IBM Intelligent Cluster and System Cluster 1350

Installation and Service Guide

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Note: Before using this information and the product it supports, read the general information in “Safety” on page v and Appendix C, “Notices,” on page 25.

Nineteenth edition, November 2009

Contents

Safety

For general information concerning safety, refer to *Electrical Safety for IBM Customer Engineers*, S229-8124. For a copy of the publication, contact your IBM® account representative or the IBM branch office serving your locality.

Enterprise rack safety information: Read the safety notices in the manual provided with the Enterprise rack before beginning work. Keep the Enterprise Rack manual near the rack for fast reference.

Safety Information

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information (安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Important

Note:

All caution and danger statements in this documentation begin with a number. This number is used to cross reference an English caution or danger statement with translated versions of the caution or danger statement in the *IBM Safety Information* book that comes with your server.

For example, if a caution statement begins with a number 1, translations for that caution statement appear in the *IBM Safety Information* book under statement 1.

Be sure to read all caution and danger statements in this documentation before performing the instructions. Read any additional safety information that comes with your server or optional device before you install the device.

Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

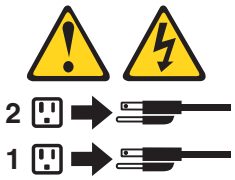
To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	**To Disconnect:**
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Statement 6:

CAUTION:
If you install a strain-relief bracket option over the end of the power cord that is connected to the device, you must connect the other end of the power cord to an easily accessible power source.

Statement 7:

CAUTION:
If the device has doors, be sure to remove or secure the doors before moving or lifting the device to avoid personal injury. The doors will not support the weight of the device.

Statement 9:

CAUTION:
To avoid personal injury, disconnect the hot-swap fan cables before removing the fan from the device.

Statement 13:

DANGER

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.

Statement 14:

CAUTION:
Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the following label is attached.

Statement 15:

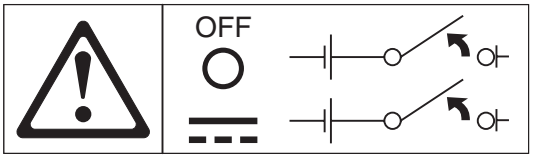
CAUTION:
Make sure that the rack is secured properly to avoid tipping when the server unit is extended.

Statement 16:

CAUTION:
Some accessory or option board outputs exceed Class 2 or limited power source limits and must be installed with appropriate interconnecting cabling in accordance with the national electric code.

Statement 19:

CAUTION:
The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.



Statement 20:

CAUTION:
To avoid personal injury, before lifting the unit, remove all the blades to reduce the weight.

Statement 21:

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

Statement 23:

CAUTION:
Do not place any object weighing more than 50 kg (110 lb.) on top of rack-mounted devices.

>50 kg (110 lb.)

CAUTION:
Removing components from the upper positions in the Enterprise Rack cabinet improves rack stability during relocation. Follow these general guidelines whenever you relocate a populated rack cabinet within a room or building:

- **Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must do the following:**
  - **Remove all devices in the 32-U position and above.**
  - **Ensure that the heaviest devices are installed in the bottom of the rack cabinet.**
  - **Ensure that there are no empty U-levels between devices installed in the rack cabinet below the 32-U level.**
- **If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.**
- **Inspect the route that you plan to take to eliminate potential hazards.**
- **Make sure that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.**
- **Make sure that all door openings are at least 760 x 2030 MM. (30 x 80 in.)**
- **Ensure that all devices, shelves, drawers, doors, and cables are secure.**
- **Ensure that the four leveling pads are raised to their highest position.**
- **Ensure that there is no stabilizer bracket installed on the rack cabinet.**
- **Do not use a ramp inclined at more than ten degrees.**
- **Once the rack cabinet is in the new location, do the following:**
  - **Lower the four leveling pads.**
  - **Install stabilizer brackets on the rack cabinet.**
  - **If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.**

If a long distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also, lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.

DANGER

- **Do not extend more than one sliding device at a time.**
- **The maximum allowable weight for devices on slide rails is 80 kg (176 lb.). Do not install sliding devices that exceed this weight.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Always install the heaviest devices in the bottom of the rack cabinet.**

Handling static-sensitive devices

Attention: Static electricity can damage electronic devices, including your server. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- When you work on a BladeCenter unit that has an electrostatic discharge (ESD) connector, use a wrist strap when you handle modules, optional devices, or blade servers. To work correctly, the wrist strap must have a good contact at both ends (touching your skin at one end and firmly connected to the ESD connector on the front or back of the BladeCenter unit).
- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to any *unpainted* metal surface of the BladeCenter chassis or any *unpainted* metal surface on any other grounded component in the rack you are installing the device in for at least 2 seconds. (This drains static electricity from the package and from your body.)
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on your server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Notices and statements used in this document

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

The following notices and statements are used in the documentation:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.

- **Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Noise Hazard Notice

Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. [This IBM system is available with an optional acoustical door feature that can help reduce the sound emitted from this system. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employees' location in relation to the equipment. Further, compliance with such government regulations also depends upon a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. IBM recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Chapter 1. System overview

This chapter provides an overview of the IBM® Intelligent Cluster and System Cluster 1350 software components, hardware components, and related documentation.

The IBM® Intelligent Cluster and the System Cluster 1350, which are also referred to in this document as the cluster, use two types of cabinets: primary and expansion. A cabinet is called primary if it contains the management node and console monitor. An expansion cabinet can contain storage nodes or mass-storage devices as well as computing nodes, called cluster nodes; it does not contain a management node or a console.

The cluster might consist of:

- One or more racks.
- From four to 1024 cluster nodes. The nodes are configured to run customer applications or provide other services required by the customer, such as file server, network gateway, or storage server.
- One management node for Extreme Cluster Administration Toolkit (xCAT) and administration.
- A management Ethernet VLAN that is used for secure traffic for hardware control.

  The management Ethernet VLAN is used for management traffic only. It is logically isolated for security using the VLAN capability of the Ethernet switches, and it is only accessible from the management node. The cluster VLAN and management VLANs share the same physical switches.
- A cluster VLAN used for other management traffic and user traffic. Switches integrated with the cluster are used for the management Ethernet VLAN and the cluster Ethernet VLAN.
- A terminal server network for remote or local console. Optionally, the customer might elect to include an additional network.
- A high-performance Myrinet InfiniBand, one-Gb (gigabit), or 10-Gb Ethernet cluster interconnect.
- The customer can elect to configure a subset of cluster nodes with additional external storage.
- A supported distribution of the Linux or Microsoft® Windows® operating system.
- Cluster systems-management software, such as xCAT.

The clusters support a maximum of 1024 nodes in addition to the one required management node. All nodes must run one of the following operating systems:

- SUSE LINUX Enterprise Server (SLES)
- Red Hat Enterprise Linux (RHEL)
- Microsoft Windows

The clusters uses a primary cabinet and expansion cabinets. The primary cabinet contains the management node and console monitor. An expansion cabinet can contain the following components:

- Cluster or compute nodes
- Storage nodes
- Mass storage devices
- Storage expansion units
- Networking switches
- iDataPlex solution (rack and nodes)

Related documentation

The documentation that comes with your cluster might be updated occasionally to include information about features, or technical updates. These updates are available from the IBM Web site at http://www.ibm.com/systems/support/. Non-IBM device documentation is not listed on this support site but is available from the original manufacturer of the device.

For additional technical information or to download device drivers and other updates, complete the following steps:

1. Go to http://www.ibm.com
2. Under **Support & downloads**, go to the **Support by product** menu and click **Systems and servers**.
3. In the **Product support** box, click **System x**.
4. From the **Product family** menu, select your product from the menu and click **Go**. (For example, if your product is System Cluster 1350, select **Cluster 1350** .)
5. To view documentation for the selected product, click **Documentation** in the **Support & downloads** box. To view available device drivers and downloads, click **Downloads**.

To remove and configure a cluster component, see the documentation that comes with the component.

Chapter 2. Cabinet placement and intercabinet cabling

This chapter provides information about the final placement and intercabinet cabling of the cluster cabinets, how to install the frame stabilizer foot and outrigger to support each cabinet, and how to prepare to install a Rear Door eXchanger Assembly unit.

Important: The information in this chapter applies only to the IBM 42U Enterprise Rack (machine type 1410 and model 1410-4RX) and the IBM 25U Enterprise Rack (machine type 1410 and model 1410-2RX). If your cluster solution contains an iDataPlex Rack Type 7825, see the *IBM iDataPlex Rack Type 7825 Installation and User's Guide* for the applicable specifications, installation procedures, cabinet placement instructions, and cabling guidelines.

Minimum service clearances for traditional 1350 racks

Several factors influence final cabinet placement. In addition to adequate cable length and staying within safe floor loading limits for your installation site, observe the minimum clearances required for service of the racks in the clusters. You might want to plan for extra space around the racks to allow movement of racks for service.

Figure 1 shows the clearances needed for servicing a rack in the clusters. Note that the service clearances for the sides of the rack are not required for operation, but only for servicing the PDUs.

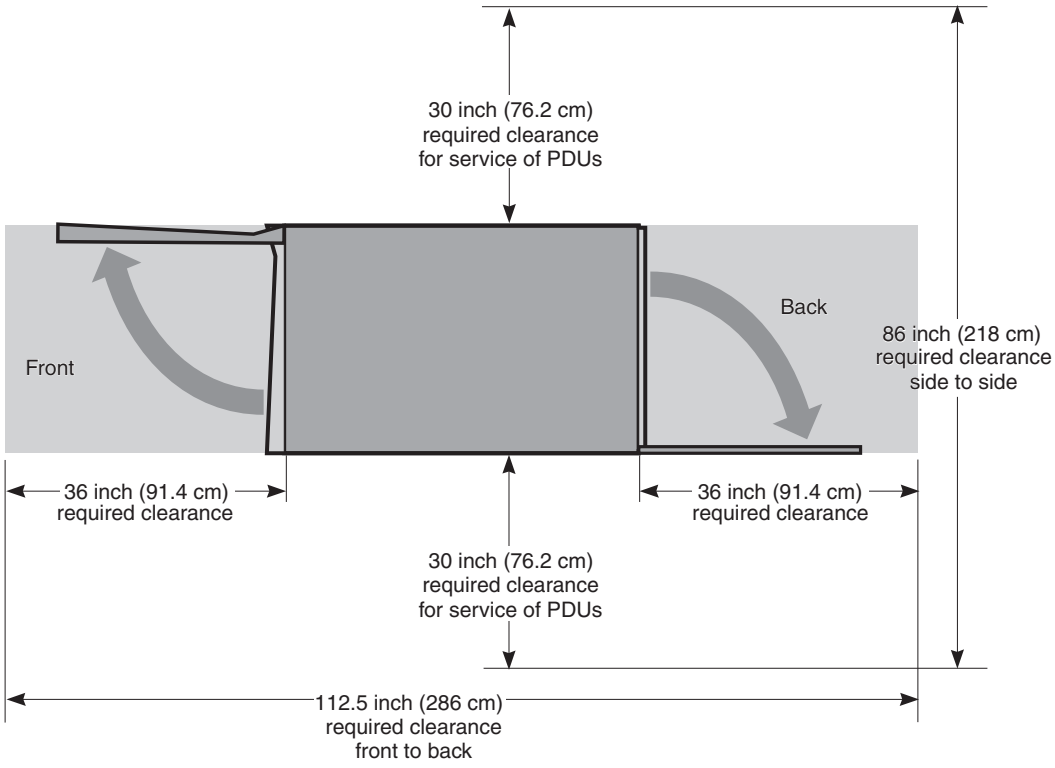


Figure 1. Cabinet clearances required for service

When planning the installation of a large cluster and you want to arrange the racks in several rows, you must maintain a minimum aisle width of 91.4 cm (36 inches) as shown in Figure 2 on page 4. This will allow enough space for the front and back covers of the racks to open. An aisle width of 122 cm (48 inches) might be more appropriate if you want to make sure that you have enough room to move the rack to gain access to the sides for servicing the PDUs.

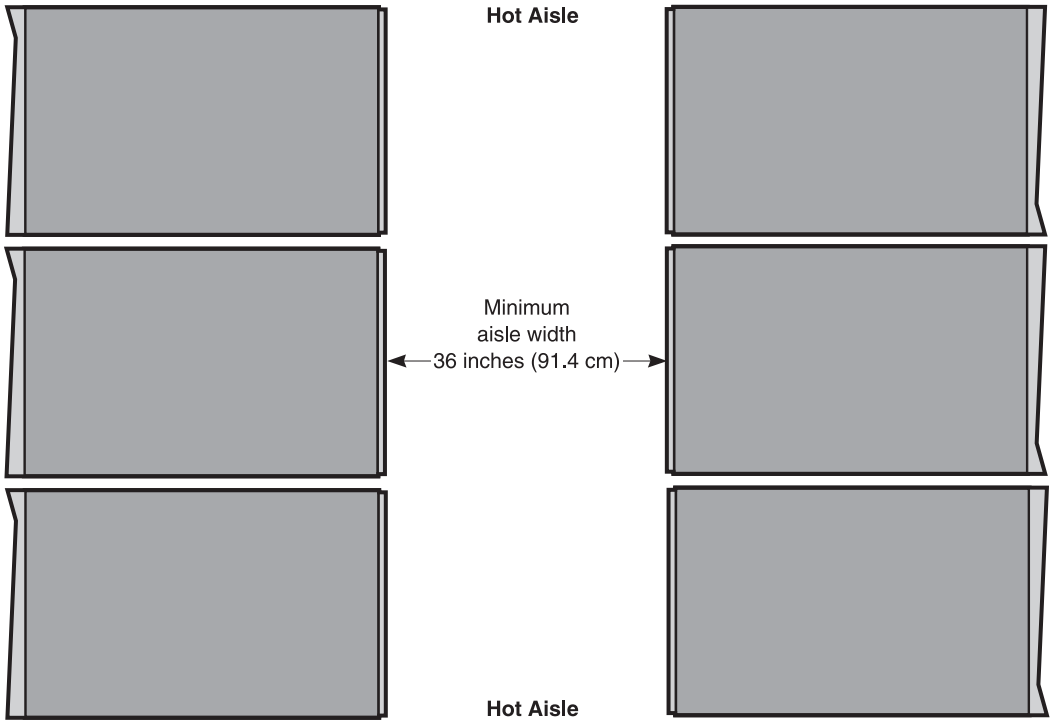


Figure 2. Minimum aisle width for installations

Final cabinet placement determines what will qualify as adequate cable lengths. This chapter gives guidelines for intercabinet (rack-to-rack) cabling. Use these guidelines to determine the best cable lengths for your installation.

Types of intercabinet cabling

Cabinet placement is partly determined by the cables that run between cabinets. Both optical and copper cables are involved.

All intercabinet (rack-to-rack) cables and cable harnesses come in varying lengths up to 25 m (82 ft.). There are no layout restrictions.

Color-coded CAT5E intercabinet Ethernet cables are available for intercabinet cabling of the cluster components. The color-coded cables operate exactly as the existing cluster intercabinet Ethernet cables with the added advantage of being able to group like-devices by a specific color. The cable colors and lengths include:

- Blue - 0.6 m (1.97 ft.), 1.5 m (4.92 ft.), 3 m (9.84 ft.), 10 m (32.8 ft.), 25 m (82 ft.)
- Green - 0.6 m (1.97 ft.), 1.5 m (4.92 ft.), 3 m (9.84 ft.), 10 m (32.8 ft.), 25 m (82 ft.)
- Yellow - 0.6 m (1.97 ft.), 1.5 m (4.92 ft.), 3 m (9.84 ft.), 10 m (32.8 ft.), 25 m (82 ft.)

Note: In some clusters, the FRU intercabinet cables can also be white or gray.

The following tables list the available lengths for the different cables and cable harnesses.

Table 1. Available lengths for fiber-based Ethernet and Fibre Channel cables

Length	Part number	Note
0.208 m (8.19 in.)	44R8701	Fibre channel cable, LC to SC

Table 1. Available lengths for fiber-based Ethernet and Fibre Channel cables (continued)

Length	Part number	Note
1 m (3.28 ft.)	39M5696	Fibre channel cable, LC to LC
5 m (16.4 ft.)	39M5697	Fibre channel cable, LC to LC
25 m (82 ft.)	39M5698	Fibre channel cable, LC to LC

Table 2. Available lengths for fiber-based DDR and QDR Infiniband cables

Length	Part number	Note
3 m DDR InfiniBand	46D0153	Fiber DDR InfiniBand CX4 to CX4
10 m DDR InfiniBand	46D0156	Fiber DDR InfiniBand CX4 to CX4
30 m DDR InfiniBand	46D0159	Fiber DDR InfiniBand CX4 to CX4
3 m DDR InfiniBand	59Y1908	Fiber DDR InfiniBand QSFP-to CX4
10 m DDR InfiniBand	59Y1912	Fiber DDR InfiniBand QSFP-to CX4
30 m DDR InfiniBand	59Y1916	Fiber DDR InfiniBand QSFP-to CX4
3 m QDR InfiniBand	59Y1920	Fiber DDR InfiniBand QSFP-to QSFP
10 m QDR InfiniBand	59Y1924	Fiber DDR InfiniBand QSFP-to QSFP
30 m QDR InfiniBand	59Y1928	Fiber DDR InfiniBand QSFP-to QSFP

Table 3. Available lengths for copper-based DDR and QDR Infiniband cables

Length	Part number	Note
1M DDR InfiniBand	46D0162	Mellanox copper DDR InfiniBand CX4-to-CX4 26AWG cable
3M DDR InfiniBand	46D0166	Mellanox copper DDR InfiniBand CX4-to-CX4 26AWG cable
5M DDR InfiniBand	46D0170	Mellanox copper DDR InfiniBand CX4-to-CX4 26AWG cable
8M DDR InfiniBand	46D0174	Mellanox copper DDR InfiniBand CX4-to-CX4 26AWG cable
0.5 m DDR InfiniBand	59Y1876	QLogic copper DDR InfiniBand QSFP-to-CX4 30AWG cable
1 m DDR InfiniBand	59Y1880	QLogic copper DDR InfiniBand QSFP-to-CX4 30AWG cable
3 m DDR InfiniBand	59Y1884	QLogic copper QDR InfiniBand QSFP-to-CX4 28AWG cable
0.5 m QDR InfiniBand	59Y1892	QLogic copper QDR InfiniBand QSFP-to QSFP 30AWG cable
1 m QDR InfiniBand	59Y1896	QLogic copper QDR InfiniBand QSFP-to QSFP 30AWG cable
3 m QDR InfiniBand	59Y1900	QLogic copper QDR InfiniBand QSFP-to QSFP 28AWG cable

Table 4. Available lengths for Copper-based 10GB Ethernet SFP+

Length	Part number	Note
0.5 m copper 10GB Ethernet	59Y1932	10GBASE-SFP+ copper cable
1 m copper 10GB Ethernet	59Y1936	10GBASE-SFP+ copper cable
3 m copper 10GB Ethernet	59Y1940	10GBASE-SFP+ copper cable
7 m copper 10GB Ethernet	59Y1944	10GBASE-SFP+ copper cable
10 m copper 10GB Ethernet	59Y1948	10GBASE-SFP+ copper cable

Table 5. Available lengths and types of Voltaire 4700 CXP Hyperscale Connectivity Cables

Length	Part number	Note
1.2m Voltaire Copper 12X CXP-to-12X CXP Cable	68Y6931	CXP Hyperscale Fabric Board to Fabric Board Cable (Same Rack 2- 4700 Chassis)
4m Voltaire Copper 12X CXP-to-12X CXP Cable	68Y6943	CXP Hyperscale Fabric Board to Fabric Board Cable (2-4700s in Same Rack)
4m Voltaire Copper 12X CXP-to-3 QSFP Breakout Cable	68Y6971	CXP to QSFP Hyperscale Fabric Board to 1U 4036 Cable (1-4700 and multiple 4036 same rack)
10m Voltaire Optical 12X CXP-to-12X CXP Cable	68Y6955	CXP Hyperscale Fabric Board to Fabric Board Cable (Rack to Rack 3 or more 4700 Chassis) copper cable
10m Voltaire Optical 12X CXP-to-3 QSFP Breakout Cable	68Y6979	CXP to QSFP Hyperscale Fabric Board to 1U 4036 Cable (1-4700 and multiple 4036 Rack to Rack) copper cable

Cabinet placement guidelines

Use the following guidelines when placing the cabinets:

- Remove cabinet side covers and inspect all side pocket cable connections for proper seating. Reinstall side covers prior to placing cabinets side-by-side.
- Cabinets can be placed side-by-side in contact with one another. Remember that to service any PDU in a cabinet, you must remove the side covers. At least 0.762 m (30 inches) of working clearance is required to ensure the safe removal of a side cover and provide access to the PDU. If the cabinets are placed side-by-side in contact with each other, leave enough extra space around the cluster so that you can move the cabinets if a PDU needs service. Cabinet placement must not exceed floor-loading limits.
- Cabinet placement must allow for access to both the front and back panels. At least 0.914 m (36 inches) of working clearance is needed to remove or insert a module into the rack.
- Cables and cable harnesses are custom made to fit the order.
- Make sure that the cabinets are arranged correctly and adjust them if necessary. See the packing slip and the cabinet labels to verify that all cabinets are in their correct locations.
- If you have purchased an IBM Rear Door Heat eXchanger, make sure that you have prepared the installation area with the proper fluid access, fluid connections, and fluid drainage. See “Preparing a Rear Door Heat eXchanger” on page 9 for more information.

Attention: Ensure that all rack-mounted units are fastened in the rack frame. Do not extend or exchange any rack-mounted units when the stabilizer is not installed.

To finish the cabinet placement, complete the following steps:

1. Inspect the cabinets, components, and cable connections for shipping damage.
2. Install the frame-stabilizer foot on each cabinet. Figure 3 on page 7 shows how to install a frame-stabilizer foot.

Installing a stability kit

A stability kit (IBM part number 41V0584), containing one stability kit, is included with the 1410 rack. Install the stability kit when the rack is at the final installation location. Figure 3 shows the attachment of the stability kit.

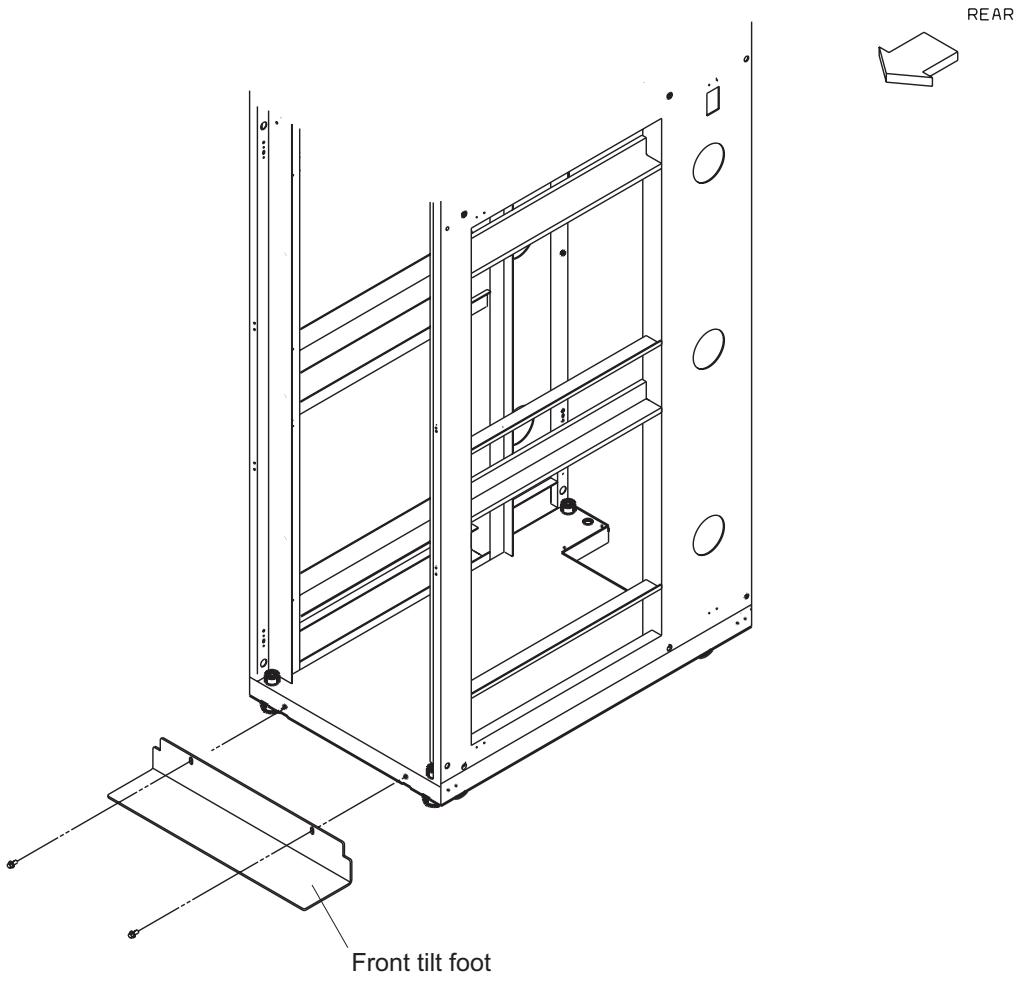


Figure 3. Stability kit

Floor loading

To determine the clearances required for each rack, you must know the maximum floor load rating in pounds per square foot or kilograms per square meter at your installation site. Table 6 on page 8 shows the necessary clearances or weight-distribution distances for a fully configured rack. The weight-distribution distances in all four directions indicate the area around the rack (minus covers) necessary to distribute the weight beyond the perimeter of the rack. Weight-distribution areas must not overlap with adjacent computer equipment weight-distribution areas. You must also take into consideration the additional weight of the cables.

For example, if the raised floor at your site could safely support 351.5 kg/m^2 (72.0 lb./$ft.^2$) then the correct distance between the sides of each cabinet would be 1.016 m (40 inches). You would also maintain front and back clearances of 0.762 m (30 inches), making sure that no other equipment was placed within the area.

The cluster cabinet footprint without covers is 0.622 3 m (24.5 inches) by 1.021 m (40.2 inches). The values shown in the Table 6 assume a maximum rack weight of 1003 kilograms (2211 pounds). Floor loading will vary by configuration.

If you need to know the approximate point load that each caster exerts on a raised floor panel, divide the weight of the rack by four.

Table 6. Floor loading

lb./ft.^{2}	**kg/m^2**	**Side clearances**	**Front and back clearances**
72.0	351.5	508 mm (20 in.)	762 mm (30 in.)
78.4	382.8	508 mm (20 in.)	610 mm (24 in.)
86.8	423.8	508 mm (20 in.)	457 mm (18 in.)
93.1	454.6	254 mm (10 in.)	762 mm (30 in.)
102.4	500.0	254 mm (10 in.)	610 mm (24 in.)
114.5	559.1	254 mm (10 in.)	457 mm (18 in.)
112.8	550.8	127 mm (5 in.)	762 mm (30 in.)
124.8	609.3	127 mm (5 in.)	610 mm (24 in.)
140.5	686.0	127 mm (5 in.)	457 mm (18 in.)
139.3	680.1	25 mm (1 in.)	762 mm (30 in.)
154.9	756.3	25 mm (1 in.)	610 mm (24 in.)
175.4	856.4	25 mm (1 in.)	457 mm (18 in.)

Preparing a Rear Door Heat eXchanger

If you purchased an IBM Rear Door Heat eXchanger with your cluster, it is attached to the rack unit by an IBM service representative during the hardware installation.

After a door is installed, the customer is responsible for filling the fluid, draining the fluid, and connecting or disconnecting the plumbing connections when the unit arrives or is replaced by an IBM service representative. You might want to plan for extra space around the racks to allow movement of racks for fluid service. See the *Installation and Maintenance Guide* that comes with the Rear Door Heat eXchanger or go to http://www.ibm.com/systems/support/ for more information.

Chapter 3. Cabling

Most of the Ethernet and fibre channel cabling is installed during manufacturing. However, there are three instances where cables must be installed at a customer site:
- Cables between cabinets
- Replacements for faulty cables
- Cables to replacement components

Any cable that fails at the customer site or is connected to components that must be replaced must be reconnected at the customer site.

The various types of cables perform functions such as providing serial and Ethernet connections to cluster components.

Notes:

1. There are additional color-coded intercabinet Ethernet cables available to help you organize your cluster cabling by color. The current cable colors include green, blue, and yellow with lengths varying from 0.6m to 25m. These cables do not replace previous Ethernet cables but can be used in place of previous cables if you prefer a color-coded cabling scheme. Contact your sales representative to order additional color-coded intercabinet Ethernet cables.
2. In some clusters, the FRU interconnect cables can also be grey or white.

Management VLAN

The management virtual local area network (VLAN) provides VLAN to manage the components in the cluster. This VLAN includes the following connections:
- Serial connections to all cluster nodes and storage nodes. These enable diagnostics and monitoring for the cluster and storage nodes.
- Serial connections to all cluster components. These provide a path for configuration of components in the cluster.

Primary cluster VLAN

The primary cluster VLAN provides an Ethernet connection (depending on the selected VLAN type) for communication with cluster nodes and storage nodes. This VLAN includes the following connections:
- An Ethernet connection to all cluster and storage nodes and other components. This provides the primary communications between the management node and the other components in the cluster.
- A Gigabit Ethernet trunk line (shared with the management VLAN) for certain VLAN types only. This serves as a high-speed trunk line for all Ethernet communication within the cluster.

Optional secondary cluster VLAN

The optional secondary cluster VLAN provides a second Ethernet, InfiniBand, or 10-Gb Ethernet high-speed interconnect for communication with cluster and storage nodes.

Keyboard/video/mouse

The keyboard/video/mouse (KVM) connects the ports on all nodes (cluster, storage, and management) to a single console through a central switch.

Fibre-channel cables

Fibre-channel cables provide fibre-channel connections between the storage nodes and the storage servers and between the storage servers and the storage expansion units.

Power distribution units

The power distribution unit provides the power to the cluster components. This includes both the power to the entire cabinet through the PDUs and remote power to the terminal servers through the power management module.

Connecting the cables

Cables and the cable harnesses in each cabinet are labeled with information that tells where to connect each end of the cable. Each label identifies the device or node it connects to, and where applicable, its port number.

Depending on the country of manufacture the label scheme will vary. Before you begin attaching cables, become familiar with the information on the labels.

When installing, start with the primary cabinet. After you have connected the intracabinet cables inside the primary cabinet, move on to each expansion cabinet and use the information printed on each cable label to connect the cables in the cabinet.

After you have connected any cables in the primary cabinet and expansion cabinets, connect the cables that run between the cabinets. This is called the intercabinet cabling.

For a complete listing of all available cables and their part numbers, see http://www.ibm.com/.

Note: Each intercabinet cable has labels at both ends. You can use the information on the label to create a site map to document all cable routing.

Fiber cabling

Fiber cables are used to connect storage nodes to storage servers, storage servers to storage expansion units, compute nodes (host bus adapters) to Infiniband network switches, and 10 GB Ethernet SFP+ cables to 10 GB Ethernet network switches.

Global console manager cabling

The global console manager (GCM) switch has 16 ACT connections (KVM over RJ-45/CAT5) and one KVM connection for the console. Use the following guidelines for cabling the GCM switch:

- Use the information on each end of each cable to create a site map.
- When routing a CAT5 KVM cable from a cabinet containing cluster nodes to the cabinet containing the GCM, use a CCO cable and a CAT5 cable sufficiently long enough to reach the GCM switch.
- Multiple KVM switches can be connected in series.
- Up to 40 cluster nodes can be connected in series to each ACT port on the RCM. The management node and all the storage nodes can also be daisy-chained, with up to 16 per ACT port. Multiple GCMs can not be daisy-chained together. The GCM can be connected to an Ethernet network to allow for remote access to the consoles of the servers over the network.

Local console manager cabling

The local console manager (LCM) switch accepts the CAT5 input from the NetBay Conversion Options and allows them to be fed into your management station. Its four CAT5 input ports support four chains of 16 servers per chain.

Use the following guidelines for cabling the LCM switch:

- Use the information on each end of each cable to create a site map.
- When routing a CAT5 KVM cable from a cabinet containing cluster nodes to the cabinet containing the LCM, use a UCO cable and a CAT5 cable sufficiently long enough to reach the LCM switch.
- Multiple KVM switches can be connected in series.
- Up to 16 cluster nodes can be connected in series.

Replacing a defective cable in a harness

If a cable in a harness is defective, complete the following steps to replace the cable:

1. Make sure that the power for the device with the defective cable is turned off.
2. Disconnect both ends of the defective cable from their ports. Do not remove any other connectors from their ports.
3. If possible, remove the cable from the harness. Otherwise, use a pair of wire cutters to cut off the connectors at both ends of the defective cable. This prevents someone from mistakenly reconnecting the cable, thinking that it has inadvertently been left unconnected.
4. Using a wire nut or electrical tape, secure the exposed cable wires.
5. Install a single cable between the two empty ports. Use wire ties to attach the cable to the harness that contains the defective cable. This identifies the replacement cable as belonging to this harness.
6. Label the replacement cable so it is clearly identified as a replacement.

Chapter 4. Checking the cabling

The clusters come without an operating system installed unless the option is purchased that includes a preloaded operating system. An IBM customer service representative (CSR) installs the hardware cabling, then the customer performs the operating system and device software installation unless a service contract is purchased that includes the software installation.

Before turning on a cluster, you must first check all the connections in the expansion cabinets and primary cabinet. After you have verified that all connections are secure, turn on the expansion cabinets containing storage nodes, storage servers, and storage expansion units. Turn on the primary cabinet last.

Note: If you have a component that does not display the operational blue LEDs on the control panel, see "Diagnosing a lights out or brown out event" on page 16.

Installing power cables and checking connections in the cabinets

To install cables and check the connections in the expansion cabinets, complete the following steps:

1. Make sure that the circuit-breaker switches for the source power are all turned off.
2. Open the side and rear doors of the cabinet.
3. From the side of the cabinet, make sure that all the power cables between the rack power distribution units and the front-end power distribution units (PDUs) are fully seated.
4. From the back of the cabinet, push on all the connectors on the cables running from the rack-mounted devices powered by the power distribution units to make sure that the cables are fully seated.
5. Connect power to the power distribution units:
   a. Connect the power cable to the power distribution unit.
   b. Pull the power cable through the opening at the base of the cabinet.
   c. Connect the power cable to the electrical outlet.
   d. Turn on the power breaker switch for the source power.
   e. Make sure that the power distribution unit circuit breakers are in the **On** position.
6. Make sure that all internal power distribution units are turned on by viewing the power LEDs on the power distribution unit connected components.
   - When power is applied, servers display a flashing green LED on the front panel.
   - The following devices have no power switch and turn on automatically when the power distribution units are turned on.

   All rack-mounted devices are powered by the internal power distribution unit.

Turning on the power to the cabinets

To turn on the power to the cabinets, complete the following steps:

1. Turn on any switches. This is necessary so that cluster components can communicate when they are brought online.
2. Turn on any storage expansion enclosures.

   Note: These must be brought online before the controllers to prevent an error condition.
3. Turn on any storage controllers.
4. Turn on the storage node or nodes. Management and compute nodes depend on the mount points on the storage nodes.
5. Turn on the management node or nodes.

   Note: By turning on the management node or nodes before you turn on the compute nodes, you can turn on the compute nodes faster.
6. Turn on the compute nodes.

Repeat the procedure for every cabinet unit in the cluster before powering on the primary cabinet.

Diagnosing a lights out or brown out event

If you experience a problem after the hardware installation, you can do a visual check of the cluster components to see if the cluster components light the various component LED indicators after installation. The following sequence occurs during a lights out or brown-out event scenario.

1. A lights-out event or brown-out event occurs. The system turns off and then turns back on through an external source.
2. All nodes turn on to the last known state (On/Off). If the last known state is On, then the nodes start and display a login prompt.
3. Log files show system restart events on nodes. If a lights-out or brown-out event occurs, check the following log files:
   - /var/log/messages
   - /var/log/csm/installnode.log (management server)
   - /var/log/csm/install.log (on the node)
   - BIOS code event log

Related topics

See Appendix A, “Error and event logs,” on page 19.

Chapter 5. Accessing the cluster from a remote location

This chapter includes information about:

- Accessing the cluster from a remote location
- Accessing each node before the operating system is installed

For more information about monitoring, remote control, setup, and technical references, see: http://www.ibm.com/servers/eserver/clusters/library/linux.html

Using the remote power command

The command **rpower** starts and resets hardware, powers hardware on and off, and queries the node power state. The syntax is:

`rpower <noderange>` [*–nodeps*] [*on* | *off* | *reset* | *stat* | *state* | *boot* | *cycle*] [*-V*|*–verbose*]
`rpower`[*-h*|*–help*|*-v*|*–version*]
PPC (with IVM or HMC) specific:
`rpower <noderange>` [*–nodeps*] [*of*] [*-V*|*–verbose*]

Remote console

All 1350 clusters can support a textual out-of-band console during BIOS and OS installation and operation. This is achieved either through SOL or using serial terminal servers. The **wcons** command accesses the remote console. This command opens a remote console session for any cluster nodes. The syntax is:

```
wcons <noderange>
```

Displaying node configuration information

The Extreme Cluster Administration Toolkit (xCAT) maintains a database of configuration information about the nodes that are configured. To download xCAT, go to http://xcat.sourceforge.net/. To display the node configuration, type the following command at the console prompt:

```
lsdef <noderange>
```

The output provides information about each node, such as the node type, model number, serial number, and host name. The output might also provide mapping data between nodes and switches, BladeCenter chassis, and terminal servers.

Related topics

- Chapter 4, “Checking the cabling,” on page 15
- Appendix A, “Error and event logs,” on page 19

Appendix A. Error and event logs

There are multiple log files available to help monitor and troubleshoot the cluster:

Linux log

The Linux OS log can be viewed in `/var/log/messages`

The system logging daemons are `syslogd` and `klogd`. They are configured via `/etc/syslog.conf`.

Log files are automatically rotated by the `logrotate` command. To rotation is configured with the `/etc/logrotate.conf` file.

Node log

POST/BIOS errors can be read by pressing F1 during the boot process and selecting **View Error Logs** from the menu. This action results in a POST code and a description of the error. For example:

```
301 Keyboard Input Error 164 Memory size has changed
```

Systems management log

Each node in a cluster will have an associated system event log. This may be read using the `xCAT eventlog <noderange> all` command.

Appendix B. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.
- Go to the IBM support Web site at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.
- For additional technical information or to download device drivers and other updates, complete the following steps:
  1. Go to http://www.ibm.com
  2. Under **Support & downloads**, go to the **Support by product** menu and click **Systems and servers**.
  3. In the **Product support** box, click **System x**.
  4. From the **Product family** menu, select your product from the menu and click **Go**. (For example, if your product is System Cluster 1350, select **Cluster 1350**.)
  5. To view documentation for the selected product, click **Documentation** in the **Support & downloads** box. To view available device drivers and downloads, click **Downloads**.
- To subscribe to the xCAT mailing list, go to http://www.xcat.org.
- If you suspect a software problem, see the information for the operating system or program.
- If you still experience a problem, contact Hardware Service and Support (see below). Be sure to have the following information available when you call.

Machine type: 1410 Model: 25U (1410 2RX) Model: 42U (1410 4RX) Serial number:

- The label containing the serial number can be found on the purchase order or in the rack cabinet.
  - The serial number label on the Model 25U (1410 4RX) rack is in the rear, middle section, on the inner, right side of the rack.
  - The serial number label on the Model 42U (1410 2RX) rack is in the rear, bottom section, in the inner, right corner of the rack.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/systems/support/ and follow the instructions. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x® and xSeries® information is http://www.ibm.com/systems/x/. The address for IBM BladeCenter information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/intellistation/.

You can find service information for IBM systems and optional devices at http://www.ibm.com/systems/support/.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with System x and xSeries servers, BladeCenter products, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/sl/products/.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/, or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through IBM Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. See http://www.ibm.com/planetwide/ for support telephone numbers, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

Note: If you have both 1410 and 7825 machine types in your rack cluster, use the 1410 when placing the service call.

For the cluster call process, complete the following steps:

1. After a hardware failure is identified, call 1-800-IBM-SERV (1-800-426-7378).
2. Make sure that you use the cluster machine type 1410 when placing the call.
3. Make sure that you have your customer number associated with the Support Line contract which is unique to this contract. After the customer number is verified, customer support works with you to determine and solve the problem.

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

IBM Taiwan product service

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:

IBM Taiwan Corporation
3F, No 7, Song Ren Rd.
Taipei, Taiwan
Telephone: 0800-016-888

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

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

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

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

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

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Appendix D. Declaration of IBM product noise emission values

General noise emission values for the cluster are shown in Table 7.

Table 7. General noise emission values

Declaration of IBM product noise emission values				
Product configuration	**Declared A-weighted sound power levels L_{WAd}(B)**		**Declared A-weighted sound pressure level L_{pAm}**(db) at 1 meter bystander position	
Intelligent Cluster and System Cluster 1350 (fully configured racks)	8.0 (bels) operating	8.0 (bels) idling	62 (db) operating	62 (db) idling
Note: **L_{WAd}** is the declared (upper limit) sound power level for a random sample of machines. **L_{pAm}** is the mean value of the A-weighted sound pressure levels at the bystander (1 - meter) positions for a random sample of machines. All measurements are made in accordance with ISO 7779 and declared in conformance with ISO 9296.				

Noise emission values are different for racks that contain BladeCenter units. Each BladeCenter unit has two blowers for cooling. An optional acoustics module is available that dampens the noise generated by the blowers. Table 8 shows the maximum sound levels emitted by BladeCenter units without the acoustics module and with the acoustics module. This represents the minimum and maximum number of BladeCenter units that can be installed in a 42-U rack.

Table 8. Noise emission values for racks containing BladeCenters

	Number of BladeCenter units per rack	**Maximum sound power idle**	**Maximum sound power operating**
Without acoustics module	1	7.4 bels	7.4 bels
With acoustics module	1	6.9 bels	6.9 bels
Without acoustics module	4	8 bels	8 bels
With acoustics module	4	7.5 bels	7.5 bels
Without acoustics module	6	8.2 bels	8.2 bels
With acoustics module	6	7.7 bels	7.7 bels

Appendix E. International License Agreement for Non-Warranted Programs

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GERMANY: No Warranty (Section 4): The following paragraphs are added to this Section: The minimum warranty period for Programs is six months. In case a Program is delivered without Specifications, we will only warrant that the Program information correctly describes the Program and that the Program can be

used according to the Program information. You have to check the usability according to the Program information within the "money-back guarantee" period.

Limitation of Liability (Section 5): The following paragraph is added to this Section: The limitations and exclusions specified in the Agreement will not apply to damages caused by IBM with fraud or gross negligence, and for express warranty.

INDIA: General (Section 6): The following replaces the fourth paragraph of this Section: If no suit or other legal action is brought, within two years after the cause of action arose, in respect of any claim that either party may have against the other, the rights of the concerned party in respect of such claim will be forfeited and the other party will stand released from its obligations in respect of such claim.

IRELAND: No Warranty (Section 4): The following paragraph is added to this Section: Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing, all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

ITALY: Limitation of Liability (Section 5): This Section is replaced by the following: Unless otherwise provided by mandatory law, IBM is not liable for any damages which might arise.

NEW ZEALAND: No Warranty (Section 4): The following paragraph is added to this Section: Although IBM specifies that there are no warranties, you may have certain rights under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods or services which IBM provides, if you require the goods or services for the purposes of a business as defined in that Act.

Limitation of Liability (Section 5): The following paragraph is added to this Section: Where Programs are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this Section are subject to the limitations in that Act.

PEOPLE'S REPUBLIC OF CHINA: Charges (Section 3): The following paragraph is added to the Section: All banking charges incurred in the People's Republic of China will be borne by you and those incurred outside the People's Republic of China will be borne by IBM.

UNITED KINGDOM: Limitation of Liability (Section 5): The following paragraph is added to this Section at the end of the first paragraph: The limitation of liability will not apply to any breach of IBM's obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982.

Appendix F. Preinstallation planning checklist

Use the following preinstallation checklist prior to the initial set up.

Important:: The cluster must be maintained only by system administrators experienced with Linux, DHCP, NFS, and Linux networking and administration.

To prepare for the delivery and installation of the cluster, you must complete the following actions before the installer arrives on site to install the hardware.

Completing these steps early in the process of planning for your cluster will help the installation proceed smoothly:

__ 1. Review the safety information.

__ 2. Review the physical, environmental, and electrical requirements for the cluster. Make sure that the installation site meets all the requirements described in this document. If there is a problem with the installation site, work with your IBM marketing representative to define an acceptable alternate approach.

__ 3. Review the proposed configuration from the IBM marketing representative. The IBM marketing representative will provide you with a suggested configuration for your cluster. The configuration will show the optimal racking scenario for your cluster.

__ 4. Complete the cluster preinstallation planning checklist and submit the results to your IBM Sales Support Representative. Consider the physical, environmental, and electrical requirements, along with the proposed configuration of the cluster, when gauging the readiness of your installation site.

__ 5. Plan the rack layout and floorplan. Use the information in Chapters 2 and 3, along with the proposed configuration to sketch the rack layout. Consider the number of racks, rack dimensions, required clearances, floor loading restrictions, and heating and cooling concerns.

__ 6. Assess the quality of the ac mains power supply. Arrange for a qualified electrician to assess your current power supply and to verify your power and electrical plans.

__ 7. Determine the grounding requirements and power consumption of your cluster. The proposed configuration that an IBM marketing representative provides shows the number and type of power distribution units (PDUs) included in each rack.

__ 8. Determine the ac power sources required to support your configuration. Each PDU has its own ac power cord that requires an external power connection outside of the cabinet.

__ 9. Unpack the cabinets only. The other boxes include instructions for the installer and miscellaneous components that might have been removed to satisfy shipping requirements.

Attention::

Make sure that all rack-mounted units are fastened in the rack frame. Do not extend or exchange any rack-mounted units when the stabilizer is not installed.

The power-supply cords provide the main disconnect for this product. If the rear door is locked, thus preventing access to the PDU disconnect, the power-socket outlet must be installed near the product and must be readily accessible.

This product has more than one power-supply cord. Disconnect all power-supply cords before servicing. This product might contain a lithium battery. To avoid possible explosion, do not burn, exchange, or charge the battery. Discard the battery as instructed by local regulations for lithium batteries. This product might contain a Class 1 laser device.

__ 10. Dispose of all packing material.

__ 11. Refer to Chapters 2, 3, and 4 to ensure proper placement of the cabinets by following the parameters listed.

__ 12. Arrange for a phone line near the cabinet.

__ 13. Schedule the installation with the IBM installer.

Appendix G. HPC-based solutions

Use the following resources to solve problems related to the applicable hardware and software combinations:

SAP solutions

For a pre-configured HS21_XM appliance that includes SAP TREX, SUSE Linux, GPFS software, and DS4700 storage, use the following resources.

Note: This solution accelerates the querying of vital business data in SAP NetWeaver BI.

- IBM System Solutions for SAP NetWeaver BI Accelerator
- IBM System Solutions for SAP Search Engine
- For more information, go to http://www-03.ibm.com/solutions/sap/us/detail/landing/N367059H83793W50.html

IBM SWG solutions

For a pre-configured System x 3650, 3655 and DS3400 appliance that includes Data Management software, a Redhat OS, and SWG lab services, use the following resources:

- Information Integrator Blade Solution - Grid-based enterprise data integration
- InfoSphere Balanced Warehouse - Business intelligence warehouse
- For more information, go to http://www-01.ibm.com/software/data/infosphere/balanced-warehouse/

For technical support, use one of the following resources:

- If you have the Customer Support Plan (CSP), go to http://www-03.ibm.com/support/techdocs/atsmastr.nsf/Web/CSPs and use the search function
- For information about BCU for Linux, go to http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS2110

Scale-Out File System solutions

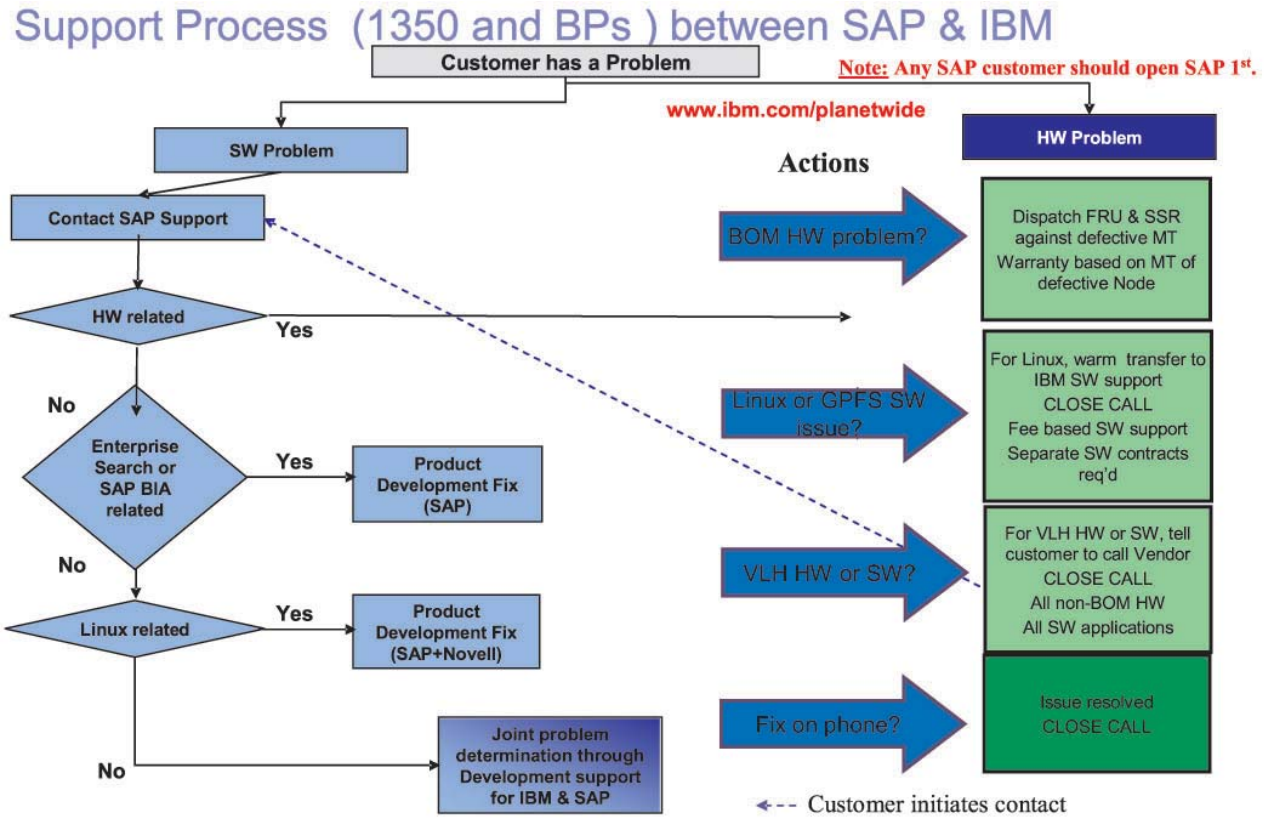
For a pre-configured HS21_XM, DS3400 or DS4700 storage appliance that includes GPFS, Tivoli Storage Manager, and a SUSE Linux OS, use the following resources.

Note: This solution provides NAS storage optimization and integration services.

- SOFS Quickstart for e1350
- For more information, go to http://www-935.ibm.com/services/us/its/html/sofs-landing.html?sa_campaign=message/ideas/leadspace/all/fileservicesflash&ca=smbstorOpt010808&tactic=html&me=W&met=inli&re=nonsmbNewsBuzz3CAEN

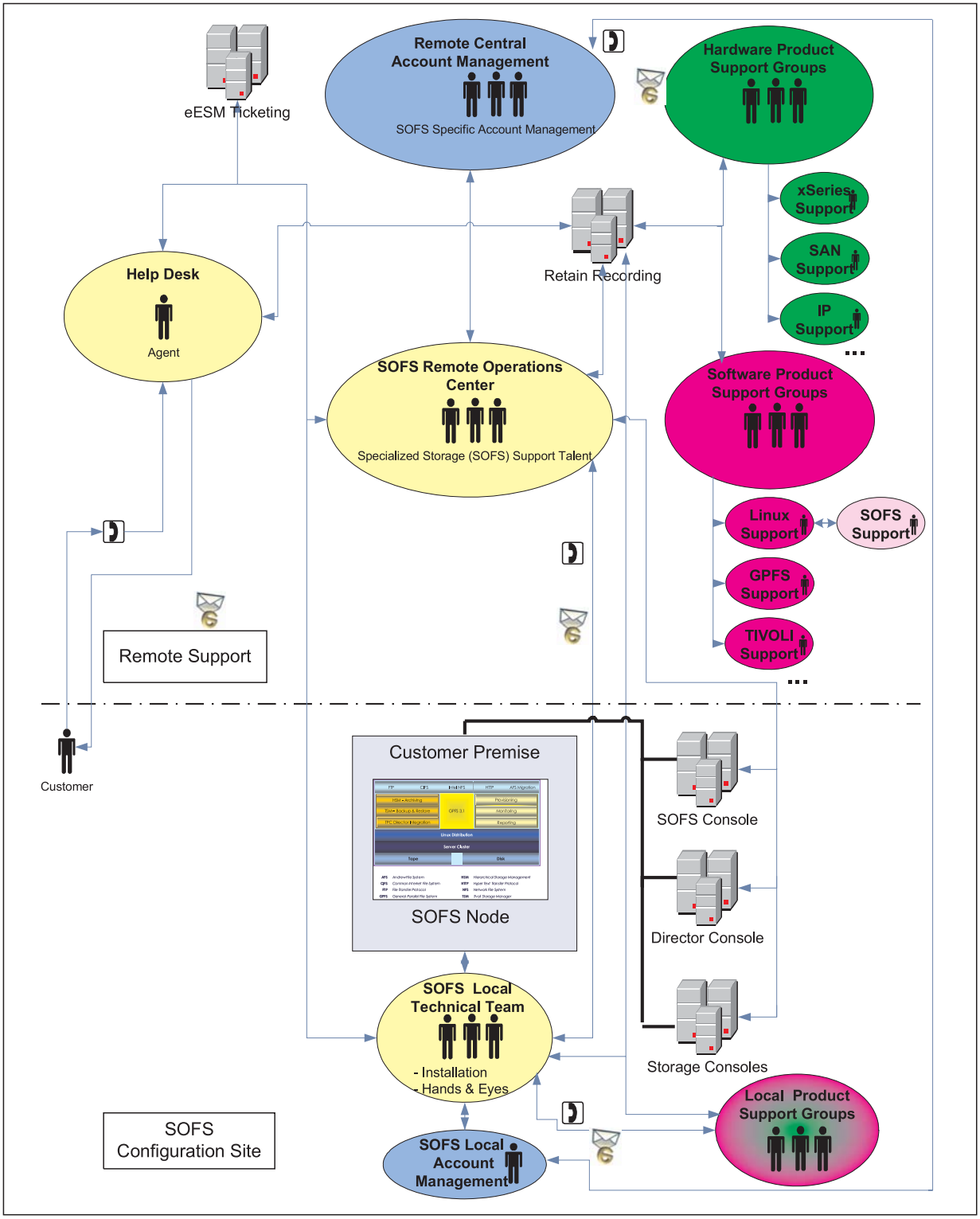
SAP BIA technical support

The following diagram illustrates the process for SAP BIA technical support.



SOFS technical support

The following diagram illustrates the process for SOFS technical support.



Index

S

T

V

W

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