord part number:			
	74P4430[2]	74P4430[2]	74P4430[4]	74P4430

Notes:

1. A maximum of two power supplies can be connected to each PDU.
2. A maximum of three power supplies can be connected to each PDU.
3. A maximum of six power supplies can be connected to each PDU.
4. A maximum of eight power supplies can be connected to each PDU.
5. A maximum of nine power supplies can be connected to each PDU, three per phase.

Power layout example 1– single BladeCenter T units

Figure 35 shows power distribution for a single BladeCenter T Type 8730 unit installed in either a NetBAY 25 or NetBAY 42 standard rack. Power sources A and B represent separate power feeds to the racks.

Figure 35 represents PDU part number (North American) 32P1766 (24 amp) or 32P1767 (48 amp), or PDU part number (international) 32P1752 (32 amp) or 32P1754 (63 amp). You can use either PDU in this position. The PDU is cabled to the 1300-W power supplies using power cable part number 74P4430 (optional part number 23K4809: C13 to C20, 2.5 m jumper cord).

Figure 35. Single BladeCenter T Type 8730 installed in a NetBAY 25 or 42U rack with 1300-W power supplies

Power layout example 2 – two BladeCenter T Type 8730 units in NetBAY 25 or 42U racks

Figure 36, Figure 37, and Figure 38 on page 69 show power distribution for two BladeCenter T Type 8730 units installed in either a NetBAY 25 or NetBAY 42 standard rack. Power sources A and B represent separate power feeds to the racks.

Figure 36 represents PDU part number (North American) 32P1766 (24 amp) or 32P1767 (48 amp), or PDU part number (international) 32P1752 (32 amp) or 32P1754 (63 amp). You can use either PDU in this position. The PDU is cabled to the 1300-W power supplies using power cable part number 74P4430 (optional part number 23K4809: C13 to C20, 2.5 m jumper cord).

Figure 36. Two BladeCenter T Type 8730 units installed in NetBAY 25 to 42U racks with 1300-W power supplies (24 or 48 amp (North American) or 32 or 63 amp [international])

Figure 37 represents PDU part number (North American) 73P5855 (48 amp) or PDU part number (international) 73P5856 (63 amp). You can use either PDU in this position. The PDU is cabled to the 1300-W power supplies using power cable part number 74P4430 (optional part number 23K4809: C13 to C20, 2.5 m jumper cable).

Figure 37. Two BladeCenter T Type 8730 units installed in NetBAY 25 to 42U racks with 1300-W power supplies (1-phase)

Figure 38 represents PDU part number (North American) 73P5847 (48 amp 3-phase) or PDU part number (international) 73P5844 (32 amp 3-phase). You can use either PDU in this position. The PDU is cabled to the 1300-W power supplies using power cable part number 74P4430 (optional part number 23K4809: C13 to C20, 2.5 m jumper cable).
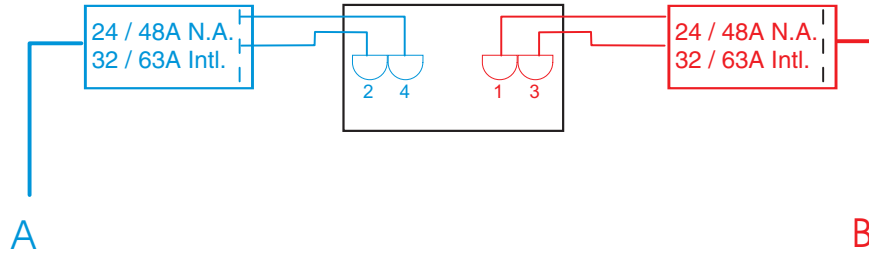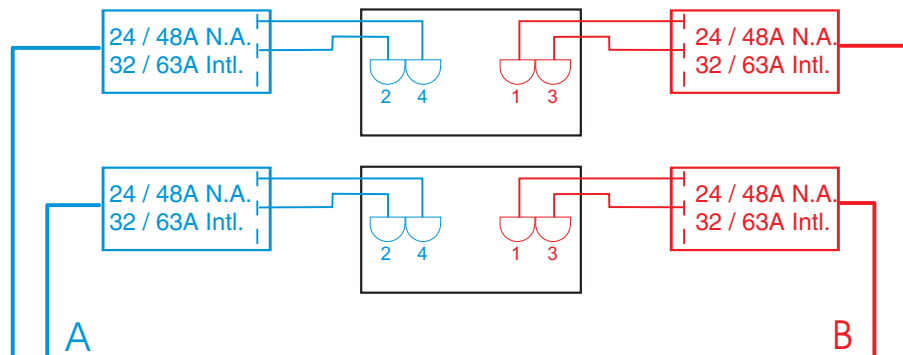

Figure 38. Power layout of two BladeCenter T Type 8730 units installed in NetBAY 25 to 42U racks with 1300-W power supplies (3-phase)

Power layout example 3 – three BladeCenter T Type 8730 units in NetBAY 25 or 42U racks

Figure 39 and Figure 40 show power distribution for three BladeCenter T Type 8730 units installed in either a NetBAY 25 or NetBAY 42 standard rack. Power sources A and B represent separate power feeds to the rack.

Figure 39 represents PDU part number (North American) 32P1766 (24 amp) or 32P1767 (48 amp), or PDU part number (international) 32P1752 (32 amp) or 32P1754 (63 amp). You can use either PDU in this position.

Figure 39. Three BladeCenter T Type 8730 units in a NetBAY 25 or 42 rack with 1300-W power supplies (24 or 48 amp (North American) or 32 or 63 amp (international)

Figure 40 represents PDU part number (North American) 73P5855 (48 amp 1-phase) or PDU part number (international) 73P5856 (63 amp 1-phase), or PDU part number (North American) 73P5847 (48 amp 3-phase) or PDU part number (international) 73P5844 (32 amp 3-phase). You can use either PDU in this position.
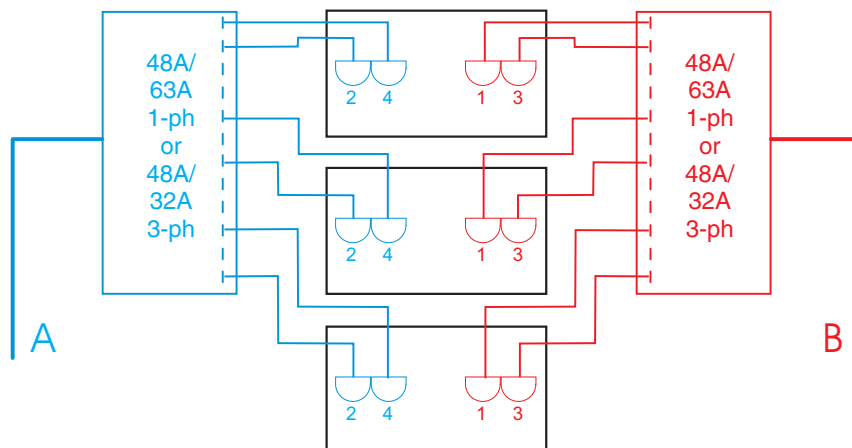
Figure 40. Three BladeCenter T Type 8730 units in a NetBAY 25 or 42 rack; 1300-W power supplies (3-phase)

Power layout example 4 – four BladeCenter T Type 8730 units in NetBAY 42U racks

Figure 41, Figure 42 on page 72, and Figure 43 on page 73 show power distribution for four BladeCenter T Type 8730 units installed in a NetBAY 42 rack. Power sources A and B represent separate power feeds to the rack.

Figure 41 represents PDU part numbers (North American) 32P1766 (24 amp) or 32P1767 (48 amp), or PDU part number (international) 32P1752 (32 amp) or 32P1754 (63 amp). You can use either PDU in this position.
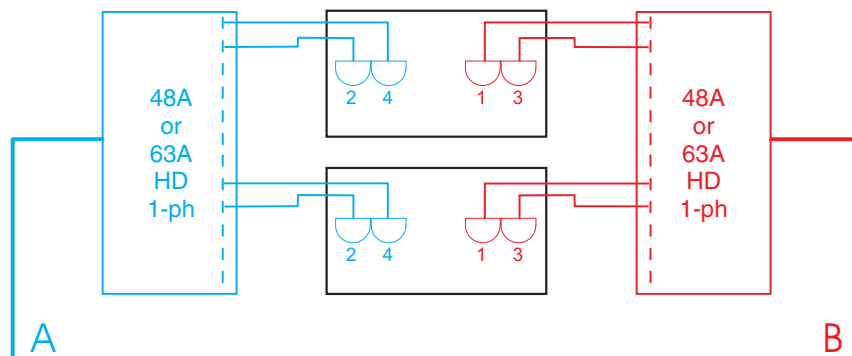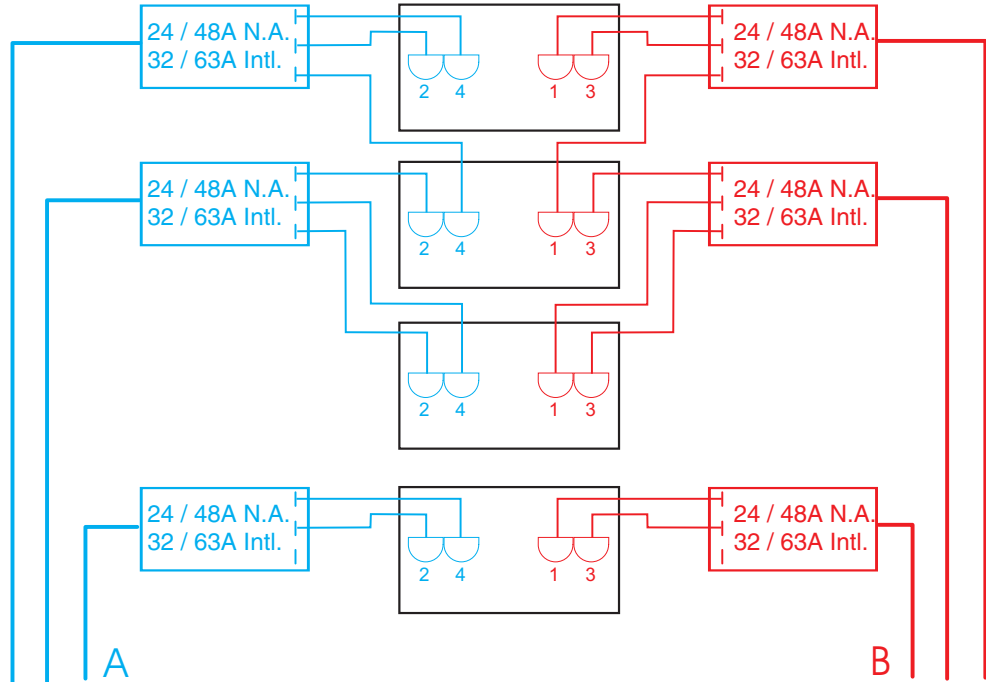

Figure 41. Four BladeCenter T Type 8730 units in a NetBAY 42U rack with 1300-W power supplies

Figure 42 represents PDU part number (North American) 73P5855 (48 amp 1-phase).
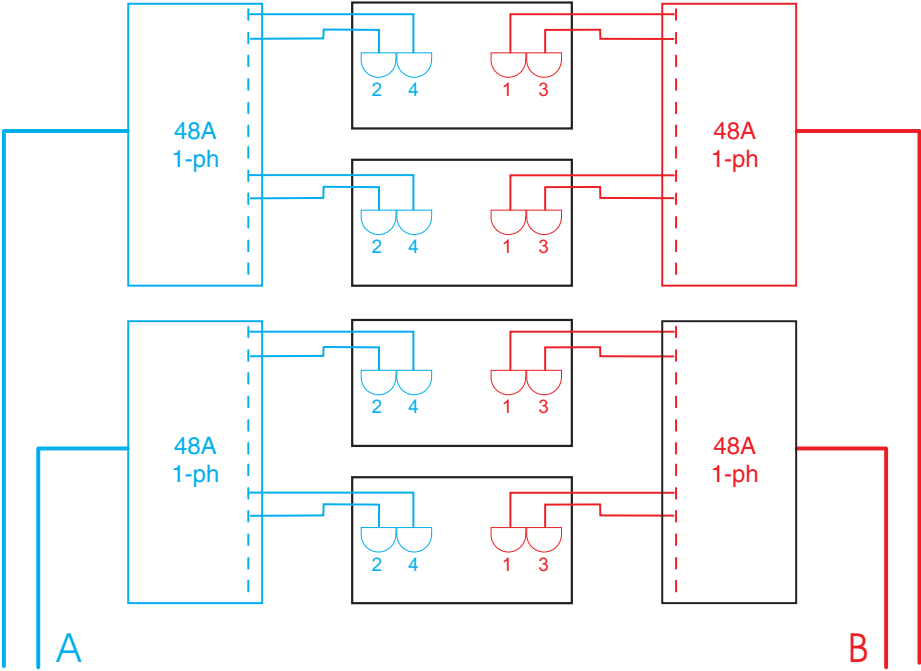
Figure 42. Four BladeCenter T units in a NetBAY 42U rack with 1300-W power supplies (1–phase)

Figure 43 represents PDU part number (international) 73P5856 (63 amp 1-phase), or PDU part number (North American) 73P5847 (48 amp 3-phase), or PDU part number (international) 73P5844 (32 amp 3-phase). You can use either PDU in this position.
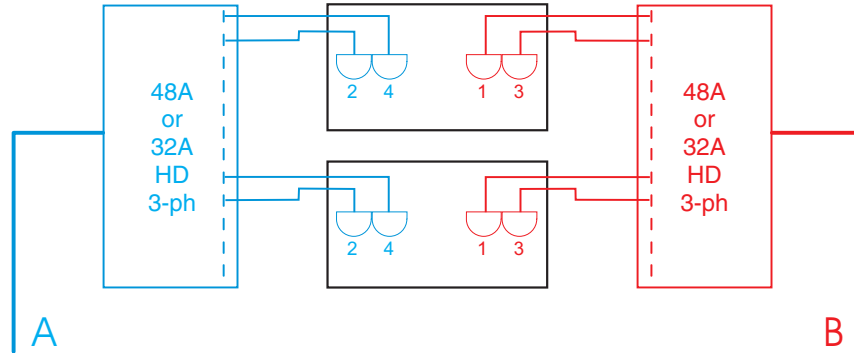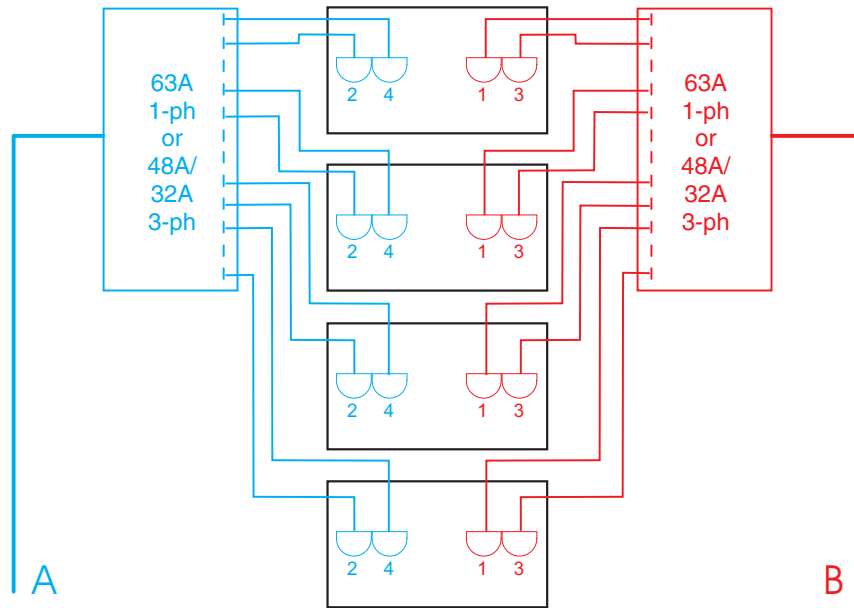

Figure 43. Power layout for four BladeCenter T Type 8730 units in a NetBAY 42U rack with 1300-W power supplies (1- and 3-phase)

Power layout example 5 – five BladeCenter T Type 8730 units in NetBAY 42U racks

Figure 44, Figure 45 on page 75, and Figure 46 on page 76 show power distribution for five BladeCenter T Type 8730 units installed in a NetBAY 42 rack. Power sources A and B represent separate power feeds to the rack.

Figure 44 represents PDU part number (North American) 32P1766 (24 amp) or 32P1767 (48 amp), or PDU part number (international) 32P1752 (32 amp) or 32P1754 (63 amp). You can use either PDU in this position.
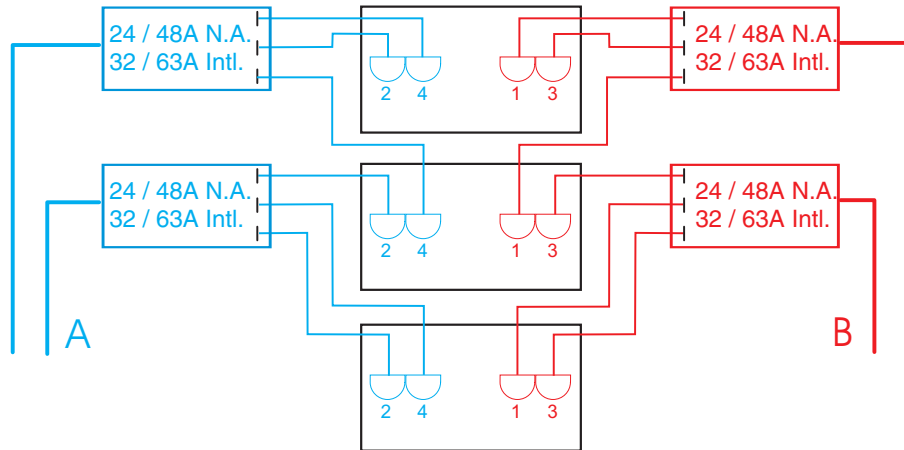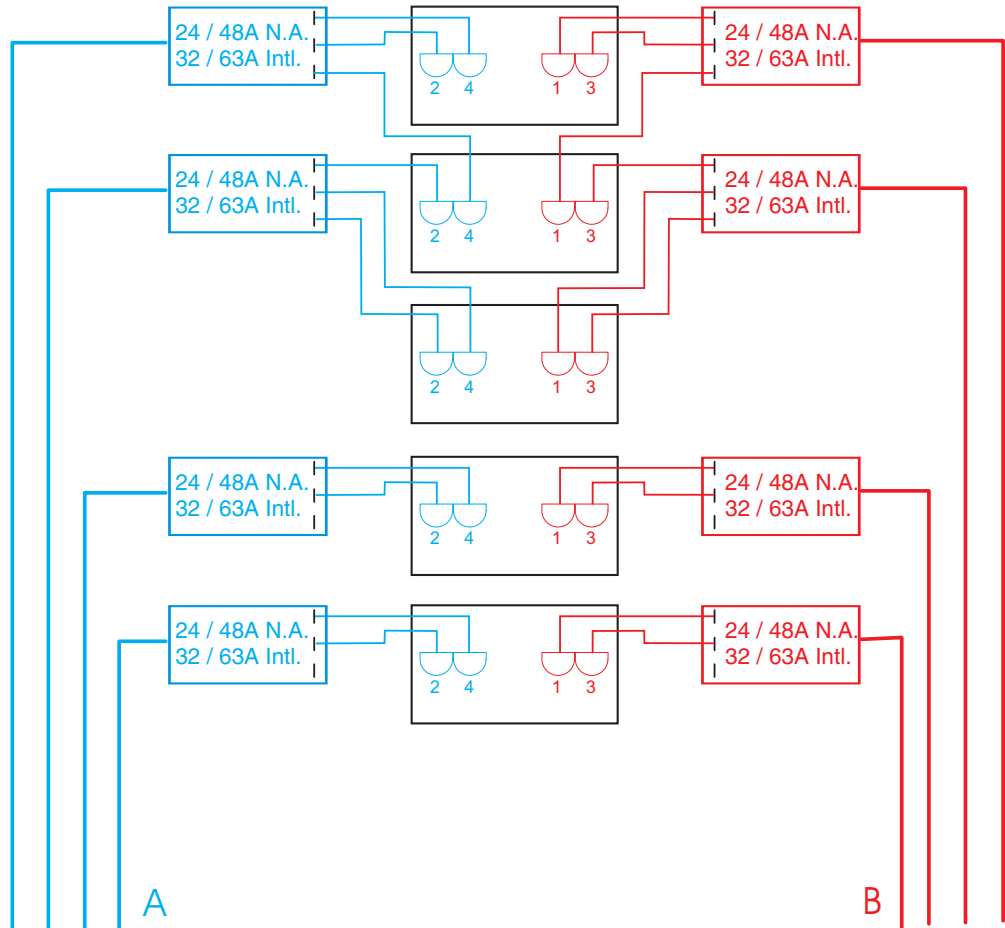

Figure 44. Five BladeCenter T Type 8730 units in a NetBAY 42 rack with 1300-W power supplies

Figure 45 represents PDU part number (North American) 73P5855 (48 amp
1-phase). PDU part number (international) 73P5856 (63 amp 1-phase).
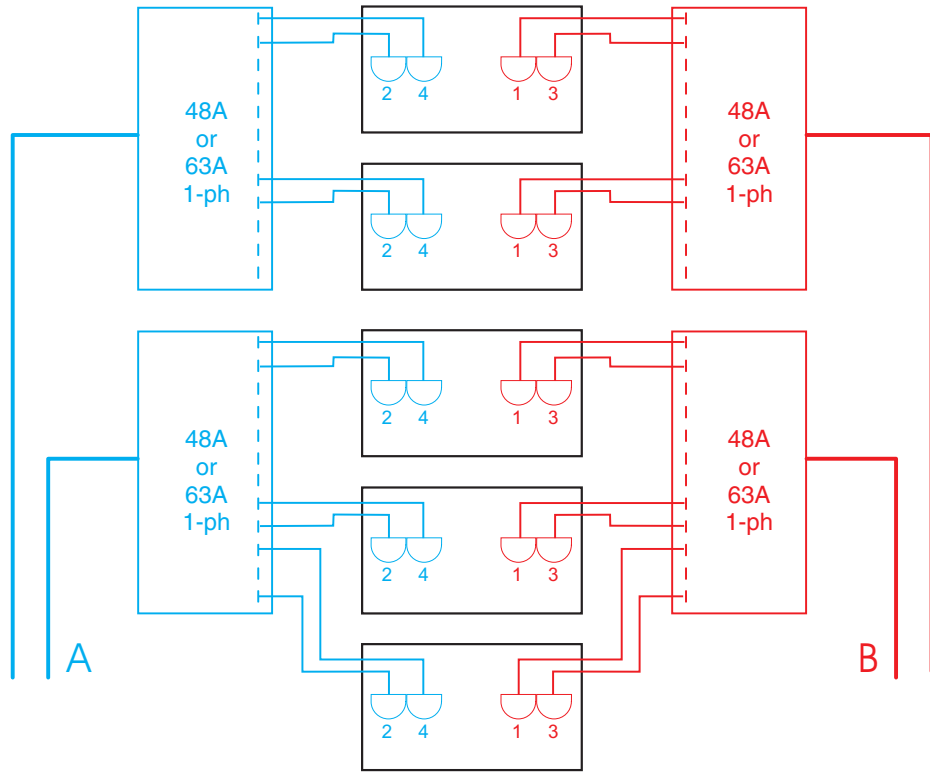
Figure 45. Five BladeCenter T Type 8730 units in a NetBAY 42 rack with 1300-W power supplies (48 amp or 63 amp 1-phase)

Figure 46 represents PDU part number (international) 73P5844 (32 amp 3-phase). You can use either PDU in this position.
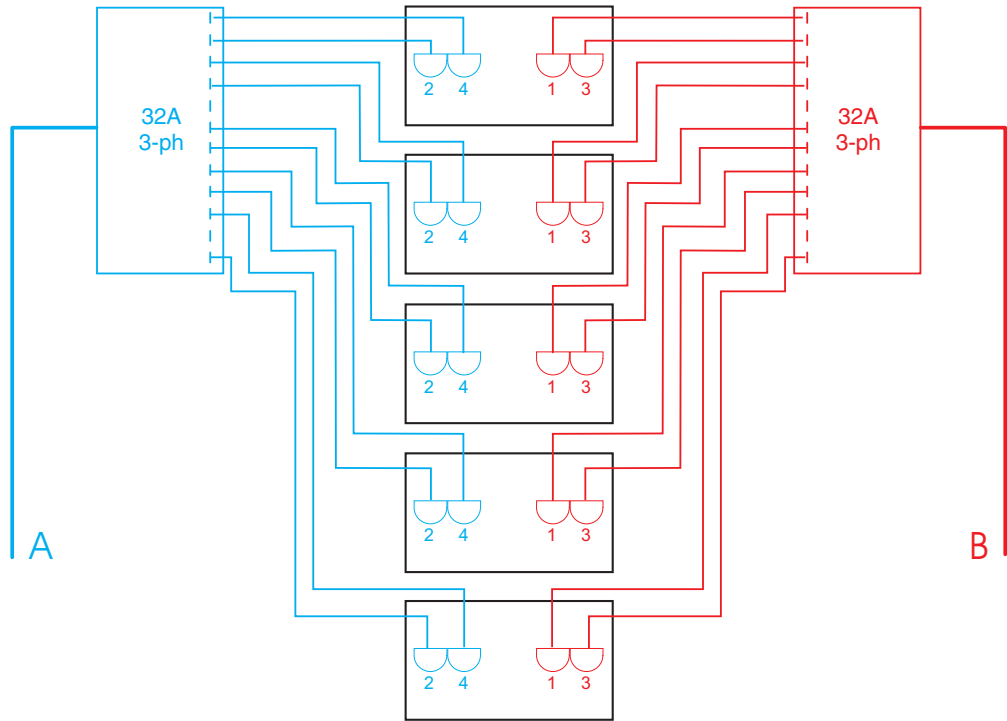
Figure 46. Power layout for five BladeCenter T Type 8730 units in a NetBAY 42 rack with 1300-W power supplies (32 amp 3-phase)

Physical installation time

Table 22 shows the average installation times required for installing blade server components, blade servers, and BladeCenter T units.

Table 22. Average BladeCenter T components installation time

Component	Average installation time
Blade server processor	1 minute 46 seconds
Blade server memory	24 seconds
Blade server disk drive	2 minutes
Blade server SCSI expansion option	38 seconds
Blade server SCSI disk drive	7 seconds
Blade server I/O expansion option	2 minutes
Blade server into BladeCenter T unit	9 seconds
BladeCenter T 4-post rack mounting kit and BladeCenter T unit into rack	25 minutes
BladeCenter T bezel assembly	7 seconds
BladeCenter T air filter installation into bezel assembly	23 seconds
BladeCenter T management module	10 seconds
BladeCenter T Ethernet switch module	5 seconds
BladeCenter T power module	12 seconds
BladeCenter T fibre channel switch module	5 seconds
BladeCenter T media tray	7 seconds
BladeCenter T CD/ROM	42 seconds
BladeCenter T Blower	7 seconds
BladeCenter T LAN module	35 seconds
BladeCenter T KVM module	32 seconds

Chapter 5. Configuration considerations

This chapter describes the information you need to plan for your BladeCenter T hardware configuration. The following hardware requires configuration:

- Management module (see "Management module configuration planning").
- Ethernet switch module (see "Ethernet switch module configuration planning" on page 81).
- Blade server (see "Blade server configuration planning" on page 90).

Management module configuration planning

The BladeCenter T unit comes with one hot-swap management module in the management bay. A second management module can be added in management bay 2.

Note: Only one management module will be active; the second management module, if present, provides redundancy.

The management module functions as a service processor for the multiple blade servers. The management module also configures the BladeCenter T unit and modules, configuring information such as the switch module IP addresses. The management module also performs USB-to-PS2 conversions for the system keyboard and mouse, and VGA signal packetizing for remote viewing.

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

- Blader 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 management module also communicates with the I/O modules, power modules, blower 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 worksheet provided (see "Management module configuration worksheet" on page 105) to plan for the configuration of the management module. In addition, complete details for each of the options that you can configure are provided in the *BladeCenter T Types 8720 and 8730 Installation and User's Guide*.

Configure these options for the management module:

- General settings
- Login profiles
- Alerts
- Port assignments
- Network interfaces
- Network protocols
- Security
- Configuration file
- Firmware update

- Restore defaults
- Restart MM

General settings

General settings include:
- Management module name
- Name of the person who is responsible for the management module
- Physical location of the management module
- Real-time clock settings

Login profiles

You can specify up to 12 login profiles. For each login profile, specify the following:
- Login ID.
- Password.
- Authority. You can specify either read only (R/O) or read/write (R/W). The default is read only.

Alerts

For alerts, you can configure the following settings:
- Which alerts are monitored (from lists of Critical, Warning, and System alerts)
- Where and to whom alerts are sent
- How alerts are sent (SNMP or e-mail)
- How often to retry alert notification and the delay between retries
- Whether to include the event log with notifications

Port assignments

The following management-modules ports can be configured:
- HTTP
- HTTPS
- Telnet
- SSH
- SNMP Agent
- SNMP Traps

Network interfaces

You can configure the following two Ethernet interfaces:
- External network interface, which is the interface for the remote management and console port.
- Internal network interface, which is the interface to the I/O modules.

Note: For I/O-module communication with a remote management station, through the management-module external Ethernet port, the I/O module internal network interface and the management module internal and external interfaces must be on the same subnet.

Network protocols

You can configure settings for the following network protocols:

- Simple Network Management Protocol (SNMP)
- Simple Mail Transfer Protocol (SMTP)
- Domain Name Server (DNS)
- Lightweight Directory Access Protocol (LDAP)

Security

You can configure the following security settings:

- View or change the secure socket layer (SSL) settings for the Web server and LDAP client
- View or change the Web server secure shell (SSH) settings
- Enable or disable SSL
- Determine to use self-signed certificates or certificates provided by a certificate authority (CA)
- Enable or disable SSH
- Generate and manage the SSH server key

Specify whether or not to enable Secure Sockets Layer (SSL). If you choose to enable SSL, you can determine whether to use self-signed certificates or certificates provided by a certificate authority (CA).

Configuration file

Configuration File is used to back up or restore the management-module configuration file.

Firmware update

Firmware Update is used to update the management-module firmware; if a second management module is installed, the firmware update is automatically applied to both management modules.

Restore defaults

Restore Defaults is used to restore the factory default configuration of the management module.

Restart MM

Restart MM is used to restart (reset) the management module. If a second management module is present, Restart MM is used to change to the redundant management module.

Ethernet switch module configuration planning

One Ethernet switch module is required in switch module bay 1 of your BladeCenter T unit. The switch module provides four external Ethernet ports, which you can use to communicate with an external Ethernet network.

Options that you can configure for the Ethernet switch module include:

- Switch settings
- Port settings
- SNMP

- User accounts
- TFTP
- VLANs
- Multicasting
- Mirroring
- Spanning tree
- Class of service
- Link aggregation
- Enable external ports for management

Note: Refer to your Ethernet switch documentation for more information about the various options.

Use the information provided in this section along with the worksheet provided (see "Ethernet switch module configuration worksheet" on page 108) to plan for the configuration of the management module. More information about these options is provided in each Gb Ethernet switch installation and user's guide.

Attention: The BladeCenter T unit 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 using the management module configuration panels. These panels are accessed by attaching a workstation to the 10/100-Mbps Ethernet port on the management module or by using the IBM Director Wizard. Once the Ethernet Switch module ports are enabled, a system management workstation can communicate with the Ethernet switch module using the Web GUI or Telnet commands.

The following Ethernet switches are supported:
- IBM BladeCenter 4-port Gb Ethernet Switch Module
- IBM BladeCenter T 4-port Gb Ethernet Switch Module
- Nortel Networks Layer 2-7 Gb Ethernet Switch Module

Switch settings

For the switch, determine the name, description, and contact. In addition, determine how the switch will obtain an IP address:
- The IP address that you specify for the switch when you configure the management module will override any settings you specify here.
- If the switch is going to obtain an IP address manually, you need to enter an IP address, subnet mask, and default gateway. The switch default IP address is based on the switch module bay in which you installed the switch:
  - Switch module bay 1: IP address is `192.168.70.127`
  - Switch module bay 2: IP address is `192.168.70.128`
  - Switch module bay 3: IP address is `192.168.70.129`
  - Switch module bay 4: IP address is `192.168.70.130`
- If you specify BOOTP as the method used to obtain an IP address, the switch sends out a BOOTP broadcast request to a BOOTP server when it is turned on. If no server is found, the default or previously entered IP settings are used.

  Note: Before the switch can broadcast a BOOTP request, you have to enable the external ports on the switch through the BladeCenter T management module.

- If you specify DHCP as the method used to obtain an IP address, the switch will send out a DHCP broadcast request to a DHCP server when it is turned on. If no server is found, the default or previously entered IP settings are used.

  Note: Before the switch can broadcast a DHCP request, you have to enable the external ports on the switch through the BladeCenter T management module.

- Group VLAN Registration Protocol (GVRP) allows members to dynamically join VLANs. You can enable or disable GVRP on the switch module.
- Telnet timeout determines the time that the Telnet interface can be idle before the switch automatically logs out the user. You can choose 2 minutes, 5 minutes, 10 minutes, 15 minutes, or never.
- Telnet sessions determines the maximum number of allowed Telnet sessions.
- MAC address aging timer and time

Port settings

The Ethernet switch modules have internal ports (for communication with the blade servers) and four external ports (for communication with external devices).

For the internal ports, you can configure these settings:

- State. The port state can be either enabled or disabled. If the internal port is disabled, the blade servers cannot communicate with the port and the switch purges their addresses from its address table after the MAC address aging time elapses.
- Flow Control. Flow control can be enabled or disabled. Selecting enabled in full-duplex mode implements IEEE 802.3x flow control.

In addition to State and Flow Control, you can configure the Speed and Duplex mode for the external ports.

- Select **Auto** to allow the port to select the best transmission speed, duplex mode, and flow control settings based on the capabilities of the device at the other end.
- You can enable or disable flow control in conjunction with all of the speed and duplex settings except 10M/Half and 100M/Half. In these cases, back pressure is automatically selected.

SNMP

Determine the management stations that will receive SNMP traps, SNMP community strings, level of access to switch settings by the community, and whether or not the community name is enabled. You can also specify up to four management station recipients to receive traps.

User accounts

Determine which user accounts will have access to the switch.

- Default user account:
  - User ID: USERID
  - Password: PASSW0RD (the sixth character is a numeric 0, not an alphabetic O)
- User IDs and passwords are case sensitive.
- Access level:
  - Root. Read/write access to all switch module settings.

– User. Read-only access to all switch module settings.

– User+. Read-only access to all switch settings, plus the ability to restart the switch module.

TFTP

Determine the location of the Trivial File Transfer Protocol (TFTP) servers (as well as the path and file name) to be used for the download configuration file, firmware code file, upload configuration file, and log file.

- TFTP server software must be running for TFTP services to work.

- For the configuration file that is uploaded to a TFTP server to be saved correctly, you must first save switch module configurations to non-volatile random access memory (NVRAM).

- Before the switch can upload its history log file to the TFTP server, an empty history log file must exist on the TFTP server.

Virtual LANs

Virtual LANs (VLANs) allow multiple blade servers to be part of a logical group and prevent other servers that do not belong to a given group from gaining direct access to the group resources and data. The BladeCenter Ethernet switches can append a 4-byte VLAN tag to incoming frames on a per-port basis, and use the tag on certain frames to permit or block access to those frames at other ports. VLAN traffic can be restricted to a single BladeCenter T unit or can extend across multiple BladeCenter T units. When VLANs are extended across multiple BladeCenter T units, intermediate switches use the VLAN tag to block frames from nonmember destinations.

When defining VLANs that span a chassis, consider the following points:

- Blade server ports that are in the same VLAN must have the same VLAN ID.

- Define the same VLAN ID on both Ethernet switches for blade servers that use both switches to connect to the same external network.

- Ethernet switch ports used to span multiple BladeCenter T units must be configured as `Tagged`, with a specific default VLAN ID for any untagged packets.

- The external ports and Link Aggregation Groups (LAGs) must be members of all VLANs that span multiple BladeCenter T units.

- The intermediate network device that interconnects the BladeCenter T units must be configured to handle tagged VLAN packets for all applicable VLAN traffic that should be passed through the device.

The BladeCenter T unit default VLAN ID is **1** and includes all blade servers in the chassis. If multiple VLANs are required, additional VLAN IDs must be configured. Review the following example to understand how VLANs can be configured.

VLAN example

The example shown in Figure 47 on page 85 defines three VLANs within a single BladeCenter T unit and multiple VLANs extended to multiple BladeCenter T units. Table 23 on page 85 shows the defined VLAN parameters that are set to support this configuration. Outgoing packets for internal blade server ports must be untagged.

Table 23. Sample VLAN configuration definitions

Port number	VLAN ID	VLAN name	Tagged/untagged egress packets	Membership egress/forbid/none
1	1	Default	U	E 1
2	1	Default	U	E 1
3	1	Default	U	E 1
4	2	VLAN 2	U	E 2
5	2	VLAN 2	U	E 2
6	2	VLAN 2	U	E 2
7	3	VLAN 3	U	E 3
8	3	VLAN 3	U	E 3
Ext 1	1*	Default	T	E (1, 2, 3)
Ext 2	1*	Default	T	E (1, 2, 3)
Ext 3	1*	Default	T	E (1, 2, 3)
Ext 4	1*	Default	T	E (1, 2, 3)
* Untagged packets are tagged as 1 (Default); Tagged packets are not changed.				

VLAN 1

VLAN 2

VLAN 3
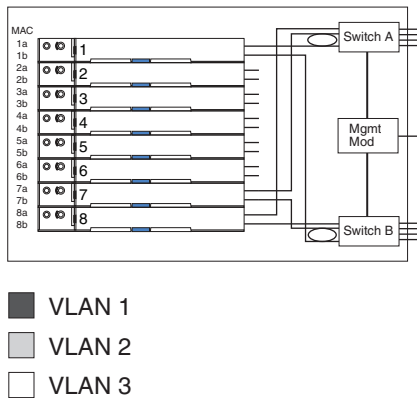
Figure 47. VLAN configuration example on a single BladeCenter T unit

Figure 48 shows an example of VLANs that span multiple BladeCenter T units. In this example, Layer 2 VLANs span the BladeCenter T units within each rack. Layer 3 subnets separate the VLANs into segments.
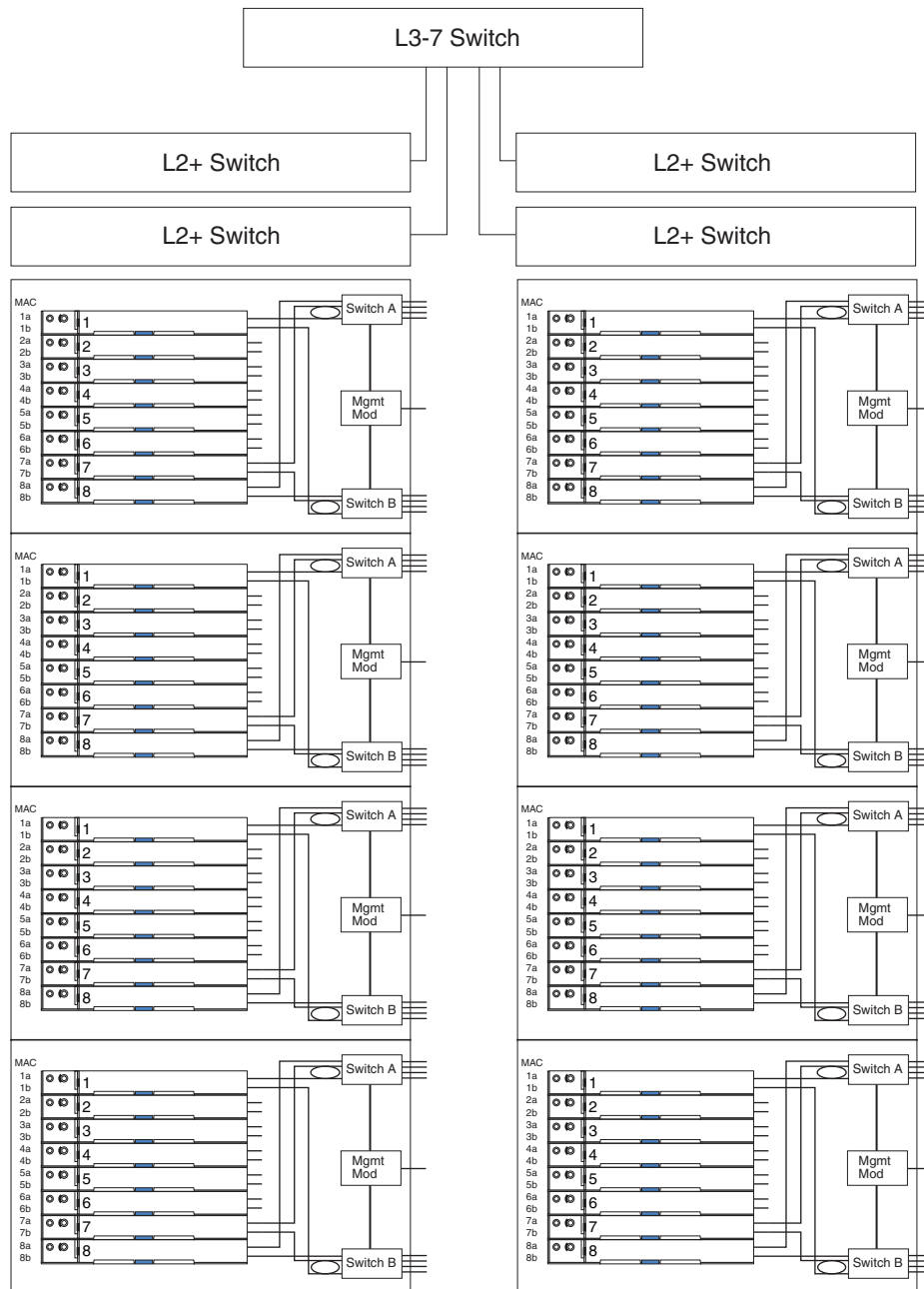
Figure 48. VLAN configuration example for multiple BladeCenter T units

Multicasting

To configure multicasting, determine the settings to be used for IGMP snooping and the entries to be included in the multicast forwarding table.

Port mirroring

The switch module provides the capability of copying frames that were transmitted and received on a source port and redirecting the copies to another target port. The

source port can be one of the four 10/100/1000-Mbps external ports. The target port is where you connect a monitoring/troubleshooting device, such as a sniffer or an RMON probe. The target port must be one of the four 10/100/1000-Mbps external ports.

Notes:

1. Do not mirror a faster port or higher-traffic ports onto a slower port. For example, trying to mirror the traffic from a 100-Mbps port onto a 10-Mbps port can cause throughput problems. The port from which you are copying frames should always support an equal or lower speed than the port to which you are sending the copies. In addition, the target port cannot be a member of a trunk group.

2. Port mirroring is not possible if you use the same egress and ingress target port.

Spanning tree

The switch module supports the 801.2d Spanning Tree Protocol (STP), which allows you to create alternative paths (with multiple switches or other types of bridges) in your network.

Keep in mind the following considerations when configuring ports:

- Port cost can be between 1 and 65535. The lower the cost, the greater the probability that the port will be chosen as the designated port (chosen to forward packets).
- Port priority can be between 0 and 255. The lower the priority, the greater the probability that the port will be chosen as the root port.
- You can choose whether to enable or disable fast STP. Enabling fast STP for a port speeds up the time between linkup and the start of packet forwarding. Enabling the fast STP option causes the port to skip the learning state. Instead, it jumps from the listening state directly to the forwarding state.
- You can choose whether to enable or disable the STP state for a port.

Class of service

The switch module supports 802.1p priority queuing; four priority queues are supported per port. The switch module provides user-programmable mapping for the eight 802.1p priority classes (0 to 7). For the priority queue feature to take effect, you must first enable Priority Queue Method by setting it to Weighted Round-Robin.

Link aggregation

The switch module supports link aggregation (or port trunking), which can be used to increase the bandwidth of a network connection or to ensure fault recovery. You can configure up to two trunk connections (combining two to four ports into one fat pipe) between any two BladeCenter switches or other Layer 2 switches. However, before making any physical connections between devices, you must specify the ports that will belong to the trunking group between switches.

Note the following considerations when planning for link aggregation:

- The ports used in a trunk must all be of the same media type (100-Mbps fiber or 1000-Mbps fiber).
- Each port can be assigned to only one trunk group, whether it is a static or dynamic group.
- The ports at both ends of the connection must be configured as trunk ports.

- All of the ports in a trunk must be treated as a whole when moved from or to, added, or deleted from a VLAN.
- You must enable the trunk before connecting any cable between the switches to avoid creating a data loop.
- Disconnect all trunk port cables or disable the trunk ports before removing a port trunk to avoid creating a data loop.
- The configuration of the lowest-numbered port in the group becomes the configuration for all ports in the port trunking group. This port becomes the Master Port of the group. All configuration options applied to the Master Port are also applied to the entire port trunking group.
- Load balancing is automatically applied to the ports in the trunked group. A link failure within the group causes the network traffic to be directed to the remaining links in the group.
- The STP treats a port trunking group as a single link on the switch level. On the port level, the STP uses the port parameters of the Master Port in the calculation of port cost and in determining the state of the port trunking group. If two redundant port trunking groups are configured on the switch, STP blocks one entire group in the same way that STP blocks a single port that has a redundant link.
- Use the Distribution Method to specify the method used to differentiate packets that go through your network. The method that you choose is used as a hashing function to determine which packets go to which port.

802.3ad link aggregation

Notes:

1. The Mode determines whether or not a port is enabled to join or create a LAG.
2. The Administrator key controls the way that links are aggregated. Use the same Administrator key for all ports to be aggregated together.
3. The Operator key is used by the port to communicate with other Link Aggregation Control Protocol (LACP) switches.

Link aggregation group recommendations

The external ports on a BladeCenter Ethernet switch module can be configured in these ways:

- Multiport LAG using the LACP – 1 Gbps per port
- Multiport trunk – 1 Gbps per port
- Single port link – 1 Gbps
- Multiport LAG using LACP – 100 Mbps per port
- Multiport trunk, 100 Mbps per port

The recommended configuration is:

- Define the four ports of each Ethernet switch module as a 4-port IEEE 802.3 LAG.
- Configure the LACP – define a minimum of two ports for an active group within a LAG to provide at least 2-Gbps full-duplex bandwidth.

By defining a LAG port group and configuring LACP, LACP allows a subset of the LAG ports to be active, meaning two, three, or four ports are active which provides 2, 3, or 4 Gbps of bandwidth between the BladeCenter T unit and the adjacent router or external switch. When a LAG is configured correctly in both the BladeCenter T unit and the adjoining device, the STP treats the group as a single link.

Link aggregation example: As shown in Figure 49, the two LAGs from a BladeCenter T unit are connected to separate Layer 2 or Layer 3 switches. This provides a redundant path in case of a link or switch failure.

Typically, the BladeCenter Ethernet switch module ports are attached to one of the following types of switch:
- A Layer 2 stack switch (1-Gbps ports with a high-speed (10-Gbps) link to a Layer 3 router.
- A Layer 2 or 3 chassis switch with integrated Layer 3 switching or routing. Ports can be grouped through VLANs.
- A Layer 3 to 7 router or load-balancing switch.
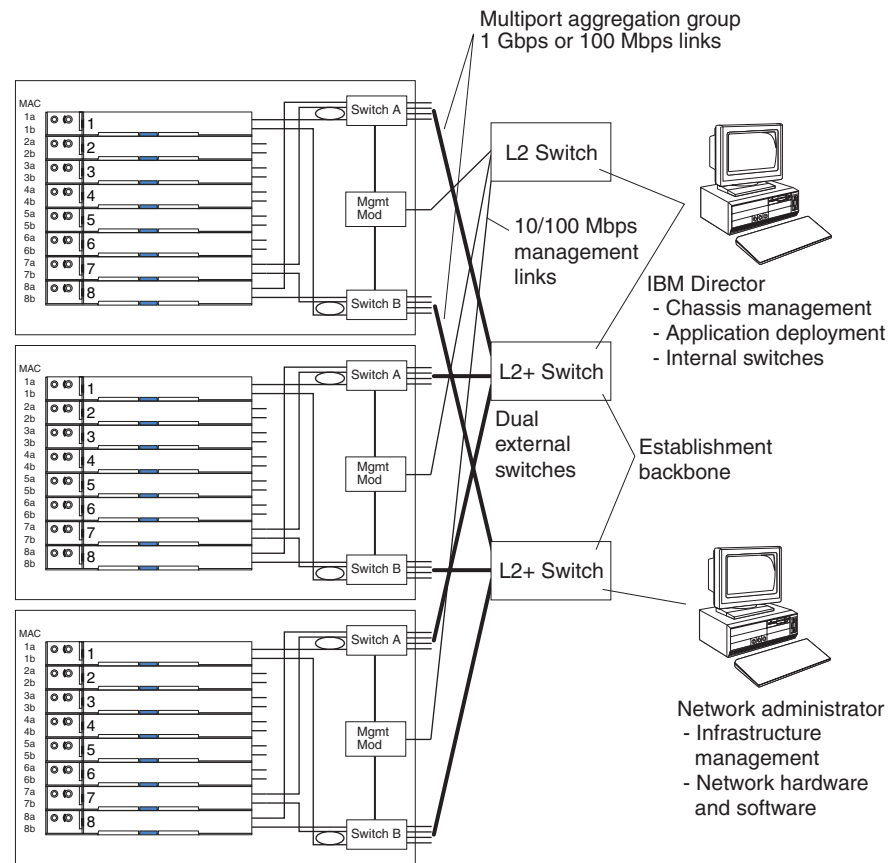
Figure 49. Recommended network topology with multiport link aggregation groups

Link Aggregation Control Protocol recommendations

LACP exchanges information between a pair of stations on a point-to-point LAG to ensure proper operation. A communication path is not established unless both stations are configured correctly and the port-to-port cables are installed on a subset of configured ports, or on all of the configured ports. For the purpose of this discussion, the stations are defined as the BladeCenter Ethernet switch ports and an adjoining Layer 3 external switch. These parameters must be correctly defined for both stations:

- Define the ports for the LAG and define the group ID.
- Assign the same administrative key to each port within a group.
- Assign a priority to each port within a group (priority can be the same for all ports).

- Assign an operator key to each port.

LACP can be used only if both stations sharing the link support the 802.3AD Link Aggregation Protocol.

Fibre-channel switch module configuration planning

You can install two fibre-channel switch modules in switch module bays 3 and 4 of the BladeCenter T unit. Each Fibre Channel switch module provides two external fibre-channel ports for connecting to storage devices and 14 internal fiber-channel ports that connect to the server blades in your the BladeCenter T unit. Internal ports run through 1 to 8 server blades. Internal ports 9 to 14 are not connected and do not need to be connected.

Options that you can configure for the fibre-channel switch modules include:
- Switch information
- Ports
- Network
- Fabric

Use the information provided in this section along with the worksheet provided (see "Fibre-channel switch module configuration planning" on page 116) to plan for the configuration of the Fibre-channel switch module. For detailed information about the fibre-channel switch module, see the *BladeCenter Fibre-channel Switch Module Installation and User's Guide*.

The following Fibre-channel switch is supported:
- IBM BladeCenter 2-port Fibre Channel Switch Module

Make sure you are using the latest versions of device drivers, firmware, and BIOS for your blade server and management module. Go to the IBM Support Web site: www.ibm.com/pc/support for the latest information about upgrading the device drivers, firmware, and BIOS for BladeCenter components. The latest instructions are in the documentation that comes with the update.

Blade server configuration planning

Use the information provided in this section along with the worksheet provided (see "Management module configuration worksheet" on page 105) to plan for the configuration of the blade server. In addition, more information about the blade server is provided in the *IBM BladeCenter HS20 Type 8832 Installation and User's Guide* and *IBM BladeCenter HS40 Type 8839 Installation and User's Guide*.

You can configure the following options for each blade server:
- Enable or disable the IDE and Ethernet controllers. If you select **disable**, the system will not configure the disabled device, and the operating system will not detect the device (this is the equivalent of unplugging the device).
- If you disable the on-board IDE controller and no other controller and the mass-storage device is installed, operating-system startup cannot occur.
- Specify a system date and time. You can specify a time to be added or subtracted from the system time that is sent to the system-management processor each time that the blade server is started. If you want the system clock time to be the same as the system-management processor clock time, leave the value set at its default of 0.

- Set a power-on password. You can use any combination of up to seven alphanumeric characters (A-Z, a-z, and 0–9) for the password.

Note: To use the CD-ROM drive as a boot-record source for a blade, the blade must be designated as the owner of the CD-ROM drive and USB port. See the *BladeCenter T Type 8720 and 8730 Installation and User's Guide* for more information about specifying ownership.

Appendix A. Planning worksheets

This appendix provides worksheets to help plan for the installation of BladeCenter T units. The worksheets are provided in building-block order where:

1. The "Blade server worksheet" on page 94 helps you plan for one to eight blade servers per BladeCenter T unit. Specify software and hardware options on this worksheet.

2. The "BladeCenter T Types 8720 and 8730 worksheet" on page 97 helps you plan for one to five BladeCenter T units per rack. Specify the rack location and weight for each BladeCenter T unit.

3. The "Rack worksheet" on page 99 helps you aggregate total BladeCenter T weight, PDU weight, and mounting kit weight to ensure that:
   - The weight of the BladeCenter T units and other hardware does not exceed the rack load limits
   - The combined weight of the BladeCenter T units and rack does not exceed floor load limits

4. The "Cabling worksheet" on page 101 helps you plan for external network connections. This section also provides information about cable media and maximum lengths.

5. The "Power worksheet for Type 8720" on page 103 helps you plan for adequate power resources for Type 8720.

6. The "Power worksheet for Type 8730" on page 104 helps you plan for adequate power resources for Type 8730.

For guidance on the amount of time to complete physical installation of components, blade servers, and BladeCenter T units, see "Physical installation time" on page 77.

Blade server worksheet

Fill out one worksheet for each blade server that is being installed: up to eight for each BladeCenter T unit. 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 my 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 T unit or in a different BladeCenter T unit.
  - BladeCenter T level – a mirror image BladeCenter T unit that resides in the same rack or in a different rack.
  - Rack level – a set of BladeCenter T units in a rack that mirrors a set of BladeCenter T units 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 which internal Ethernet switch module this server uses; circle 1 or 2.
6. Select **Automatic through DHCP server** or **Static** and record the IP address information. (The host name can be up to 63 characters.)
7. Circle the number of the BladeCenter T bay location for this blade server.

   Note: If this server has a blade expansion option, circle two adjacent BladeCenter T bay locations

8. Circle a BladeCenter T chassis number. This should match the location of the BladeCenter T unit in the rack. For example, BladeCenter T number 1 should be installed in the bottom of the rack.

   Location 1 uses U1 to U8
   Location 2 uses U9 to U16
   Location 3 uses U17 to U24
   Location 4 uses U25 to U32
   Location 5 uses U33 to U40

9. Record the number and physical location of the rack.
10. For the remainder of the worksheet: select the components of this server: processors, memory, and so forth. Compute the weight for each component and record it on the worksheet. At the bottom of the worksheet, record the total weight for this blade server. This information is needed for "BladeCenter T Types 8720 and 8730 worksheet" on page 97.

Table 24. BladeCenter HS20 Type 8832 blade server worksheet

Blade server name and purpose: _____
Operating system: _____
OS installation option:
☐ Preloaded
☐ Deployed through network management
☐ Manual install with product CD.
Applications:
1._____
2._____
Connects to
I/O module
1 _____
2 _____
3 _____
4 _____
	Blade server IP information:
	☐ Automatic through DHCP server
	☐ Static:
	   Host name _____
	   Subnet mask _____._____.___._____
	   IP address _____._____.___._____
	   Gateway address _____._____.___._____
	
	   Host name _____
	   Subnet mask _____._____.___._____
	   IP address _____._____.___._____
	   Gateway address _____._____.___._____

BladeCenter T bay location 1 2　3　4　5　6　7　8
BladeCenter T chassis number 1　2　3　4　5
Rack number and location _____

Component	Quantity	Details	Weight	Base or optional feature
8832 blade server	1	Blade server with Intel™ Xeon DP processor	5.4 kg (12 lb) or 7.0 kg (15.4 lb)	Base with either two 256 or 512 MB memories
Second processor	1	Xeon DP	0.57 kg (1.25 lb)	Optional
Optional memory choices for slots 3 and 4 (Base)	2	☐ 512 MB ☐ 1 GB ☐ 2 GB	0.03 kg (0.06 lb)	Two 256 or 512 MB base memory
Memory slots 1 and 2. Select a memory size. (Optional)	2	☐ 256 MB ☐ 512 MB ☐ 1 GB ☐ 2 GB	0.03 kg (0.06 lb)	Optional
EIDE hard disk drives	1 or 2	40 GB ATA 100; 5400 RPM	Quantity × 0.12 kg (0.28 lb) = _____	Optional (not supported for NEBS environment)
IDE Flash disk drive	1 or 2	☐ 1 GB ☐ 2 GB ☐ 4 GB	Quantity x 0.09 kg (0.19 lb) = _____	Optional
I/O Expansion option	1	☐ Ethernet ☐ Fibre Channel	.08 kg (0.19 lb)	Optional
SCSI Storage Expansion option	1	Supports two additional hot-swapped SCSI hard disks	1.90 kg (4.19 lb)	Optional
SCSI hard disk drive	1 or 2		Quantity x 0.95 kg (2.09 lb) = _____	Optional
PCI I/O Expansion option	1	Supports two PCI-X adapters	2.32 kg (5.13 lb)	Optional
PCI-X adapter 1				Optional
PCI-X adapter 2				Optional
			Total: ____	

Table 25. BladeCenter HS40 Type 8839 blade server worksheet

Blade server name and purpose: _____
 Operating system: _____
 OS installation option:
 ☐ Preloaded
 ☐ Deployed through network management
 ☐ Manual install with product CD.
 Applications:
 1._____
 2._____
 Connects to
 I/O module
 1 _____
 2 _____
 3 _____
 4 _____
	Blade server IP information:
	 ☐ Automatic through DHCP server
	 ☐ Static:
	     Host name _____
	     Subnet mask _____._____.____._____
	     IP address _____._____.____._____
	     Gateway address _____._____.____._____
	
	     Host name _____
	     Subnet mask _____._____.____._____
	     IP address _____._____.____._____
	     Gateway address _____._____.____._____

BladeCenter T bay location   2   3   4   5   6   7   8
BladeCenter T chassis number 1   2   3   4   5
Rack number and location _____

Component	Quantity	Details	Weight	Base or optional feature
8839 blade server	1	Blade server with Intel™ Xeon MP processor	5.4 kg (12 lb) or 7.0 kg (15.4 lb)	Base with either two 256 or 512 MB memories
Second processor	1	Xeon MP	0.57 kg (1.25 lb)	Optional
Third processor	1	Xeon MP	0.57 kg (1.25 lb)	Optional
Fourth processor	1	Xeon MP	0.57 kg (1.25 lb)	Optional
Memory choices: Base (First): Slots 4 and 8 Second: (Optional) Slots 3 and 7 Third: (Optional) Slots 2 and 6 Fourth: (Optional) Slots 1 and 5	2	☐ 512 MB ☐ 1 GB ☐ 2 GB	Quantity x 0.03 kg (0.06 lb) = _____	Two 256 or 512 MB base memory
EIDE hard disk drives	1 or 2	40 GB ATA 100; 5400 RPM	Quantity $\times$ 0.12 kg (0.28 lb) = _____	Optional (not supported for NEBS environment)
IDE Flash disk drive		☐ 1 GB ☐ 2 GB ☐ 4 GB	Quantity x .09 kg (.19 lb) = _____	Optional
I/O Expansion option	1	☐ Ethernet ☐ Fibre Channel	.08 kg (0.19 lb)	Optional
SCSI Storage Expansion option	1	Supports two additional hot-swapped SCSI hard disks	1.90 kg (4.19 lb)	Optional
SCSI hard disk drive	1 or 2		Quantity x 0.95 kg (2.09 lb) = _____	Optional
PCI I/O Expansion option	1	Supports two PCI-X adapters	2.3 kg (5.13 lb)	Optional
PCI-X adapter 1				Optional
PCI-X adapter 2				Optional
			Total: ____	

BladeCenter T Types 8720 and 8730 worksheet

This worksheet is provided to help you plan for the BladeCenter T location in the rack, and rack weight. When completed, the worksheet will provide a total number for weight of up to eight blade servers. Each worksheet applies to one 8720 or 8730 BladeCenter T unit. A copy of this worksheet must be filled out for each BladeCenter T unit:

1. Before you can complete this worksheet, fill out a worksheet for each blade server (1 to 8) that will be installed in this chassis. See "Blade server worksheet" on page 94.

2. Circle the BladeCenter T number and the BladeCenter T position in the rack. Position 1 is installed in the bottom of the rack.

3. Circle how many power modules are required for this BladeCenter T unit.

   Note: Four power modules are required if you install a blade server, a SCSI Storage Expansion option, or a PCI I/O Expansion option in any one of bay locations 5 through 8 on the BladeCenter T unit.

4. If any are to be installed, circle the number of optional Fibre Channel switch modules.

5. Compute and record **Subtotal 1** for the weight of these components.

6. For each blade server (1 through 4), record the weight numbers from the blade server worksheets.

7. Compute and record **Subtotal 2** for blade servers 1 through 4.

8. For each blade server (5 through 8), record the weight from the blade server worksheets.

9. Compute and record **Subtotal 3** for blade servers 5 through 8.

10. Record the subtotals for weight on the bottom of the worksheet. Add the subtotals to derive the total weight for this BladeCenter T unit.

Table 26. BladeCenter T Types 8720 and 8730 worksheet

BladeCenter T number: 1 2 3 4 5
Rack position: **1** (U1-U8) **2** (U9-U16) **3** (U17-U24) **4** (U25-U32) **5** (U33-U40)
  Rack number and location: _____

Component	Quantity	Weight	Base or optional feature
Chassis	1	31.26 kg (69 lb)	Base without modules or fillers
Power modules	2 or 4	Quantity × 3.53 kg (7.8 lb) = ____	Modules 1 and 2 are base. Modules 3 and 4 are required if a blade server or SCSI storage expansion option is installed in bays 5 through 8.
Power module fillers	2 or 0	Quantity x .90 kg (2.0 lb)	Base
Management module	1 or 2	Quantity x 1.46 kg (3.22 lb)	Base
Management module fillers	1 or 0	Quantity x .62 kg (1.37 lb)	Base
Ethernet switch modules	4 maximum	Quantity × .91 kg (2.0 lb) = _____	Optional
Fibre Channel switch modules	2 maximum	Quantity × 0.91 kg (2 lb) = _____	Optional. Required if this BladeCenter T unit provides network connectivity for an external fibre channel storage device or a SAN.
Switch fillers		Quantity x .33 kg (.72 lb) = _____	
Blowers	4	.63 kg (1.4 lb) x 4	Base
Media tray	1	2.27 kg (5.02 lb)	Base
Front bezel with filter	1	1.54 kg (3.4 lb)	Base
Subtotal 1 for chassis worksheet		_____	
Blade server 1		_____	Optional
Blade server 2		_____	Optional
Blade server 3		_____	Optional
Blade server 4		_____	Optional
Blade server 5		_____	Optional
Blade server 6		_____	Optional
Blade server 7		_____	Optional
Blade server 8		_____	Optional
Blade fillers		Quantity x .56 kg (1.5 lb) = ____	Base
Subtotal 2 for blade servers 1 through 8		_____	
Subtotal 1 (Chassis) **Subtotal 2 (Blades)** **Total**		**Subtotal 1**_____ **Subtotal 2**_____ **Total**_____	

Rack worksheet

This worksheet helps you plan for the rack location of each BladeCenter T unit, compute the total weight for the BladeCenter T units and other hardware. Each BladeCenter T unit is 8U; up to five can be installed in a 42U rack. Fill out one worksheet for each rack.

1. Record the weight totals for each BladeCenter T unit in this rack from the "BladeCenter T Types 8720 and 8730 worksheet" on page 97.

2. Record the weight totals for other units in this rack from the "BladeCenter T Types 8720 and 8730 worksheet" on page 97.

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 step 7 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 27. Rack worksheet

Component	Location (Ux – Uy)	Quantity	Weight
BladeCenter T units	1	1	_____
BladeCenter T unit or others	2	1	_____
BladeCenter T unit or others	3	1	_____
BladeCenter T unit or others	4	1	_____
BladeCenter T unit or others	5	1	_____
			Subtotal 1 _____
Rack-mounting kits		1 2 3 4 5	Quantity = ___
PDUs			Quantity = ___
Cables			Quantity = ___
			Subtotal 2 _____
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 ☐ Universal Telecom Framework ☐ Seismic 2-post rack ☐ Seismic 4-post 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) 113.4 kg (250 lb) without doors 52.16 kg (115 lb) 181.4 kg (400 lb) without doors
Total floor load			**Rack weight**___ **Total rack load** ___

Cabling worksheet

This worksheet is used to plan for the external network cables to attach the Management module, Ethernet switch modules, and, if present, fibre-channel switch modules to external networks. Fill out one worksheet for each BladeCenter T unit.

On this worksheet, record:
1. The BladeCenter T number (1 through 5)
2. The BladeCenter T location in the rack (1 through 5)
3. The rack number and location
4. The **From port:** and **To:** connections.

Table 28. Cabling worksheet

BladeCenter T number: ___ Location in rack (1 through 5): ___ Rack number and location: _____		
Component	**From port:**	**To:**
Management module 1 (10/100 Mbps)	1	
Management module 2 (10/100 Mbps)	2	
Ethernet switch module 1 (10/100/1000 Mbps) Bay 1	1	
	2	
	3	
	4	
Ethernet switch module 2 (10/100/1000 Mbps) Bay 2	1	
	2	
	3	
	4	
I/O module 3 Bay 3 (Ethernet or fibre channel)	1	
	2	
	3	
	4	
I/O module 4 Bay 4 (Ethernet or fibre channel)	1	
	2	
	3	
	4	
PCI I/O expansion unit 1	1	
	2	
PCI I/O expansion unit 2	1	
	2	
PCI I/O expansion unit 3	1	
	2	
PCI I/O expansion unit 4	1	
	2	

Power worksheet for Type 8720

This section describes how to determine dc power needs and how many power cords and outlets you will need.

1. Record the number of blades to be installed in this BladeCenter T unit.
2. Use the following chart to determine the number of required power modules (1 or 2).

Table 29. Power worksheet for Type 8720

Power modules	Number of blade slots	Number of switch bays	Maximum ac input power	Number of PDU outlets	Number of DC power cables
1 and 2	1 to 4	1 – 2	1.7 kVA	2 outlets	6 (3 per side)
1, 2, 3, and 4	1 to 8	1 – 4	3.3 kVA	2 outlets	6 (3 per side)

3. Record the number of power modules per BladeCenter T unit = _____.
4. Record the number of BladeCenter T units to be installed in this rack _____.
5. Multiply the number recorded in Steps 3 and 4 to obtain the total number of required DC cables _____.

Power worksheet for Type 8730

This section describes how to determine ac power needs and how many power cords and outlets you will need.

1. Record the number of blades to be installed in this BladeCenter T unit.
2. Use the following chart to determine the number of required power modules (2 or 4).

Table 30. Power worksheet for Type 8730

Power modules	Number of blade slots	Number of switch bays	Maximum ac input power	Number of PDU outlets	Number of power cords
1 and 2	1 to 4	1 – 2	1.6 kVA	2 outlets	2 (1 per module)
1, 2, 3, and 4	5 to 8	1 – 4	3.1 kVA	4 outlets	4 (1 per module)

3. Record the number of power modules per BladeCenter T unit = _____.
4. Record the number of BladeCenter T units to be installed in this rack _____.
5. Multiply the number recorded in Steps 3 and 4 to obtain the total number of required power cords and power outlets _____.

Appendix B. Configuration worksheets

Use the worksheets in this appendix to configure the components for your BladeCenter T unit. Information about each of the worksheets is provided in Chapter 3, "Deployment considerations," on page 39.

Management module configuration worksheet

Fill out this worksheet to provide the information needed to configure the management module. For information on filling out the worksheet, see "Management module configuration planning" on page 79 and the *BladeCenter T Types 8720 and 8730 Installation and User's Guide*.

General Settings

Management module name	
Contact name	
Physical location	
Clock settings	

Login profiles

		Authority level	
Login ID	**Password**	**R/O**	**R/W**

External network interface (eth0)

Interface	__ Enabled
	__ Disabled
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	_____._____._____._____

Internal network interface (eth1)

Interface IP address	_____._____._____._____
Subnet mask	_____._____._____._____
Locally administered MAC address	

Alerts

Remote alert recipients		
Receives critical alerts only		
	Status	
	Notification method	___ SNMP over LAN ___ E-mail over LAN ___ IBM Director over LAN
	Host name (or IP Address)	
	E-mail address	
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		Select all critical alerts
		Hard disk drive
		Multiple blower failure
		Power failure
		Temperature
		Virtual resource manager (VRM) failure
		Multiple switch module failure
		Invalid configuration
Warning alerts		Select all warning alerts
		Single blower failure
		Temperature
		Voltage
		KVM/media tray switching failure
		Redundant module failure
System alerts		Power off	
		Inventory	
		Log 75% full	

Network protocols

SNMP	
SNMP agent	__ Enable
	__ Disable
SNMP traps	__ Enable
	__ Disable
Community name	
Host name (or IP address)	
SMTP	
Host name (or IP address)	
DNS	
DNS	__ Enable
	__ Disable
DNS Server IP address 1	_____._____._____._____
DNS Server IP address 2	_____._____._____._____
DNS Server IP address 3	_____._____._____._____

Security

Secure Sockets Layer (SSL)	__ Enabled
	__ Disabled
Certificates	__ Self-signed
	__ Provided by a certificate authority

Ethernet switch module configuration worksheet

Fill out the worksheet in this section for each Ethernet switch module you plan to have in your BladeCenter T unit. For information on filling out the worksheet, see "Ethernet switch module configuration planning" on page 81 and the *BladeCenter T Ethernet Switch Module Installation and User's Guide*.

Switch settings

Name	
Location	
Local contact	
Get IP from (manual, BOOTP, DHCP)	
IP address	____.____.____.____
Subnet mask	____.____.____.____
Default gateway	____.____.____.____
Switch GVRP (enabled or disabled)	
MAC address aging timer (enabled or disabled)	
Aging time (10 to 1,000,000 seconds)	
Telnet time out	
Telnet sessions (1 to 4)	
Enable external ports for management	

Port settings

Port	State		Speed (Mbps)				Duplex		Flow control	
	E	D	10	100	1000	Auto	H	F	E	D
1					x			x		
2					x			x		
3					x			x		
4					x			x		
5					x			x		
6					x			x		
7					x			x		
8					x			x		
9					x			x		
10					x			x		
11					x			x		
12					x			x		
13					x			x		
14					x			x		
Ex1										
Ex2										
Ex3										
Ex4										

SNMP management station IP settings

IP address	_____._____._____._____
IP address	_____._____._____._____
IP address	_____._____._____._____

SNMP community strings and trap recipients

Community string	Rights		Status		Trap recipient	Status	
	R	R/W	E	D		E	D
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		
					_____._____._____._____		

Ethernet switch module user accounts

User ID	Password	Access level		
		Root	User	User+
USERID	PASSW0RD	x		

TFTP servers

Table 31. TFTP servers

File	TFTP server address	Path and file name
Download configuration	____.____.____.____	
Firmware code	____.____.____.____	
Upload configuration	____.____.____.____	
History log	____.____.____.____	

802.1Q VLANs

VLAN ID (VID): _____

VLAN name: _____

Port	Tag	None	Egress	Forbidden
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
EX1				
EX2				
EX3				
EX4				

802.1Q port settings

Port	Port VLAN ID	Priority	Ingress filter	GVRP
1				
2				
3				
4				
5				
6				
7				

Port	Port VLAN ID	Priority	Ingress filter	GVRP
8				
9				
10				
11				
12				
13				
14				
EX1				
EX2				
EX3				
EX4				

IGMP snooping settings

Switch IGMP snooping (enabled or disabled)	__ Enabled __ Disabled
Querier state	__ Non-Querier __ V1–querier __ V2–querier
Query interval (1 to 65,500 seconds)	
Maximum response (1 to 25 seconds)	
Robustness variable (1 to 255)	

Multicast forwarding table entries

Port	MAC address	VID	None	Egress
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
EX1				
EX2				

Port	MAC address	VID	None	Egress
EX3				
EX4				

Port mirroring settings

Source port	Mirroring status (enabled/disabled)	Target port	
		Ingress	Egress
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
EX1			
EX2			
EX3			
EX4			

Spanning tree settings

Status (enabled or disabled)	
Maximum age (6 to 40 seconds)	
Hello time (1 to 10 seconds)	
Forward delay (4 to 30 seconds)	
Priority (0 to 65,535)	

STP port settings

Port	Cost	Priority	Fast STP		STP state	
			E	D	E	D
1						
2						
3						
4						

Port	Cost	Priority	Fast STP		STP state	
			E	D	E	D
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
EX1						
EX2						
EX3						
EX4						

Class of service configuration

Output priority method queue:

__ Enabled

__ Disabled

__ Weighted Round—Robin

Class	Weight (0 to 16)	Max latency
High priority		
Med-high priority		
Med-low priority		
Low priority		

802.1p priority mapping

802.1p priority mapping class:

__ Low priority

__ Med-low priority

__ Med-high priority

__ High priority

Priority levels	Low	Med-L	Med-H	High
0				
1				
2				
3				
4				
5				
6				
7				

Diffserv mapping

Diffserv mapping

__ Enabled

__ Disabled

Class

__ Low priority

__ Med-low priority

__ Med-high priority

__ High priority

Code point	Class				Code point	Class			
	Low	M-L	M-H	High		Low	M-L	M-H	High
0					32				
1					33				
2					34				
3					35				
4					36				
5					37				
6					38				
7					39				
8					40				
9					41				
10					42				
11					43				
12					44				
13					45				
14					46				
15					47				

Code point	Class				Code point	Class			
	Low	M-L	M-H	High		Low	M-L	M-H	High
16					48				
17					49				
18					50				
19					51				

Distribution method

Packet type	Src MAC	Dest MAC	Src & Dest MAC	Src IP	Dest IP	Src & Dest IP
Non-IP				N/A	N/A	N/A
IP						

Port trunking

Group ID	Port				Method	
	EX1	EX2	EX3	EX4	Trunk	Disabled

802.3ad link aggregation

Link Aggregation Control Protocol (enabled or disabled): _____
System Priority (LACP switch ID): _____

Port	Priority	Administrator key	Operator key	Mode	
				Enabled	Disabled
EX1					
EX2					
EX3					
EX4					

Fibre-channel switch module configuration planning

Fill out the worksheet in this section for each fibre-channel switch module you plan to have in your BladeCenter T unit. For information on filling out the worksheet, see "Fibre-channel switch module configuration planning" on page 90 and the *BladeCenter T Fibre Channel Switch Module Installation and User's Guide*.

Chassis name		
State	__ Online	__ Test
	__ Offline	
Domain ID		
Domain ID lock	__ Enable	__ Disable
Broadcast support	__ Enable	__ Disable
Inband management	__ Enable	__ Disable
Timeout values		
R_A_TOV		
R_T_TOV		
E_D_TOV		
IP configuration		
IP address	_____._____._____._____	
Subnet mask	_____._____._____._____	
Gateway	_____._____._____._____	
Boot method	__ Static	__ BootP
	__ RARP	__ DHCP
Remote logging (syslog)	__ Enabled	__ Disabled
Logging (syslog) host IP address	_____._____._____._____	
SNMP configuration		
Contact		
Location		
Read community		
Authentication trap	__ False	__ True
Trap community		
Write community		
__ Enable Trap 1 configuration		
Trap address	_____._____._____._____	
Trap port		
Trap severity	__ Unknown	__ Emergency
	__ Alert	__ Critical
	__ Error	__ Warning
	__ Notify	__ Info
	__ Debug	__ Mark
__ Enable Trap 2 configuration		
Trap address	_____._____._____._____	

Trap port		
Trap severity	__ Unknown	__ Emergency
	__ Alert	__ Critical
	__ Error	__ Warning
	__ Notify	__ Info
	__ Debug	__ Mark
__ Enable Trap 3 configuration		
Trap address	_____._____._____._____	
Trap port		
Trap severity	__ Unknown	__ Emergency
	__ Alert	__ Critical
	__ Error	__ Warning
	__ Notify	__ Info
	__ Debug	__ Mark
__ Enable Trap 4 configuration		
Trap address	_____._____._____._____	
Trap port		
Trap severity	__ Unknown	__ Emergency
	__ Alert	__ Critical
	__ Error	__ Warning
	__ Notify	__ Info
	__ Debug	__ Mark
__ Enable Trap 5 configuration		
Trap address	_____._____._____._____	
Trap port		
Trap severity	__ Unknown	__ Emergency
	__ Alert	__ Critical
	__ Error	__ Warning
	__ Notify	__ Info
	__ Debug	__ Mark
Port settings		
Option	**Port 1**	**Port 2**
Port state	__ Online	__ Online
	__ Offline	__ Offline
	__ Test	__ Test
Port speed	__ Auto-detect	__ Auto-detect
	__ 1Gb	__ 1Gb
	__ 2Gb	__ 2Gb
Port modes	__ F_Port	__ F_Port
	__ FL_Port	__ FL_Port
	__ TL_Port	__ TL_Port
	__ G_Port	__ G_Port

	__ GL_Port	__ GL_Port
	__ Donor	__ Donor
TL Modes	__ TL target	__ TL target
	__ TL initiator	__ TL initiator
E_Port BB credits		
I/O stream guard	__ Enable	__ Enable
	__ Disable	__ Disable
Fabric settings		
Fabric name		
IP address	_____._____._____._____	
Login name		
Password		

Blade server configuration planning

Fill out this worksheet for the blade servers in your BladeCenter T unit. For information on filling out the worksheet, see "Blade server configuration planning" on page 90 and the *BladeCenter T HS20 Installation and User's Guide*.

| Bay Number | Blade server name | IDE Controller | | Ethernet Controller | | Startup (boot) sequence | | | | |
		E	D	E	D	IDE drive 1	IDE drive 2	CD-ROM	Diskette	Network
1										
2										
3										
4										
5										
6										
7										
8										

Table 32. Blade server operating systems/applications

Bay Number	Blade server name	Operating system/applications
1		
2		
3		
4		
5		
6		
7		
8		

Appendix C. Notices

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Processor speeds indicate the internal clock speed of the microprocessor; other factors also affect application performance.

CD-ROM drive speeds list the variable read rate. Actual speeds vary and are often less than the maximum possible.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

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