ESCALA Power7

Managing PCI Adapters for the M6-700 or M7-700

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This publication concerns the following models:

 - Bull Escala E5-700 (Power 750 / 8233-E8B)

 - Bull Escala M6-700 (Power 770 / 9117-MMB)

 - Bull Escala M7-700 (Power 780 / 9179-MHB)

References to Power 755 / 8236-E8C models are irrelevant.

Hardware

March 2010

Trademarks and Acknowledgements

We acknowledge the right of proprietors of trademarks mentioned in this book.

Contents

Safety notices

Safety notices may be printed throughout this guide:

- **DANGER** notices call attention to a situation that is potentially lethal or extremely hazardous to people.
- **CAUTION** notices call attention to a situation that is potentially hazardous to people because of some existing condition.
- **Attention** notices call attention to the possibility of damage to a program, device, system, or data.

World Trade safety information

Several countries require the safety information contained in product publications to be presented in their national languages. If this requirement applies to your country, a safety information booklet is included in the publications package shipped with the product. The booklet contains the safety information in your national language with references to the U.S. English source. Before using a U.S. English publication to install, operate, or service this product, you must first become familiar with the related safety information in the booklet. You should also refer to the booklet any time you do not clearly understand any safety information in the U.S. English publications.

German safety information

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

Laser safety information

IBM® servers can use I/O cards or features that are fiber-optic based and that utilize lasers or LEDs.

Laser compliance

IBM servers may be installed inside or outside of an IT equipment rack.

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- 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 procedures when installing, moving, or opening covers on this product or attached devices.

   To Disconnect:
   1. Turn off everything (unless instructed otherwise).
   2. Remove the power cords from the outlets.
   3. Remove the signal cables from the connectors.
   4. Remove all cables from the devices

   To Connect:
   1. Turn off everything (unless instructed otherwise).
   2. Attach all cables to the devices.
   3. Attach the signal cables to the connectors.
   4. Attach the power cords to the outlets.
   5. Turn on the devices.

   (D005)

DANGER

Observe the following precautions when working on or around your IT rack system:

- Heavy equipment–personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.

- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

CAUTION

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- *(For sliding drawers.)* Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.
- *(For fixed drawers.)* This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.

(R001)

CAUTION:
Removing components from the upper positions in the 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 observe the following precautions:
  - Remove all devices in the 32U 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 32U 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.
- Verify 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.
- Verify that all door openings are at least 760 x 230 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 during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
  - 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.

(R002)

(L001)

(L002)

(L003)

or

All lasers are certified in the U.S. to conform to the requirements of DHHS 21 CFR Subchapter J for class 1 laser products. Outside the U.S., they are certified to be in compliance with IEC 60825 as a class 1 laser product. Consult the label on each part for laser certification numbers and approval information.

CAUTION:
This product might contain one or more of the following devices: CD-ROM drive, DVD-ROM drive, DVD-RAM drive, or laser module, which are Class 1 laser products. Note the following information:
- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of the controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

(C026)

CAUTION:
Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. (C027)

CAUTION:
This product contains a Class 1M laser. Do not view directly with optical instruments. (C028)

CAUTION:
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information: laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)

Power and cabling information for NEBS (Network Equipment-Building System) GR-1089-CORE

The following comments apply to the IBM servers that have been designated as conforming to NEBS (Network Equipment-Building System) GR-1089-CORE:

The equipment is suitable for installation in the following:
- Network telecommunications facilities
- Locations where the NEC (National Electrical Code) applies

The intrabuilding ports of this equipment are suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding ports of this equipment *must not* be metallically connected to the interfaces that connect to the OSP (outside plant) or its wiring. These interfaces are designed for use as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metallically to OSP wiring.

Note: All Ethernet cables must be shielded and grounded at both ends.

The ac-powered system does not require the use of an external surge protection device (SPD).

The dc-powered system employs an isolated DC return (DC-I) design. The DC battery return terminal *shall not* be connected to the chassis or frame ground.

Managing PCI adapters

Learn about using and managing Peripheral Component Interconnect (PCI) adapters. Find specifications and instructions for specific adapters.

What's new in Managing PCI adapters

See what is new and what has changed in Managing PCI adapters since the last edition of this topic collection.

March 2010

The following updates have been made to the content:
- PCIe Cryptographic Coprocessor (FC 4807)
- "175MB Cache RAID - Dual IOA Enablement Card (FC 5662)" on page 46

February 2010

The following update has been made to the content:
- Added information for IBM Power Systems™ servers that contain the POWER7™ processor.

Managing PCI adapters for the 9117-MMB or 9179-MHB for the 9117-MMB or 9179-MHB

Learn about using and managing Peripheral Component Interconnect (PCI) adapters. Find specifications and instructions for specific adapters.

The adapter information shown here is used during nondirected service activities. This information is used to:
- Identify an adapter
- Find specific technical information about an adapter
- Where applicable, show special installation or cabling instructions
- Show signal names for the output pins of the adapter connectors
- Where applicable, show the settings for switches or jumpers

Adapters can be identified by their feature code (FC) or their custom-card identification number (CCIN). Normally, the CCIN number is labeled on the adapter.

The FRU part number (P/N) of your adapter might not match the FRU P/N listed in this document. When this occurs verify the CCIN is the same. If the CCIN is same, the adapter has the same function and can be used in the same way.

Adapters must be placed in specific PCI, Peripheral Component Interconnect-X (PCI-X), or PCI Express® (PCIe) slots in order to function correctly or perform optimally. See the PCI adapter placement for system-specific information on which slots are available and which adapters can be placed in those slots.

Backplane daughter cards and RAID enablement cards

Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Backplane daughter cards and RAID enablement cards that are not in the PCI form factor are not covered in Managing PCI adapters.

See Parts information to find part numbers and location codes for these types of cards.

See Backplanes and cards for removal and replacement procedures.

See SAS RAID enablement for SAS RAID enablement procedures.

Related tasks

➦ SAS RAID enablement
Learn how to install features to enable RAID on your system.

📄 Backplanes and cards
Learn how remove and replace RAID enablement cards or a system backplane.

Related reference

Parts information

➦ Parts information

PCI Express

Learn about PCI Express (PCIe) adapters and slots.

PCI Express (PCIe) adapters use a different type of slot than Peripheral Component Interconnect (PCI) and Peripheral Component Interconnect-X (PCI-X) adapters. If you attempt to force an adapter into the wrong type of slot, you might damage the adapter or the slot. A PCI adapter can be installed in a PCI-X slot, and a PCI-X adapter can be installed in a PCI adapter slot. A PCIe adapter cannot be installed in a PCI or PCI-X adapter slot, and a PCI or PCI-X adapter cannot be installed in a PCIe slot. The following illustration shows an example of a PCI-X adapter (**A**) next to a PCIe 4x (**B**) adapter.
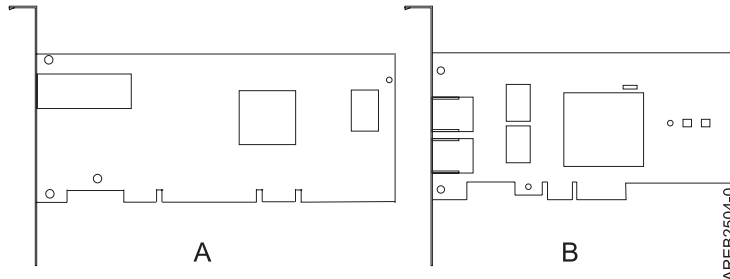
Figure 1. PCI-X adapter and PCIe 4x adapter

PCIe adapters and slots come in 4 different sizes: 1x, 4x, 8x and 16x. Smaller size adapters will fit in larger slots, but larger size adapters will not fit in smaller slots. The following table shows PCIe slot compatibility.

Table 1. PCIe slot compatibility

	1x slot	**4x slot**	**8x slot**	**16x slot**
1x adapter	Supported	Supported	Supported	Supported
4x adapter	Not supported	Supported	Supported	Supported
8x adapter	Not supported	Not supported	Supported	Supported
16x adapter	Not supported	Not supported	Not supported	Supported

To learn more about the PCIe standard, see the IBM Redbooks® Technote, *Introduction to PCI Express* at http://www.redbooks.ibm.com/abstracts/tips0456.html.

Safety information

Observe these precautions in order to avoid electric shock when working on or around the system.

DANGER

> **When working on or around the system, observe the following precautions:**
>
> **Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:**
> * **Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.**
> * **Do not open or service any power supply assembly.**
> * **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
> * **The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.**
> * **Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.**
> * **Connect any equipment that will be attached to this product to properly wired outlets.**
> * **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 procedures when installing, moving, or opening covers on this product or attached devices.**
>
> **To Disconnect:**
> 1. **Turn off everything (unless instructed otherwise).**
> 2. **Remove the power cords from the outlets.**
> 3. **Remove the signal cables from the connectors.**
> 4. **Remove all cables from the devices**
>
> **To Connect:**
> 1. **Turn off everything (unless instructed otherwise).**
> 2. **Attach all cables to the devices.**
> 3. **Attach the signal cables to the connectors.**
> 4. **Attach the power cords to the outlets.**
> 5. **Turn on the devices.**
>
> **(D005)**

DANGER

> **To prevent a possible shock from touching two surfaces with different protective ground (earth), use one hand, when possible, to connect or disconnect signal cables. (D001)**

Note: This system might be equipped with a second power supply. Before continuing with this procedure, ensure that the power source to the system has been completely disconnected.

(L003)
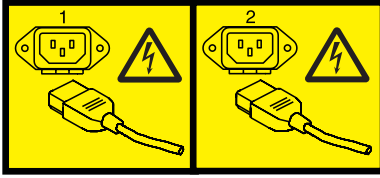
or
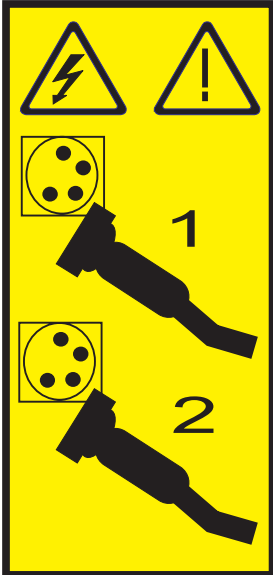
Handling static sensitive devices

Electronic boards, adapters, media drives, and disk drives are sensitive to static electricity discharge. These devices are wrapped in antistatic bags to prevent this damage. Take these precautions to prevent damage to these devices from static electricity discharge.

- Attach a wrist strap to an unpainted metal surface of your hardware to prevent electrostatic discharge from damaging your hardware.
- When using a wrist strap, follow all electrical safety procedures. A wrist strap is for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
- If you do not have a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds.
- Do not remove the device from the antistatic bag until you are ready to install the device in the system.
- With the device still in its antistatic bag, touch it to the metal frame of the system.
- Grasp cards and boards by the edges. Avoid touching the components and gold-edge connectors on the adapter.
- If you need to lay the device down while it is out of the antistatic bag, lay it on the antistatic bag. Before picking it up again, touch the antistatic bag and the metal frame of the system at the same time.
- Handle the devices carefully to prevent permanent damage.

Important partitioning considerations with dual-slot and multi-adapter configurations

Learn about partitioning considerations with dual-slot and multi-adapter configurations.

Logical partitions can own physical I/O resources. Physical I/O resources are assigned to logical partitions at the slot level. Assigning a slot to a logical partition enables the operating system that runs in the logical partition to control the functionality of the I/O resource and power for that slot. When the operating system powers a slot on or off, the physical I/O resource is powered on or off.

In some I/O configurations, the functionality of an adapter or I/O resource depends on two or more physical slots. For example, if you have a double-wide RAID adapter or two separate RAID adapters paired together, both physical slots might need to be assigned to the same or different logical partitions. It is important to understand the desired configuration and function being provided before completing the logical partitioning and activation of the resources involved. There are two I/O configurations involving adapter pairs:

Mult-initiator and high availability

Auxiliary Write Cache

Multi-initiator and high availability

The terms multi-initiator and high availability (HA) refer to connecting multiple adapters (typically two adapters) to a common set of disk expansion drawers for the purpose of increasing availability. This is also referred to as Dual Storage IOA configuration. This is commonly done in either of the following configurations:

Note: Some systems have SAS RAID adapters integrated onto the system boards and use a Cache RAID - Dual IOA Enablement Card (FC 5662) to enable storage adapter Write Cache and Dual Storage IOA (HA RAID Mode). For these configurations, installation of the Cache RAID - Dual IOA Enablement Card will place the two integrated adapters into a HA RAID configuration. There are no separate SAS cables required to connect the two integrated SAS RAID adapters to each other.

HA two system configuration

An HA two system configuration provides a high-availability environment for system storage by enabling two systems or partitions to have access to the same set of disks and disk arrays. This feature is typically used with the IBM High-Availability Cluster Multiprocessing application (HACMP™). The IBM HACMP software provides a commercial computing environment that ensures that mission-critical applications can recover quickly from hardware and software failures. The support for this configuration is operating system dependent.

HA single system configuration

An HA single system configuration provides for redundant adapters from a single system to the same set of disks and disk arrays. This feature is typically referred to as Multi-Path I/O (MPIO). MPIO support is part of the operating system support and can be used to provide a redundant IBM SAS RAID controller configuration with RAID protected disks.

Auxiliary write cache adapter

The auxiliary write cache (AWC) adapter provides a duplicate, nonvolatile copy of write cache data of the RAID controller to which it is connected.

Protection of data is enhanced by having two battery-backed (nonvolatile) copies of write cache, each stored on separate adapters. If a failure occurs to the write cache portion of the RAID controller, or the RAID controller itself fails in such a way that the write cache data is not recoverable, the AWC adapter provides a backup copy of the write cache data to prevent data loss during the recovery of the failed RAID controller. The cache data is recovered to the new replacement RAID controller and then written out to disk before resuming normal operations.

The AWC adapter is not a failover device that can keep the system operational by continuing disk operations when the attached RAID controller fails. The system cannot use the auxiliary copy of the cache for runtime operations even if only the cache on the RAID controller fails. The AWC adapter does not support any other device attachment and performs no other tasks than communicating with the attached RAID controller to receive backup write cache data. The purpose of the AWC adapter is to minimize the length of an unplanned outage, due to a failure of a RAID controller, by preventing loss of critical data that might have otherwise required a system reload.

It is important to understand the difference between multi-initiator connections and AWC connections. Connecting controllers in a multi-initiator environment refers to multiple RAID controllers connected to a common set of disk enclosures and disks. The AWC controller is not connected to the disks, and it does not perform device media accesses.

The RAID controller and the AWC adapter each require a PCI bus connection and are required to be in the same partition. The two adapters are connected by an internal connection. For the planar RAID enablement and planar auxiliary cache features, the dedicated connection is integrated into the system planar.

Related reference

"PCI-X DDR External Dual – x4 Port SAS Adapter (FC 5912; CCIN 572A)" on page 106
Learn about the specifications and operating system requirements for the 5912 adapter.

"PCI-X DDR 1.5 GB cache SAS RAID Adapter (FC 5904, 5906, 5908; CCIN 572F and 575C)" on page 103
Learn about the specifications and operating system requirements for the 5904, 5906, and 5908 adapter.

"PCI-X Double-Wide, Quad-Channel Ultra320 SCSI RAID Controller (FC 5778, 5782; CCIN 571F, 575B)" on page 89
Learn about the features, specifications and installation notes for the PCI-X Double-Wide, Quad-Channel Ultra320 SCSI RAID Controller for IBM System i® models.

Related information

➦ Logical partioning
Learn about logical partioning.

➦ Changing partition profile properties
Learn about changing partition profile properties using the HMC.

Dual IOA Enablement Card (FC 5662)
Learn about the specifications for the Dual IOA Enablement Card.

SAS RAID controllers for AIX
Learn about usage and maintenance information for the SAS RAID Controller for the AIX.

SAS RAID controllers for IBM i on the 9117-MMB or 9179-MHB
Learn about usage and maintenance information for the SAS RAID Controller for the IBM i.

SAS RAID controllers for Linux on the 9117-MMB or 9179-MHB
Learn about the useage and maintenance information for the SAS RAID Controller for Linux.

Serial-attached SCSI cable planning
Learn about the serial-attached SCSI (SAS) cables.

PCI adapter information by feature type

Find technical information for specific adapters. Adapters can be identified by their feature code (FC) or their custom card identification number (CCIN).

Related information

Adapters, Devices, and Cable Information for Multiple Bus Systems (SA38-0516)
Learn about older adapters that are not covered in Managing PCI adapters, and that were announced before October 2003.

4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR Adapter (FC 1910, 5759; CCIN 1910, 5759)

Learn about the specifications and operating system requirements for the 4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR Adapter.

The 4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR Adapter is a 64-bit address/data, short form factor Peripheral Component Interconnect-X (PCI-X) adapter with an LC type external fiber connector that provides single or dual initiator capability over an optical fiber link or loop. With the use of appropriate optical fiber cabling, this adapter provides the capability for a network of high-speed local and remote located storage. The adapter will auto-negotiate for the highest data rate between adapter and an attaching device at 1 Gbps, 2 Gbps or 4 Gbps of which the device or switch is capable. Between the adapter and an attaching device or switch, the distances supported are up to: 500 meters running at 1 Gbps data rate, 300 meters running at 2 Gbps data rate, and 150 meters running at 4 Gbps data rate. When used with IBM fibre channel storage switches supporting long-wave optics, distances of up to 10 kilometers are capable running at either 1 Gbps, 2 Gbps, or 4 Gbps data rates.

The 4 Gb Dual-Port Fibre Channel PCI-X Adapter can be used to attach devices either directly, or by means of fibre channel switches. If attaching a device or switch with a SC type fiber connectors, use a LC-SC 50 micron fiber converter cable (#2456) or a LC-SC 62.5 micron fiber converter cable (#2459).

Adapter specifications

Item   Description
Adapter FRU number
    03N5029[*] or 03N5020[**]

    [*] Designed to comply with RoHS requirement.
    [**] Not designed to comply with the RoHS requirement.
Wrap plug FRU number
    11P3847 (FC 1910, 5759)
I/O bus architecture
    PCI-X 2.0a, PCI 3.0, PCI-X Mode 2 - 266 MHz, PCI-X Mode 1 - 133 MHz, PCI - 66 MHz
Slot requirement
    One available 3.3 volt PCI or PCI-X slot
FC compatibility
    1, 2, 4 gigabit
Cables

    50/125 micron fiber (500 MHz*km bandwidth cable)
    • 1.0625 Gbps 2 – 500 m
    • 2.125 Gbps 2 – 300 m
    • 4.25 Gbps 2 – 150 m

    62.5/125 micron fiber (200 MHz*km bandwidth cable)
    • 1.0625 Gbps 2 – 300 m
    • 2.125 Gbps 2 – 150 m
    • 4.25 Gbps 2 – 70 m
Maximum number
    For system-specific adapter placement information, see the topic collections.
Operating system or partition requirements
    AIX 5L™ Version 5.2 with the 5200-08 Technology Level

AIX 5L Version 5.3 with the 5300-04 Technology Level

Red Hat Enterprise Linux® version 4 U2

SUSE Linux Enterprise Server 9 SP3

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web

site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Related tasks

Installing PCI adapters

Related reference

IBM Prerequisite Web page

Parts information

Parts information

PCI adapter placement

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCI-X DDR Dual-Channel Ultra320 SCSI Adapter (FC1912, 5736; CCIN 571A)

Learn about the specifications for the PCI-X DDR Dual-Channel Ultra320 SCSI Adapter.

The PCI-X DDR Dual-Channel Ultra320 SCSI Adapter is a high-performance SCSI adapter for Peripheral Component Interconnect-X (PCI-X) and PCI systems. The adapter provides two SCSI channels (buses), each capable of running 320 MBps (maximum). Each SCSI bus can either be internal (on systems that support internal SCSI devices or backplane attachments) or external, but not both. Internally attached Ultra320 devices run at a data rate of up to 320 MBps on systems that have internal backplanes that are capable of supporting Ultra320 speeds.

The adapter uses and supports low voltage differential (LVD) drivers and receivers only.

PCI-X DDR dual-channel Ultra320 SCSI adapter specifications

Item   Description
FRU number
    FC 0647, 5736, or 5775 is 42R4860[*] or 39J4996[**]

    FC 1912 is 42R4862[*] or 39J4998[**]

    [*] Designed to comply with RoHS requirement.
    [**] Not designed to comply with the RoHS requirement.
I/O bus architecture
    PCI 2.2 compliant
Slot requirement
    One available 3.3 volt PCI or PCI-X slot
Maximum number
    For system-specific adapter placement information, see the topic collections.
Operating system or partition requirements
    AIX 5L Version 5.2 with the 5200-08 Technology Level, or later

    AIX 5L Version 5.3 with the 5300-03 Technology Level, or later

Red Hat Enterprise Linux 4 Update 2, or later

SUSE Linux Enterprise Server 9 Service Pack 2, or later

Required software or drivers

AIX® - devices.pci.1410c002 device driver package

Linux - ipr driver Version 2.0.10.3 (or later) for SLES 9 kernels, Version 2.0.11.1 (or later) for RHEL4 kernels, or Version 2.0.13 (or later) for kernel.org kernels (kernel version 2.6.12 or later)

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM

Prerequisite Web site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Tools None

Cables

Attachment cables are included with the attaching subsystem or device.

Related tasks

Installing PCI adapters

Related reference

IBM Prerequisite Web page

Parts information

Parts information

PCI adapter placement

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter (FC 1983, 5706; CCIN 5706)

Learn about the specifications and LEDs for the 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter.

The 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter is a full duplex, dual ported, gigabit Ethernet adapter that can be configured to run each port at 10, 100, or 1000 Mbps data rates. The adapter connects to the system using a PCI or PCI-X bus and connects to a network using standard unshielded twisted pair (UTP) cable for distances of up to 100 meters. AIX Network Installation Management (NIM) boot capability is supported with this adapter. The adapter conforms to the IEEE 802.3ab 1000 Base-T standard. The adapter also supports jumbo frames when running at the 1000 Mbps speed.

Adapter LED

The LEDs on the adapter provide information about the card's operation status. The LEDs are visible through the adapter's mounting bracket and, when lit, indicates the following conditions:

LED	Light	Description
Link Speed	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps
Link	Green	Good link
	Off	No link: could indicate a bad cable, bad connector, configuration mismatch, or not selected
	Blinking	Indicates data activity
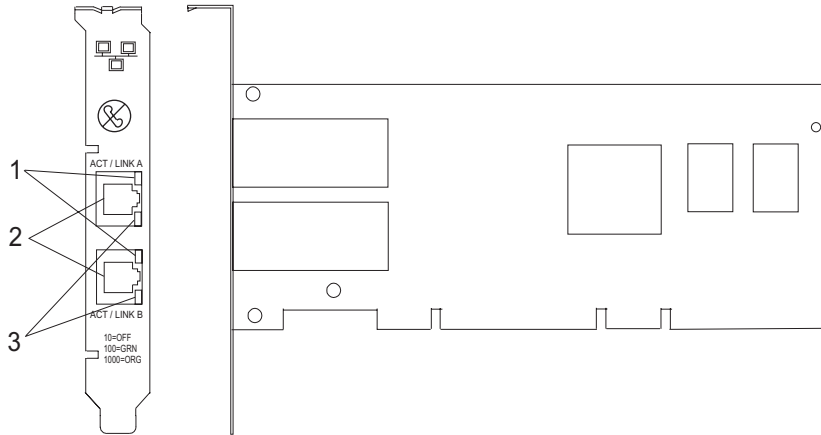
Figure 2. 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter

1   ACT/LNK LED
2   RJ-45 connector
3   Link Speed LED

Adapter Specifications

Item   **Description**
FRU number
>5706 is 03N5297[*] or 00P6131[**]

>1983 is 03N5298[*] or 80P6450[**]

>[*] Designed to comply with RoHS requirement.
>[**] Not designed to comply with the RoHS requirement.

I/O bus architecture
>PCI 2.2 and PCI-X V1.0a compliant

Busmaster
>Yes

Maximum number
>For system-specific adapter placement information, see the topic collections.

Adapter size
>PCI short form

Connector information
>RJ-45

Wrap plug
>RJ-45, part number 03N6070

Cables
>Customers supply the cables. For best performance, use cables that meet Cat 5e cabling standards, or later.

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web

site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Related tasks

⮩ Installing PCI adapters

Related reference

⮩ IBM Prerequisite Web page

Parts information

⮩ Parts information

PCI adapter placement

⮩ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

1 Gigabit iSCSI TOE PCI-X Adapter (FC 1986, 5713) (CCIN 573B)

Learn about the 1 Gigabit iSCSI TOE PCI-X Adapter.

CCIN 573B is not supported for use as Ethernet adapters under the IBM i operating system.

Description and technical overview

The IBM 1 Gigabit iSCSI TOE PCI-X Adapter encapsulates SCSI commands and data into TCP packets and transports them over a 1-gigabit-Ethernet network through IP. The adapter is dual function, operating as an iSCSI TOE (TCP/IP offload engine) adapter or as a general purpose Ethernet adapter where the TCP/IP protocol is offloaded onto the adapter. However, the network function is not supported by AIX.

The adapter is available in the following versions:

1 Gigabit-SX iSCSI TOE PCI-X Adapter (optical connector), FC 5714

1 Gigabit-TX iSCSI TOE PCI-X Adapter (copper connector), FC 5713 and FC 1986

1 Gigabit-SX iSCSI TOE PCI-X Adapter (optical connector), FC 5714 (CCIN 573C)

- FRU part number 03N6058* or 30R5519**
  (* Designed to comply with RoHS requirement.
  ** Not designed to comply with the RoHS requirement.)
- 133 MHz PCI-X version 1.0a support and version 2.0 mode 1
- PCI 2.3 compliant
- Low profile
- 3.3 V
- Hardware implementation of entire TCP/IP stack
- 200 MB/s, full duplex gigabit Ethernet
- iSCSI initiator support
- IEEE 802.3z compliant
- iSCSI RFC 3720 Compliant
- Multimode fiber cabling support
- Fiber LC connector for multimode fiber cabling
- Dual-address cycle support for access to 64-bit addresses
- 64-bit addressing support for systems with physical memory greater than 4 gigabytes
- PCI-X split transactions support
- LED indicator for link activity

Note: The fiber adapters are designed with specifications that the cable be a dual-cable connector, with transmit and receive cable ends clamped together. If you use separate transmit and receive fiber cables, clamp the cables together to enhance the retention strength on the fiber transceiver connector. Clamping the cables together also improves the alignment of the fibers with the connector and is designed to improve overall performance.
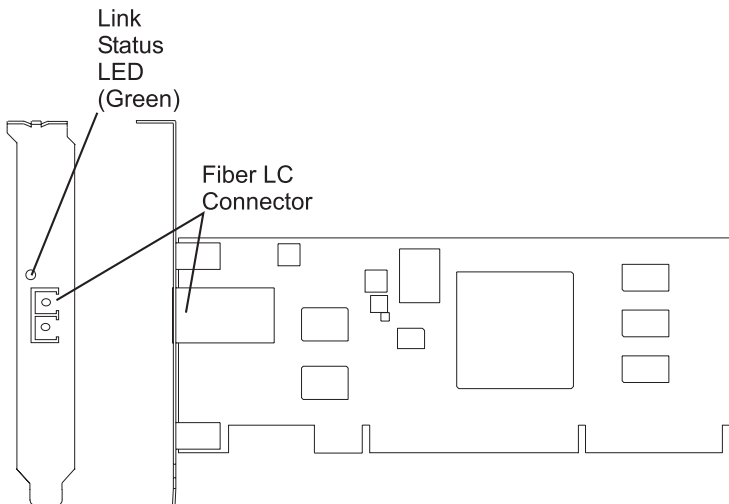
Figure 3. 1 Gigabit-SX iSCSI TOE PCI-X Adapter

1 Gigabit-TX iSCSI TOE PCI-X Adapter (copper connector), FC 5713 and FC 1986 (CCIN 573B)

- FRU part number 03N6056* or 30R5219**
  (* Designed to comply with RoHS requirement.
  ** Not designed to comply with the RoHS requirement.)
- 133 MHz PCI-X version 1.0a support and version 2.0 mode 1
- PCI 2.3 compliant
- Low profile
- 3.3 v
- Hardware implementation of entire TCP/IP protocol stack
- Full Duplex Gigabit Ethernet
- iSCSI initiator support
- IEEE 802.3ab 1000 Base-T compliant
- iSCSI RFC 3720 Compliant
- PCI-X split transactions support
- LED indicator for link activity
- RJ-45 unshielded twisted pair (UTP) connector
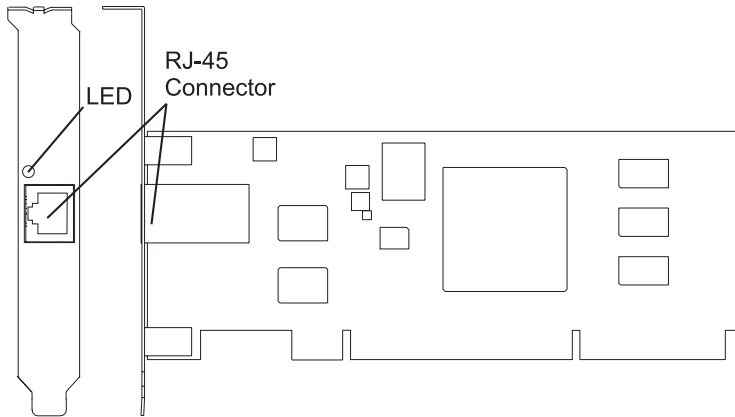
Figure 4. 1 Gigabit-TX iSCSI TOE PCI-X Adapter

Preparing to install the adapter

Preparing to install the adapter involves the following tasks.

- Verifying your hardware requirements
- Verifying your software requirements
- Checking prerequisites
- Gathering tools and documentation

Note: If you are installing your operating system at this time, install the adapter before you install the operating system. If you are installing only the device driver for this adapter, install the device driver before you install the adapter.

Verifying your hardware requirements:

Before you install your adapter, verify that you have the required hardware.

1 Gigabit-TX iSCSI TOE PCI-X Adapter (copper connector)

The IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter requires the following hardware:

- Cat 5, Cat 5e, or Cat 6 unshielded twisted pair (UTP) cables for network attachment.
  Customers supply the cables.

  Restriction: The cable can be no longer than 100 meters (including patch cables) from the adapter to the local switch.
- RJ-45 wrap plug. (Part number 00P1689, included in FC 5713)

The following table shows the minimum and maximum allowable fiber cable lengths from the SX adapter to the gigabit Ethernet switch, including patch cables:

Table 2. Fiber cable lengths for the 1 Gigabit-SX iSCSI TOE PCI-X Adapter (optical connector)

Fiber type	Modal bandwidth (MHz-km)	Minimum range (meters)	Maximum range (meters)
62.5 μ.m MMF	160	2	220
62.5 μ.m MMF	200	2	275
50 μ.m MMF	400	2	500
50 μ.m MMF	500	2	500

Verifying your software requirements:

Before you install your adapter, verify that you have the required operating system software.

The 1 Gigabit iSCSI TOE PCI-X Adapter is supported on AIX 5L version 5.2 and 5.3, and on SUSE Linux Enterprise Server 9 SP3.

For additional information, see the IBM Prerequisite Web site at

http://www-912.ibm.com/e_dir/eServerPrereq.nsf

Checking prerequisites:

To install the adapter, you will need the following items.
* The adapter
* AIX Base Operating System CD, which includes the device driver, or the AIX device driver CD

If an item is missing or damaged, contact your vendor.

Note: Be sure to retain your proof of purchase as it might be required to receive warranty service.

Gathering tools and documentation:

To install the adapter, you need the following tools and documentation.
* A flat-blade screwdriver
* Instructions on how to install a PCI adapter in your specific, system unit.
  For instructions on how to install PCI adapters, refer to the PCI adapters topic.
* Your operating system documentation.

Related tasks

Installing PCI adapters

Installing the device driver software for the adapter
Use the information in this section to install the device driver software. The device driver is provided for the AIX operating system.

Installing the device driver software for the 1 Gigabit-SX iSCSI TOE PCI-X Adapter:

Learn how to install the device driver software. The device driver is provided for the AIX operating system.

Note: If you are installing your operating system at this time, install the adapter before you install the operating system. If you are installing only the device driver for this adapter, install the device driver before you install the adapter.
1. If you should install your device driver software first, go to step 1 and continue with this section.
2. If you should install your adapter hardware first, go to "Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter" on page 17. When you install AIX, your adapter device driver is automatically installed.

Note: You only need to install the device driver for the first instance of the 1 Gigabit-SX iSCSI TOE PCI-X Adapter. Any subsequent installation of the 1 Gigabit-SX iSCSI TOE PCI-X Adapter will not require that you install the device driver again. Go to "Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter" on page 17 for instructions.

To install the device driver software, do the following steps:

1. Turn on the system unit power.
2. Log in as root user.
3. Insert the media containing the device driver software (for example, a CD-ROM)) into the appropriate media device. If your system does not have a CD-ROM drive, refer to your system documentation for performing a NIM (Network Installation Management) installation.
4. At the command line, type the following System Management Interface Tool (SMIT) fastpath:

   `smit devinst`
5. Press Enter. The Install Additional Device Software screen highlights the INPUT device/directory for software option.
6. Select or type your input device by doing one of the following actions:

   • Press F4 to display the input device list and select the name of the device (for example; CD-ROM) that you are using and press Enter.

   or

   • In the entry field, type the name of the input device you are using and press Enter. The Install Additional Device Software window highlights the SOFTWARE to install option.
7. Press F4 to display the SOFTWARE to install window.
8. Type a forward slash (/) to display the Find window.
9. For the IBM 1 Gigabit-SX iSCSI TOE PCI-X Adapter, type the following device package name:

   `devices.pci.1410cf02`
10. Press Enter. The system finds and highlights this device driver software.
11. Press Enter.

    The INSTALL ADDITIONAL DEVICE SOFTWARE screen displays. The entry fields are automatically updated.
12. Press Enter to accept the information.

    The ARE YOU SURE window displays.
13. Press Enter to accept the information.

    The COMMAND STATUS screen displays. The term RUNNING is highlighted, to indicate that the installation and configuration command is in progress.
14. When RUNNING changes to OK, scroll to the bottom of the page and locate the Installation Summary.

    After a successful installation, SUCCESS displays in the Result column of the Installation Summary.
15. Remove the installation media from the drive.
16. Press F10 to exit SMIT.
17. Go to "Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter" on page 17, to see the adapter installation procedure.

Verifying AIX software installation:

Use this procedure to verify that the device driver for the adapter is installed.

1. If necessary, log in as root user.
2. At the command line, type: `lslpp -l devices.pci.1410cf02.rte`
3. Press Enter. Possible results are as follows:

   • If the 1 Gigabit-SX iSCSI TOE PCI-X Adapter device driver is installed, the following is an example of the data that displays on your screen:

Fileset	Level	State	Description

Path: /usr/lib/objrepos devices.pci.1410cf02.rte	5.3.0.0	COMMITTED	1000 Base-SX PCI-X iSCSI TOE Adapter Device Software

Verify that the **devices.pci.1410cf02.rte** filesets are installed at the AIX 5.2.0 or later level. If this information displays but you continue to have problems, go to "Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter" on page 17.

- If no data displays on your screen, the 1 Gigabit-SX iSCSI TOE PCI-X Adapter device driver did not install correctly. Return to "Installing the device driver software for the 1 Gigabit-SX iSCSI TOE PCI-X Adapter" on page 14. If you continue to experience problems, it may be necessary to call your system support organization. Refer to your operating system documentation for instructions.

Installing the device driver software for the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter:

Learn how to install the device driver software. The device driver is provided for the AIX operating system.

Note: If you are installing your operating system at this time, install the adapter before you install the operating system. If you are installing only the device driver for this adapter, install the device driver before you install the adapter.

- If you should install your device driver software first, go to step 1 and continue with this section.
- If you should install your adapter hardware first, go to"Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter" on page 17. When you install AIX, your adapter device driver automatically installs.

Note: You only need to install device driver for the first instance of the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter. Any subsequent installation of the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter will not require device driver installation again. Go to "Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter" on page 17 for instructions.

To install device driver software:
1. Turn on the system unit power.
2. Log in as root user.
3. Insert the media containing the device driver software (for example: CD-ROM) into the appropriate media device. If your system does not have a CD-ROM drive, refer to your AIX operating system documentation for performing a NIM (Network Installation Management) installation.
4. Type the following System Management Interface Tool (SMIT) fastpath:
   `smit devinst`
5. Press Enter. The Install Additional Device Software screen highlights the INPUT device/directory for software option.
6. Select or type your input device by doing one of the following actions:
   - Press F4 to display the input device list and select the name of the device (for example; CD-ROM) that you are using and press Enter.

   OR

   - In the entry field, type the name of the input device you are using and press Enter. The Install Additional Device Software window highlights the SOFTWARE to install option.
7. Press F4 to display the SOFTWARE to install window.
8. Type the following to display the Find window:
   `/`
9. For the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter, type the following device package name:
   `devices.pci.1410d002`
10. Press Enter. The system finds and highlights this device driver software.
11. Press F7 to select the highlighted device driver software.

12. Press Enter.

    The INSTALL ADDITIONAL DEVICE SOFTWARE screen displays. The entry fields are automatically updated.

13. Press Enter to accept the information.

    The ARE YOU SURE window displays.

14. Press Enter to accept the information.

    The COMMAND STATUS screen displays. The term RUNNING is highlighted to indicate that the installation and configuration command is in progress.

15. When RUNNING changes to OK, scroll to the bottom of the page and locate the Installation Summary.

    After a successful installation, SUCCESS displays in the Result column of the Installation Summary at the bottom of the page.

16. Remove the installation media from the drive.

17. Press F10 to exit SMIT.

18. Go to the adapter installation procedure, "Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter."

Verifying AIX software installation:

Use this procedure to verify that the device driver for the adapter is installed.

1. If necessary, log in as root user.

2. At the command line, type: `lslpp -l devices.pci.1410d002.rte`

3. Press Enter. Possible results are as follows:

    - If the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter device driver is installed, the following is an example of the data that displays on your screen:

Fileset	Level	State	Description
Path: /usr/lib/objrepos devices.pci.1410d002.rte	5.3.0.0	COMMITTED	1000 Base-TX PCI-X iSCSI TOE Adapter Device Software

    Verify that the devices.pci.1410d002.rte filesets are installed at the AIX 5.2.0 or later level. If this information displays but you continue to have problems, go to "Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter."

    - If no data displays on your screen, the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter device driver did not install correctly. Return to "Installing the device driver software for the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter" on page 16. If you continue to experience problems, it may be necessary to call your system support organization. Refer to your operating system documentation for instructions.

Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter

Use the procedures in this section to install the adapter, verify the adapter installation, and run adapter diagnostics.

Installing the adapter:

Learn how to install the adapter.

Note: If you are installing your operating system at this time, install the adapter before you install the operating system. If you are installing only the device driver for this adapter, install the device driver before you install the adapter.

For instructions on how to install PCI adapters, refer to the PCI adapters topic.

After you have installed the adapter, continue on to "Verifying the adapter installation" on page 18.

To install your device driver software first, go to "Installing the device driver software for the adapter" on page 14 first, and then return to this section.

Related tasks

➦ Installing PCI adapters

Verifying the adapter installation:

Learn how to verify the adapter installation.

At the system prompt:

1. Type `cfgmgr` and then press Enter.
2. Type `lsdev -Cs pci` and then press Enter.

A list of PCI devices displays. If the 1 Gigabit-*XX* iSCSI TOE PCI-X Adapter installed correctly, an Available status indicates that the adapter is installed and ready to use.

If the message on your screen indicates that your adapter is Defined instead of Available, shut down your server. Verify that the adapter was installed correctly.

Running adapter diagnostics:

Diagnostics are provided with the device driver software. To run diagnostics, refer to your system unit documentation for instructions.

Configuring the 1 Gigabit iSCSI TOE PCI-X adapter

Use the following information to configure the 1 Gigabit iSCSI TOE PCI-X adapter in AIX.

Note: You must complete this configuration in order for the adapter to function correctly.

Overview of configuration process:

These are the steps in the configuration process.

1. Install any device-specific storage device support files. See "Installing the device-specific storage support files."
2. Use the **smit** command to configure the adapter in AIX. See "Configuring the adapter in AIX."
3. Update the iSCSI targets flat file. See "Updating the iSCSI targets flat file" on page 19.
4. Configure the storage device. See "Configuring the storage device" on page 19.

Notes:

1. The adapter does not support autonegotiation. Connected devices should be set to 1 gigabit-per-second only.
2. Some Ethernet switch configurations exhibit degraded reliability when configured in a high fan-in topology. Observe conservative LAN resource allocation practices when planning Ethernet storage networks.

Installing the device-specific storage support files:

For the system to function correctly with AIX, storage devices often require support-files. These files might include special utilities or device specific object data manager (ODM) entries.

Refer to the support documentation provided by the manufacturer of the storage device being used.

Configuring the adapter in AIX:

Learn how to configure the adapter using AIX commands.

Using the **smit** command, do the following steps:

1. From the command prompt, type **smit iscsi**, then press Enter.
2. In the **smit** menu, move the cursor over the **iSCSI Adapter** entry, then press Enter.
3. In the menu that displays, from the **Change/Show** option, select the number of the adapter you are configuring (Examples: **ics0**, **ics1**). The following is an example of the settings displayed when you select an adapter number:

```
                                                 [Entry Fields]
   iSCSI Adapter                                 ics0
   Description                                   iSCSI Adapter
   Status                                        Available
   Location                                      1f-09
     iSCSI Initiator Name                         []
   Maximum number of Commands to Queue to Adapter [200]                    +#
   Maximum Transfer Size                         [0x100000]                +
   Discovery Filename                            [/etc/iscsi/targetshw0] *
   Discovery Policy                              file               +
   Automatic Discovery Secrets Filename          [/etc/iscsi/autosecret>
   Adapter IP Address                            [10.100.100.14]
   Adapter Subnet Mask                           [255.255.255.0]
   Adapter Gateway Address                       []
   Apply change to DATABASE only                 no                 +



   sc+1=Help          Esc+2=Refresh      Esc+3=Cancel      Esc+4=List
   sc+5=Reset         Esc+6=Command      Esc+7=Edit        Esc+8=Image
   sc+9=Shell         Esc+0=Exit         Enter=Do
```

Notes:

- Set the value for the Maximum number of Commands to Queue to Adapter to be greater than the queue depth times the number of LUNs. For example, for 20 LUNs with a queue depth of 20, the value should be greater than 400.
- To use flat file discovery, the Discovery Policy must be set to "file."
- Change the default file name **/etc/iscsi/targetshw** from **targetshw** to **targetshw***x* where *x* is the adapter instance number (Examples: **ics0**, **ics1**).
- The user may specify the iSCSI node name. If it is not specified, the adapter will use the default iSCSI node name provided by the adapter. To display the iSCSI node name used by a particular adapter, use the **lscfg** command to display the adapter VPD. For example, to display the iSCSI node name for **ics0**, use lscfg -vl ics0. The iSCSI node name is in the **Z1** field of the displayed VPD. The initiator's iSCSI node name may be required to configure some iSCSI targets.
- If the **rmdev** command with the **-d** option is issued, then you must reenter the data in the specified fields.

Updating the iSCSI targets flat file:

When autodiscovery is not used, the 1 Gigabit iSCSI TOE PCI-X adapter obtains the iSCSI target descriptions from a flat file. The default file name is /etc/iscsi/targetshw. The information in this file must accurately describe the target devices for this adapter.

For an explanation of this file format, see http://publib16.boulder.ibm.com/doc_link/en_US/a_doc_lib/ files/aixfiles/targets.htm.

Configuring the storage device:

To be visible to the adapter, storage devices must be correctly configured. Often the storage device must be informed of the adapter iSCSI name, and the adapter must be informed of the storage device iSCSI name. Additionally, either or both may need specific permissions to access the other side of the iSCSI connection.

For instruction on configuring the storage device, refer to the support documentation provided by the manufacturer of the storage device.

Connecting the adapter to an Ethernet network

Use this information to learn about connecting the IBM 1 Gigabit iSCSI TOE PCI-X Adapter to your Ethernet network.

Connecting the IBM 1 Gigabit-SX iSCSI TOE PCI-X adapter (optical connector) to an Ethernet network:

The fiber adapters are designed with specifications that the cable be a dual-cable connector, with transmit and receive cable ends clamped together. If you use separate transmit and receive fiber cables, clamp the cables together to enhance the retention strength on the fiber transceiver connector. Clamping the cables together also improves the alignment of the fibers with the connector and is designed to improve overall performance.

Note: Only one type of network can be attached to the adapter at a time.

Understanding the adapter LED:

The LED on the 1 Gigabit-SX iSCSI TOE PCI-X Adapter provides information about the card's link status. The LED is visible through the card's mounting bracket and indicates the following conditions.

Light	State	Description
Green	On	Good Link
Green	Off	No link: could be the result of a bad cable, bad connector, or configuration mismatch

Link Status
LED (Green)

Fiber LC
Connector
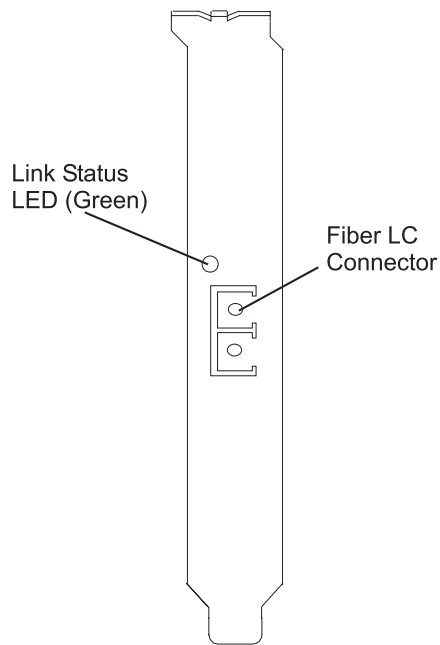
Figure 5. LED on the 1 Gigabit-SX iSCSI TOE PCI-X Adapter

Connecting the network cables and adapter:

Use these instructions to connect the adapter to your network.

Before you begin connecting the adapter, make sure you have the hardware listed in "Verifying your hardware requirements" on page 13.

To connect the adapter to the multimode fiber network:
- Insert the male LC Fiber Optic Connector into the adapter LC connector.
- Insert the male LC Fiber Optic connector of the other end of the cable into the network switch.

Connecting the IBM 1 Gigabit-TX iSCSI TOE PCI-X adapter (copper connector) to an Ethernet network:

Only one type of network can be attached to the adapter at a time.

Connecting the network cables and adapter:

Use these instructions to connect the adapter to your network.

Before you begin connecting the adapter, make sure you have the hardware listed in "Verifying your hardware requirements" on page 13.

To connect the adapter to an unshielded twisted pair (UTP) network, do the following steps:
1. Insert the RJ-45 jack of the UTP cable into the RJ-45 connector on the adapter.
2. Insert the RJ-45 jack of the other end of the UTP cable into the network switch.

Understanding the adapter LED:

The LED on the 1 Gigabit-TX iSCSI TOE PCI-X Adapter provides information about the card's link status. The LED is visible through the card's mounting bracket and indicates the following conditions.

Light	State	Description
Green	On	Good Link
Green	Off	No link: could be the result of a bad cable, bad connector, or configuration mismatch
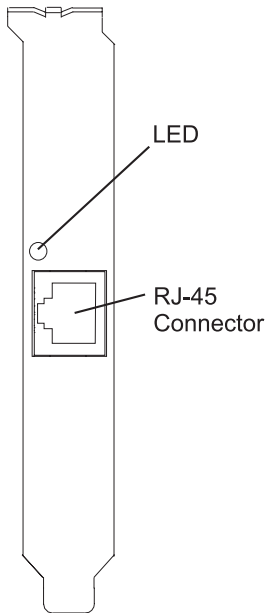
Figure 6. LED on the 1 Gigabit-TX iSCSI TOE PCI-X Adapter

Resolving configuration errors

Learn about config logging information, iSCSI TOE adapter error log information (ICS_ERR template), and iSCSI TOE protocol driver error log detail (ISCSI_ERR template).

This information might be useful for resolving configuration errors.

Config logging information:

It might be helpful to use the config log facility when trying to debug the iSCSI environment.

The most common error scenario is when `cfgmgr -vl ics0` completes successfully, but does not create any hdisks, or creates fewer hdisks than expected. Several common configuration errors can lead to this scenario. The cfglog can be used to determine which of several common errors may have occurred.

You can run the following command to display any captured config log data:
```
alog -o -t cfg
```

To display information about the log file configuration, such as the location of the log file, run:
```
alog -L -t cfg
```

If config logging is not enabled, it can be enabled as follows:
```
export CFGLOG=""
echo "Create cfglog" | alog -t cfg
```

A useful debug method is to perform the following steps:

```
rmdev -Rl ics<x>
rm /usr/adm/ras/cfglog
echo "Create cfglog" | alog -t cfg
cfgmgr -l ics<x>
alog -o -t cfg
```

Some common errors will cause the open of the iSCSI protocol device driver to fail. In this case, the cfglog will contain a message such as the following, where XX is an error number from `errno.h`

```
open of /dev/iscsi0 returned XX" where XX is an error number from errno.h.
```

The value returned by the open can indicate the problem. Two common values that can be caused by a configuration error are 69 (ENETDOWN) and 70 (ENETUNREACH).

The return code 69 indicates that the link attached to the iSCSI adapter is physically down. Check to see if the cable is correctly plugged in.

The return code 70 indicates that the link is up, but that the adapter was unable to obtain a client address from DHCP. If the adapter's host_addr attribute is not set to a valid IP address, the adapter will attempt to acquire an IP address from a DHCP server. If no DHCP server provides an IP address, the open will fail with a return code 70.

After a successful open, the configuration method will attempt to start the device. If the SCIOLSTART ioctl fails, it will prevent the discovery of the hdisks. A failure of SCIOLSTART will be recorded in the config log as follows:

```
SCIOLSTART failed, errno = E, status_class = C, status_detail = D
```

If the values of `C` or `D` for the Status Class and Status Detail are nonzero, it indicates that the iSCSI login failed. The Status Class and Status Detail are values returned in the iSCSI login response. The meaning of the Status Class and Status Detail values are documented in the iSCSI RFC 3270.

The SCIOLSTART ioctl may also fail before it attempts the iSCSI login. If the Status Class and Status Detail are both zero but Errno is nonzero, then the ioctl failed before the login occurred.

Two common errno values returned by the SCIOLSTART ioctl are 73 (ECONNRESET) and 81 (EHOSTUNREACH).

The errno 73 indicates that the target IP address refused the TCP connection that the iSCSI adapter attempted. One possible cause is that the wrong TCP port number is specified in the `/etc/iscsi/targetshwx` configuration file.

The errno 81 indicates that the iSCSI adapter did not get any response from the target's IP address. In other words, the iSCSI adapter cannot ping the target's IP address.

If the iSCSI adapter does not discover any new hdisks, and the cfglog does not reveal any of those errors, the following are other possibilities.
- If the syntax of the `/etc/iscsi/targetshwx` file is incorrect, the configuration method will not attempt to open or start the device, so the preceding errors will not appear.
- If the target device is accessible but no LUNs are assigned to the device, no error will appear, but there will be a message indicating `0 luns found`.

iSCSI TOE adapter error log information (ICS_ERR template):

Learn about the error log entries made by the iSCSI TOE adapter.
- Table 3 on page 24 shows the detail sense data layout.
- Table 4 on page 24 shows the detail sense data descriptions.

- Special detail sense data and Table 5 on page 26 show a special format that is used for logging bulk data such as a crash record or an IOCB request or completion queue.
- Table 6 on page 26 shows the error number values.

The detail sense data log in the ICS_ERR template for PCI iSCSI TOE adapters uses the structure error_log_def defined in `src/rspc/kernext/pci/qlisc/qliscdd.h`.

Table 3. Detail Sense Data

AAAA AAAA is the general error field.

```
XXXX VVVV AAAA AAAA BBBB BBBB CCHH RRRR YYYY YYYY RRRR RRRR RRRR RRRR RRRR RRRR
IIII IIII IIII IIII IIII IIII IIII IIII PPPP PPPP PPPP PPPP SSSS SSSS UUUU UUUU
LLLL LLLL LLLL LLLL EEEE EEEE EEEE EEEE DDDD DDDD DDDD DDDD MMMM MMMM MMMM MMMM
FFFF FFFF FFFF FFFF GGGG GGGG GGGG GGGG JJJJ JJJJ JJJJ JJJJ KKKK KKKK KKKK KKKK
0000 0000 0000 0000 QQQQ QQQQ QQQQ QQQQ RRRR RRRR RRRR RRRR RRRR RRRR RRRR RRRR
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
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TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT
WWWW RRRR ZZZZ ZZZZ 2222 2222 2222 2222 3333 3333 3333 3333 4444 4444 4444 4444
5555 5555 5555 5555 6666 6666 6666 6666 7777 7777 7777 7777 8888 8888 8888 8888
9999 9999 9999 9999 #### #### #### #### $$$$ $$$$ $$$$ $$$$ %%%% %%%% %%%% %%%%
&&&& &&&& &&&& &&&& **** **** **** **** @@@@ @@@@ @@@@ @@@@ ???? ???? ???? ????
```

Table 4. Detail sense data descriptions

Data	Description
X	Device type ID. X value of 0 indicates Qlogic iSCSI adapter driver.
V	Valid length of detail.
A	Determined by the adapter driver based on the error.
B	Return code from an operation.
C	Discovery policy. Possible values: • 0 - Unknown how the adapter is connected • 1 - This adapter is using flat file discovery • 2 - This adapter is using SLP
H	Type of data in the error log. Possible values: • 0 - None • 1 - Mailbox • 2 - IOCB • 3 - Register data • 4 - Driver data • 5 - qlisc_cmd data • 6 - Raw data • 7 - Return code data

Table 4. Detail sense data descriptions (continued)

Data	Description
Y	Link Speed
R	These values are reserved for future use.
I	IP address of adapter
P	Port Number of target.
S	Adapter State
U	Number of iSCSI nodes known
L	Poll Lbolt value
E	Lbolt of last adapter reset
D	No DMA resource count
M	No adapter IOCBs available
F	Number of Input requests
G	Number of Outbound requests
J	Number of control requests
K	Total number of Input bytes
F	Total number of Output bytes
Q	Current lbolt value
N	iSCSI name of target
T	If command was for IOCB, then this contains IOCB that failed
W	I/O Handle of next IOCB
Z	How often Link stat timer is running (in seconds)
2	Number of IOCBs issued
3	Number of mailboxes issued
4	Number of link down events
5	MAC bytes received
6	MAC CRC error count
7	MAC encoding error count
8	Number of IP packets transmitted
9	Number of IP bytes transmitted
#	Number of IP packets received
$	Number of IP bytes received
%	IP fragment received overlap count
&	Transmitted iSCSI PDU count
*	Transmitted iSCSI data bytes
@	Received iSCSI PDU count
?	Received iSCSI data bytes

Special detail sense data(AAAA AAAA is the general error field.)

This format is used for logging bulk data such as a crash record or an IOCB request or completion queue. The first line of the detail data has a special format and all remaining lines of the detail data contain the

bulk data being logged. Note that the bulk data may take up more than one of these records. The first line of the entry contains information to piece the data together. The first line is:

XXXX XXXX AAAA AAAA BBBB BBBB CCCC CCCC DDDD DDDD EEEE EEEE FFFF FFFF 0000 0000

The following table shows how to interpret the special detail sense data:

Table 5. Special detail sense data descriptions

Data	Description
X	Not used
A	Number determined by the adapter driver based on the error. At present it will always be "0xFF" for the special format.
B	Return code from an operation
C	Segment number of the data in this record
D	Offset of the beginning of this record in the total data
E	Length of valid data in this record
F	Total length of data to be logged

For example, when logging a crash record the total length is usually 0x1000 bytes. Each of these records can contain 0x300 bytes and there will be six of these error report entries. The first five segments will be numbered 1, 2, 3, 4, 5 with length of 0x300 and offsets of x0, x300, x600, x900, xC00. The sixth entry will be segment 6 with length of x100 and offset 0xf00.

Table 6. Error number values

Error number	Error template	Description of error
0x23	ICS_ERR6	DHCP lease expired. Link is no longer usable.
0x25	ICS_ERR6	Adapter Reset Timer expired
0x26	ICS_ERR6	Mailbox time-out, mailbox provided
0x27	ICS_ERR2	IOCB time-out
0x28	ICS_ERR2	Time-out on invalid type timer
0x29	ICS_ERR6	D_MAP_LIST failed return code provided. May need to increase the max_xfer_size attribute for the adapter icsX
0x2A	ICS_ERR6	Time-out on invalid type timer
0x2B	ICS_ERR6	Received completion for adapter originated IOCB, but could not find the original IOCB.
0x2C	ICS_ERR6	Size of mailbox IOCB is not equal to mb info size
0x2E	ICS_ERR2	Abort time out
0x2F	ICS_ERR6	Received unsolicited IOCB and protocol driver does not handle unsolicited IOCBs
0x30	ICS_ERR2	Adapter reported fatal error
0x31	ICS_ERR6	Invalid command entry type, command provided.
0x32	ICS_ERR6	Invalid command opcode, command provided.
0x33	ICS_ERR6	Invalid command entry type, command provided.
0x34	ICS_ERR6	Invalid command opcode, command provided.
0x36	ICS_ERR6	Stub routine called.
0x4B	ICS_ERR6	D_MAP_INIT in config INIT failed, size of DMA resources provided in return code field

Table 6. Error number values (continued)

Error number	Error template	Description of error
0x4C	ICS_ERR6	D_MAP_INIT at open time failed, size of DMA resources provided in return code field
0x4D	ICS_ERR6	Could not allocate delay timer at open time.
0x4E	ICS_ERR6	Could not allocate poll timer at open time
0x50	ICS_ERR10	Debug Only Trace. Target is reporting busy. IOCB, and cmd included.
0x51	ICS_ERR6	Invalid type or parameter error, IOCB, and cmd included.
0x52	ICS_ERR6	DMA error occurred, IOCB and cmd included.
0x53	ICS_ERR6	Entry State Flag error, IOCB and cmd included.
0x55	ICS_ERR6	Unknown Async IOCB received. IOCB included.
0x65	ICS_ERR6	Should never occur
0x71	ICS_ERR6	Exceeded delay waiting for I/O to complete before download operation.
0x7A	ICS_ERR2	Failed to get NVRAM semaphore for extracting VPD.
0x83	ICS_ERR6	EEH callback function with unsupported parameter...EEH_DD_DEBUG.
0x90	ICS_ERR6	Cannot issue Login because of invalid mode. Mode, origin, and ddb_dev_index provided
0x91	ICS_ERR6	Cannot issue Logout because of invalid mode. Mode, origin, and ddb_dev_index provided
0x92	ICS_ERR6	Cannot get DDB because of invalid mode. Mode, origin, and ddb_dev_index provided
0x93	ICS_ERR6	Cannot set DDB because of invalid mode. Mode, origin, and ddb_dev_index provided
0x94	ICS_ERR6	Cannot do a Get Management data mailbox. Mode, origin, and ddb_dev_index provided
0x95	ICS_ERR6	Cannot do a Read Flash ROM mailbox because of of invalid mode. Mode and origin provided
0x96	ICS_ERR6	Cannot do a Write Flash ROM mailbox because of invalid mode. Mode, origin provided
0x97	ICS_ERR6	Cannot do a ping because of invalid mode. Mode, address provided
0x98	ICS_ERR6	Cannot get crash record data because of invalid mode, Mode, data size and origin provided.
0x99	ICS_ERR6	Cannot free DDB because of invalid mode. Mode, origin, and ddb_dev_index provided
0x9A	ICS_ERR6	Cannot get About Firmware data because of invalid mode. Mode, origin provided.
0x9B	ICS_ERR6	Cannot get init firmware control block data because of invalid mode. Mode, origin provided.
0x9A	ICS_ERR6	Cannot get firmware state because of invalid mode. Mode, origin provided.
0xA0	ICS_ERR6	Received Mailbox completion, but do not have any mailboxes active. Mailbox completion and last know mailbox IOCB sent included
0xA2	ICS_ERR6	Get Initialize Firmware mailbox failed, completion mailbox and original mailbox provided.
0xA3	ICS_ERR6	Initialize Firmware mailbox failed, completion mailbox and original mailbox provided.
0xA4	ICS_ERR6	Failed to build Get Firmware State after Initialize Firmware, Return code included.

Table 6. Error number values (continued)

Error number	Error template	Description of error
0xA5	ICS_ERR6	Failed to build Get Crash Record mailbox.
0xA6	ICS_ERR6	Failed to build Get DDB mailbox.
0xA7	ICS_ERR6	Get DDB mailbox failed, mailbox, rc, and original mailbox included
0xA8	ICS_ERR6	Number of iSCS nodes known by adapter has decreased.
0xA9	ICS_ERR6	Failed to build Get Firmware State after Initialize Firmware, Return code included.
0xAA	ICS_ERR6	Issued Get DDB mailboxes, but have no previously known nodes.
0xAB	ICS_ERR6	Get Crash Record mailbox failed.
0xAC	ICS_ERR6	Get Crash Record succeeded. Crash record data follows in "0xFF" error report entries.
0xAD	ICS_ERR6	Unknown mailbox completed. mailbox included.
0xAE	ICS_ERR6	Unrecoverable error reported by Get Firmware State
0xB0	ICS_ERR2	Mailbox completed with busy status, completion mailbox and original included.
0xB1	ICS_ERR2	Mailbox failed with invalid parameter or invalid command. Mailbox included
0xB2	ICS_ERR2	Mailbox failed. Mailbox included.
0xB3	ICS_ERR2	Mailbox failed with unknown status. Mailbox included.
0xC0	ICS_ERR2	Adapter reported system error.
0xC1	ICS_ERR10	Debug only log, Link up
0xC2	ICS_ERR10	Debug only log. Link Down
0xC3	ICS_ERR10	Debug only log. Adapter reported DDB change
0xC4	ICS_ERR10	Debug only log. Adapter's IP addresss or MAC address changed
0xC5	ICS_ERR10	Debug only log. iSNS message received.
0xC6	ICS_ERR1	Adapter reporting self test failure.
0xC7	ICS_ERR2	NVRAM invalid async mailbox received
0xC8	ICS_ERR2	Async message reporting login, heartbeat, DNS, failures.
0xC9	ICS_ERR2	Unknown Async mailbox received.
0xCA	ICS_ERR10	SCSI Command PDU rejected
0xCB	ICS_ERR6	Build get DDB entry mailbox failed
0xCC	ICS_ERR10	Link dead flag set (link down longer than link timeout period
0xD0	ICS_ERR2	Reset Adapter failed. Reset step provided.
0xD1	ICS_ERR2	Reset Adapter failed. Adapter reported Fatal Error
0xD2	ICS_ERR2	Reset Adapter failed. Adapter self test did not complete
0xDEAD	ICS_ERR1	All retries of adapter reset failed.
0xE0	ICS_ERR6	Failed to allocate iSCSI entry list.
0xE1	ICS_ERR6	Failed to create new node entry for CHAP entry
0xE2	ICS_ERR7	Failed to initialize EEH
0xF0	ICS_ERR6	D_MAP_INIT for microcode download failed
0xF1	ICS_ERR6	D_MAP_PAGE for microcode download failed.
0xF2	ICS_ERR6	Failed to build write FLASH mailbox
0xF3	ICS_ERR6	Get DDB entry mailbox failed.

Table 6. Error number values (continued)

Error number	Error template	Description of error
0xF4	ICS_ERR6	Set DDB entry mailbox failed.
0xF5	ICS_ERR6	Could not find empty slot for CHAP secret
0xF6	ICS_ERR6	Could not get CHAP secret entry from FLASH
0xF7	ICS_ERR6	Secrets memory area pointer unexpectedly NULL
0xF8	ICS_ERR6	Build get DDB entry mailbox failed
0xF9	ICS_ERR6	Could not write to FLASH to erase CHAP secret
0xFA	ICS_ERR2	SCSI IOCB Command queue data follows. RC is current queue head. (debug driver only)
0xFB	ICS_ERR2	SCSI IOCB completion queue data follows. RC is current queue head. (debug driver only)
0xFF	ICS_ERR6	Crash record or queue data. Special format for detailed sense data.

iSCSI TOE protocol driver error log detail (ISCSI_ERR template):

Learn about the error log entries made by the iSCSI protocol driver.
- Table 7 shows the detail sense data layout.
- Table 8 shows the detail sense data descriptions.
- Table 9 on page 31 shows the error number values.

Table 7. Detail Sense Data

AAAA AAAA is the general error field.

```
XXXX VVVV AAAA AAAA BBBB BBBB CCHH RRRR YYYY YYYY TTTT TTTT LLLL LLLL LLLL LLLL
IIII IIII IIII IIII IIII IIII IIII IIII EEEE EEEE EEEE EEEE EEEE EEEE EEEE EEEE
QQQQ QQQQ QQQQ QQQQ QQQQ QQQQ QQQQ QQQQ ZZZZ ZZZZ ZZZZ ZZZZ ZZZZ ZZZZ ZZZZ ZZZZ
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ
JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ
TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT
TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT
DDDD DDDD DDDD DDDD DDDD DDDD DDDD DDDD DDDD DDDD DDDD DDDD GGGG GGGG GGGG GGGG
GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG
GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG
MMMM MMMM MMMM MMMM PPPP PPPP PPPP PPPP KKKK KKKK KKKK KKKK UUUU WWSS 1111 1111
2222 2222 2222 2222 3333 3333 3333 3333
```

Table 8. Detail sense data descriptions

Data	Description
X	Device type ID. X value of 0 indicates Qlogic iSCSI protocol driver.
V	Valid length of detail.
A	Determined by the adapter driver based on the error.
B	Return code from either the adapter driver output routine or control function.

Table 8. Detail sense data descriptions (continued)

Data	Description
C	Discovery policy. Possible values: • 0 - Unknown how the adapter is connected • 1 - This adapter is using flat file discovery • 2 - This adapter is using SLP
H	Type of data in the error log. Possible values: • 0 - IOCB • 1 - CMD Element • 2 - Raw/General
Y	Status value of the control element returned by the adapter driver.
T	Time-out value of command.
L	Lun id to which this request was issued
I	This value is the 128-bit IP address of this adapter.
E	This value is the 128-bit IP address of the device to which this command was sent.
Q	The iSCSI CDB that failed.
Z	Additional CDB
R	These values are reserved for future use.
N	Target name
J	If the type of data is IOCB, then is the failed command IOCB
T	If the type of data is IOCB, this is the reply IOCB
D	DSD array for this command
G	This is used for the first 72 bytes of autosense
M	Bus real address of SCSI CDB
P	Bus real address of Auto sense buffer
K	Bus real address of DSD list
U	scsi_buf version
W	q_tag_msg
S	cmd_type
1	Variable CDB len
2	Port Number
3	num_start_LUNs for this target
F	This is used for the address of the failing scsi_info structure.
P	Port Number
G	Time out value
U	Number of remaining active commands for this device if it is LUN specific
S	Qstate if command is to a specific LUN
N	First 242 bytes of the the iSCSI name of the target.
M	Target State if applicable
P	Open count since device configured
2	Preempt count for fairness
3	Flags from target

Table 8. Detail sense data descriptions (continued)

Data	Description
4	Adapter specific stats from ndd_specstats: CRC
5	transmit data in megabytes since opened
6	received data in megabytes since opened
7	Number of writes since opened
8	Number of reads since opened
9	Number of nondata requests since opened
#	Number of times a request was not sent because no command elements
%	lbolt when last opened
*	lbolt of current request

Table 9. Error number values

Error Number	Error Template	Description of Error
0x1	ISCSI_ERR4	Command Time-out in SCIOLINQU. dev_info information is included.
0x2	ISCSI_ERR4	Command Time-out in SCIOLSTUNIT. dev_info information is included.
0x3	ISCSI_ERR4	Command Time-out in Test Unit Ready IOCTL. dev_info information is included.
0x4	ISCSI_ERR4	Command Time-out in Read Block Ioctl. dev_info information is included.
0x5	ISCSI_ERR6	SCIOLNMSRV control request to the adapter driver failed
0x6	ISCSI_ERR6	SCIOLSTART failed since target IP address or iSCSI name is the same as this adapter.
0x7	ISCSI_ERR6	Trace table failed to allocate
0x8	ISCSI_ERR6	size of SCIOLNMSRV is not multiple of word.
0x10	ISCSI_ERR13	Only logged when debug is turned on . An LUN reset (SCIOLRESET) ioctl call failed with EINVAL, most likely because LUN reset is not supported for this device, so a target reset was issued instead.
0x11	ISCSI_ERR6	Invalid kernext handle passed to strategy.
0x12	ISCSI_ERR6	Version 0 scsi_buf or no kernext handle passed to strategy
0x13	ISCSI_ERR6	SC_DEV_RESTART received but has a scsi command in it.
0x14	ISCSI_ERR6	Only logged when debug is turned on. An unexpected SC_Q_CLR was received
0x15	ISCSI_ERR6	Only logged when debug is turned on. A SC_DEV_RESTART command was received.
0x16	ISCSI_ERR6	Only logged when debug is turned on . A SC_TARGET_RESET command was received
0x17	ISCSI_ERR6	Only logged when debug is turned on . A SC_LUN_RESET command was received
0x18	ISCSI_ERR6	An invalid scsi_buf was received in the strategy routine.
0x19	ISCSI_ERR6	A SCSI Command with no command length is about to be issued.
0x1A	ISCSI_ERR6	Invalid control element received from adapter driver.
0x1B	ISCSI_ERR6	Invalid IOCB entry type for control element completion.
0x1C	ISCSI_ERR6	Unknown unsolicited IOCB received.
0x1D	ISCSI_ERR6	Control element received from adapter driver, but is not active. cmd included.

Table 9. Error number values (continued)

Error Number	Error Template	Description of Error
0x1E	ISCSI_ERR6	Unknown mailbox command completion received.
0x1F	ISCSI_ERR6	Processing completion of marker command but invalid IOCB or target.
0x20	ISCSI_ERR6	Timeout for an unknown device.
0x21	ISCSI_ERR6	Timeout for an unknown device. ID/Lun is not valid. target_info information is included.
0x22	ISCSI_ERR6	A command completed before it was to be timed out (i.e. the command completed within milliseconds of timing-out).
0x23	ISCSI_ERR6	Timeout for command that is not active. dev_info information is included.
0x26	ISCSI_ERR4	A device cancel timed-out. There are still commands active at the adapter, which were not flushed back. dev_info information is included.
0x27	ISCSI_ERR6	A device cancel timed-out and the retry of the cancel failed. dev_info information is included.
0x28	ISCSI_ERR4	A target cancel timed-out. target_info information is included.
0x29	ISCSI_ERR4	A login issued to the adapter driver's cmd entry point timed out. target_info information is included.
0x2A	ISCSI_ERR4	A Pass thru IOCB timed out.
0x2B	ISCSI_ERR4	Proc level task management function (SCIOLRESET) timed-out. command is included
0x2C	ISCSI_ERR4	Interrupt level task management function (Target Reset) timed-out. command is included
0x2D	ISCSI_ERR6	Wait for DDB time-out occurred.
0x2E	ISCSI_ERR4	Data underrun detected by adapter, the command is included.
0x2F	ISCSI_ERR4	An unknown time-out occured.
0x30	ISCSI_ERR2	Async status received from adapter indicates a complete adapter failure
0x31	ISCSI_ERR2	Only logged when debug is turned on . Async status received from adapter driver indicating link is dead
0x32	ISCSI_ERR4	Only logged when debug is turned on. Async status received from adapter driver indicating link is down.
0x33	ISCSI_ERR4	Only logged when debug is turned on. Async status received from adapter driver indicating link is up.
0x34	ISCSI_ERR4	Only logged when debug is turned on. Async status received from adapter driver indicating a LOGO was received for a device. target_info information is included
0x35	ISCSI_ERR4	Only logged when debug is turned on . Async status received from adapter driver indicating a State Change Notification was received. target_info information is included.
0x36	ISCSI_ERR2	Only logged when debug is turned on . The adapter has been halted.
0x37	ISCSI_ERR2	Only logged when debug is turned on . The adapter has been resumed after being halted.
0x38	ISCSI_ERR13	Only logged when debug is turned on. Async status received from adapter driver indicating PDU was rejected.
0x39	ISCSI_ERR6	Only logged when debug is turned on. Async status received from adapter driver indicating DDB change
0x3A	ISCSI_ERR2	Only logged when debug is turned on. Unknown async NDD status received from adapter driver

Table 9. Error number values (continued)

Error Number	Error Template	Description of Error
0x3B	ISCSI_ERR6	Unknown async status received from adapter driver
0x3C	ISCSI_ERR13	Async status for DDB change received indicating device is different.
0x3D	ISCSI_ERR4	Only logged when debug is turned on. Async status received from adapter indicating DHCP lease expired.
0x40	ISCSI_ERR2	Adapter dd detected error that indicates HOST IO BUS ERROR. cmd element included
0x41	ISCSI_ERR2	Adapter dd detected error that indicates adapter hardware failure. cmd element included.
0x42	ISCSI_ERR4	Adapter dd detected error that indicates adapter software failure. cmd element included.
0x43	ISCSI_ERR4	Adapter dd detected an unknown error status from the adapter driver.cmd element included.
0x44	ISCSI_ERR13	Device returning busy status.
0x45	ISCSI_ERR4	Adapter reporting an invalid IOCB. cmd element included
0x46	ISCSI_ERR2	Adapter reporting DMA error on IOCB. cmd element included
0x47	ISCSI_ERR4	Adapter reporting an entry state flag error. cmd element included
0x48	ISCSI_ERR6	IOCB failed with invalid parameter. Cmd included
0x49	ISCSI_ERR2	IOCB failed with DMA error. Cmd included.
0x4A	ISCSI_ERR10	IOCB failed with transport error. Cmd included.
0x4B	ISCSI_ERR10	OCB failed because data direction specified from device is different from IOCB. Cmd included.
0x4C	ISCSI_ERR6	IOCB failed because Queue full. Cmd included.
0x4D	ISCSI_ERR13	IOCB failed because device at DDB dev index changed. Cmd included.
0x4E	ISCSI_ERR10	IOCB failed because device indicated the device has a duplicate tag. Cmd included.
0x4F	ISCSI_ERR6	IOCB failed with unknown error status, cmd included.
0x51	ISCSI_ERR6	Could not issue Cancel for above failing a command which has not received an interrupt. dev_info information is included.
0x60	ISCSI_ERR4 or ISCSI_ERR6	Call to adapter driver's output entry point failed to accept a control element for SCSI command. The return code is included. cmd element included
0x61	ISCSI_ERR4 or ISCSI_ERR6	Call to adapter driver's output entry point failed to accept a cancel control element. The return code is included. cmd element included
0x62	ISCSI_ERR4 or ISCSI_ERR6	Output routine failed to accept target reset or a device. The return code is included. target_info information included.
0x63	ISCSI_ERR4 or ISCSI_ERR6	Output routine failed to accept LUN reset for a device. The return code is included. dev_info information included.
0x64	ISCSI_ERR4 or ISCSI_ERR6	Output routine failed to accept Abort Task Set for a device. The return code is included. dev_info information included.
0x65	ISCSI_ERR4 or ISCSI_ERR6	Output routine failed to accept Clear ACA for a device. The return code is included. dev_info information included.
0x66	ISCSI_ERR4 or ISCSI_ERR6	Output routine failed to accept Marker for a device. The return code is included dev_info information included.
0x67	ISCSI_ERR4 or ISCSI_ERR6	Output routine failed to accept normal Passthru IOCB for a device. The return code is included. command is included

Table 9. Error number values (continued)

Error Number	Error Template	Description of Error
0x70	ISCSI_ERR2	Timed out waiting for either link to come up or DHCP server to restablish our lease. The rc fields indicates which of these two is the case.
0x71	ISCSI_ERR2	Timed out waiting for the adapter to resume.
0x80	ISCSI_ERR6	Ioctl issue task management command failed from adapter driver returned error. cmd included.
0x81	ISCSI_ERR6	Ioctl issue task management command failed. cmd included.
0x82	ISCSI_ERR6	non-Ioctl issued task management command failed from adapter driver returned error. cmd included.
0x83	ISCSI_ERR6	non-Ioctl issued task management command failed. cmd included.
0x84	ISCSI_ERR6	Unknown task management command failed. cmd included.
0x85	ISCSI_ERR6	Unknown task management command completed. cmd included.
0x86	ISCSI_ERR6	Unable to cancel task management command.
0x87	ISCSI_ERR6	Unknown task management command timed-out.
0x90	ISCSI_ERR6	Unknown Passthru IOCB completion status returned.
0x91	ISCSI_ERR6	Only displayed with debug driver . Passthru IOCB issued from ioctl failed.
0x92	ISCSI_ERR6	Passthru IOCB not-issued from ioctl failed.
0x93	ISCSI_ERR2	Cancel (Internal Lun Reset) failed.
0x94	ISCSI_ERR6	Cancel completed but has no device associated
0x95	ISCSI_ERR10	Adapter detected underrun/overrun
0x96	ISCSI_ERR13	Async PDU with autosense data received.
0x97	ISCSI_ERR13	Target is requesting logout. Target included.
0x98	ISCSI_ERR13	Target will drop this connection or all connections. Target included
0x99	ISCSI_ERR13	Target requesting renegotiation of iSCSI parameters. Target included
0x9A	ISCSI_ERR13	Unknown Async IOCB received. Control element included.
0x9B	ISCSI_ERR10	Only displayed with debug driver. Check condition with autosense data length returned from a SCSI command, but the key fields of the autosense data are all 0.
0xA0	ISCSI_ERR13 or ISCSI_ERR6	A command entry point command was returned from the adapter with an error. This command was for a Login. target_info is included
0xA1	ISCSI_ERR13	A command entry point relogin command returned succesfully, but the device at this N_Port ID is different (i.e a different iSCSI name) target_info is included
0xA2	ISCSI_ERR13 or ISCSI_ERR6	A command entry point command was returned from the adapter with an error. This command was for a Logout. target_info is included
0xA4	ISCSI_ERR6	Unknown cmd was sent from the adapter driver to protocol driver
0xB1	ISCSI_ERR4 or ISCSI_ERR6	Adapter driver's cmd entry point rejected a login/logout operation. target_info is included
0xC0	ISCSI_ERR6	Multiple matches for target_info found with same iSCSI name.
0xC1	ISCSI_ERR6	Failed to issue cancel prior to Clear ACA.
0xE0	ISCSI_ERR6	IP address not IPV4 nor IPV6 for ioctl iSCSI login
0xE1	ISCSI_ERR6	IP address not IPV4 nor IPV6 for non-ioctl iSCSI login

4-Port USB PCI Express Adapter (FC 2728; CCIN 57D1)

Learn about the specifications for the 4-Port USB PCI Express (PCIe) Adapter.

The 4-Port USB PCIe Adapter is a single-lane (1x) PCIe high-performance expansion adapter that provides the following features and support:

- Compliance with PCIe base specification revision 1.1
- Single-lane (1x) PCI Express for a throughput of 2.5 Gbps
- Single-slot, half-length PCIe card
- FCC Class A
- Four downstream, external, high-speed USB 2.0 ports [1]
- Data-transfer rates of 480 Mbps (high-speed), 12 Mbps (full-speed), and 1.5 Mbps (low-speed)
- Full compliance with Universal Serial Bus (USB) specifications, revision 1.1 and 2.0
- Simultaneous operation of multiple USB 2.0 and USB 1.1 devices
- Compliance with Enhanced Host Controller Interface (EHCI) and Open Host Controller Interface (OHCI) standards
- Integrated dual-speed USB transceivers
- A total of 126 USB hubs and devices are supported by the adapter [1]

[1] The four external ports are shared and controlled by three internal USB controllers. AIX might list only the three controllers; however, all four ports are operational.
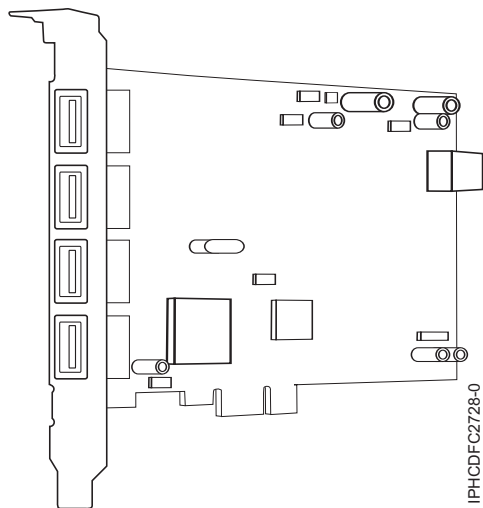
Figure 7. 4-Port USB PCIe Adapter

Specifications

Item   Description
FRU number
      46K7494 (Designed to comply with RoHS requirement.)
Bus architecture
      PCI 2.2 compliant
Busmaster
      Yes
Card type
      Full size
Maximum number and adapter slots
      For system-specific adapter placement information, see the topic collections. .

Connector

      Standard USB single pin-type series "A" receptacle

Wrap plug

      None

Cables

      None

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web

site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Related tasks

Installing PCI adapters

Related reference

IBM Prerequisite Web page

Parts information

Parts information

PCI adapter placement

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe 2-Line WAN with Modem (FC 2893, 2894; CCIN 576C)

Learn about the features of the PCIe 2-Line WAN with Modem.

This adapter is a 2-line/port WAN with Modem PCIe adapter. Port 0 is the modem port and supports V.92 56K Async PPP, V.92 data modem, V.44 data compression, V.34 FAX modem and FAX functions, such as ECM and 2D/1D conversion. Port 0 does not provide Sync modem capabilities (SDLC and Sync PPP). Port 1 is the RVX port and supports multiple communications protocols, including synchronous operations.

2893 is the non-CIM (Complex Impedance Matching) version offered in all countries and regions except Australia and New Zealand.

2894 is the CIM (Complex Impedance Matching) version offered only in Australia and New Zealand.

The FRU part numbers for the adapter are:

- FC 2893 and 2894: 44V5323

Adapter type

      Short, x4, PCIe

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web

site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Related tasks

⤷ Installing PCI adapters

Related reference

⤷ IBM Prerequisite Web page

Parts information

⤷ Parts information

PCI adapter placement

⤷ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1

Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCI-X Cryptographic Coprocessor (FC 4764; CCIN 4764)

Learn about the specifications, requirements, and installation notes for the 4764 PCI-X Cryptographic Coprocessor.

The adapter for the PCI-X Cryptographic Coprocessor provides applications with cryptographic processing capability and a means to securely store cryptographic keys. Cryptographic functions available include encryption for keeping data confidential, message digests and message authentication codes for ensuring that data has not been changed, and digital signature generation and verification for authentication. In addition, the coprocessor provides basic services for financial PIN, EMV, and SET applications. The coprocessor also can serve as an accelerator to accelerate the establishment of new SSL sessions.

The adapter is designed to meet FIPS PUB 140-2 Security Level 4 requirements.

Specifications and requirements

Item   Description

FRU number
      41U0442[*] or 12R6540[**]

      [*] Designed to comply with RoHS requirement.
      [**] Not designed to comply with the RoHS requirement.

Battery kit
      41V1061, kit contains two batteries and a battery tray.

Adapter type
      Short, 64-bit, 3.3 v, PCI version 2.2, PCI-X version 1.0

Placement information
      For system-specific adapter placement information, see the topic collections.

Environmental requirements
      Attention: The PCI-X Cryptographic Coprocessor must be shipped, stored, and used within the following environmental specifications. If these specifications are not met, the 4764 tamper sensors can be activated and render the 4764 permanently inoperable.

      Shipping

      Ship the adapter in the original packaging (moisture barrier bag with desiccant and thermally insulated box with gel packs).

            Temperature when shipping: +5 degrees F (-15 degrees C) to +140 degrees F (+60 degrees C)

            Pressure when shipping: minimum 550 mbar, maximum 1039 mbar

            Humidity when shipping: 5% to 100% RH

Storage

Store the adapter in sealed moisture barrier bag with desiccant.

Temperature in storage: +38.8 degrees F (+1 degrees C) to +140 degrees F (+60 degrees C)

Pressure in storage: minimum 700 mbar, maximum 1039 mbar

Humidity in storage: 5% to 80% RH

Operation (ambient in system)

Temperature while operating: +50 degrees F (+10 degrees C) to +104 degrees F (+40 degrees C)

Humidity while operating: 8% to 80% RH

Altitude while operating: maximum 7000 feet, equivalent to 768 mbar

Handling requirements

Each PCI-X Cryptographic Coprocessor is shipped from the factory with a certified device key. This electronic key, which is stored in the adapter's battery-powered and protected memory, digitally signs status messages to confirm that the PCI Cryptographic Coprocessor is genuine and that no tampering has occurred.

If any of the secure module's tamper sensors are triggered by tampering or by accident, the PCI-X Cryptographic Coprocessor erases all data in the protected memory, including the certified device key. Incorrect removal of the batteries triggers the tamper sensors and destroys the certified device keys. The PCI Cryptographic Coprocessor cannot operate without the certified device keys. To protect the keys, follow the guidelines given in the documentation provided with the coprocessor.

Attention: The batteries keep the coprocessor powered on even when it is not installed in a system. When handling, installing, or removing the adapter, do not let the adapter circuits come in contact with any conductive surface or tools. Doing so can render the adapter permanently inoperable.

Do not remove the adapter's batteries. Data in the protected memory is lost when battery power is removed. For information about replacing the batteries, see "Replacing the batteries" on page 41.

Attention: While installing the coprocessor, observe the following precautions:
- The coprocessor is always powered by the batteries, even when it is not installed in the system.
- The battery power is necessary to keep the coprocessor operational.
- The loss of battery power or a voltage drop triggers a Tamper Event and permanently renders the coprocessor inoperable.
- Any short on the battery power distribution circuits causes a voltage drop and a Tamper Event.
- Do not lay the coprocessor on or cause the coprocessor to come in contact with any conductive surface.
- Do not touch the coprocessor circuits with metal or conductive tools.
- Use static-protective measures at all times when handling the coprocessor.

Operating system or partition requirements

AIX 5L Version 5.2 with the 5200-09 Technology Level, or later

AIX 5L Version 5.3 with the 5300-05 Technology Level, or later

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM

Prerequisite Web site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Required software or drivers

AIX

devices.pci.1410e501 device driver package

Linux

No Linux support

Required firmware
CD form number LCD8-0477-00 contains functional firmware and must be purchased with the adapter.

PKCS11 support program installation
The *4764 PCI-X Cryptographic Coprocessor PKCS#11 Support Program Installation Manual* is included on the CD that is shipped with the adapter. The manual is contained in the csufx.xcrypto.man file set.

CCA support program installation
The *4764 PCI-X Cryptographic Coprocessor CCA Support Program Installation Manual* is included on the CD that is shipped with the adapter. The manual is contained in the csufx.xcrypto.man file set. You can also view or download the manual from the IBM Power Systems hardware information Web site at http://publib.boulder.ibm.com/infocenter/eserver/v1r3s/index.jsp.

Preparing for installation

If you are installing your operating system at this time, install your adapter before you install the operating system. See "Installing the adapter" on page 40 for instructions.

If you are installing only the device driver for this adapter, install your device driver software before you install the adapter. See "Installing the device driver software " for instructions.

Installing the device driver software

This section explains how to install device driver software. The device driver is provided for the following AIX 5L technology levels:

AIX 5L Version 5.2 with the 5200-09 Technology Level

AIX 5L Version 5.3 with the 5300-05 Technology Level

To install device driver software, do the following steps:
 1. Log in to the system unit as root user.
 2. Insert the media containing the device driver software (for example; CD) into the appropriate media device.
 3. Type the following System Management Interface Tool (SMIT) fast path: `smitty devinst`
 4. Press Enter. The Install Additional Device Software menu highlights the INPUT device or directory for software option.
 5. Select or type your input device by doing one of the following actions:
    - Press F4 to display the input device list and select the name of the device (for example; CD-ROM) that you are using and press Enter.

      OR

    - In the entry field, type the name of the input device you are using and press Enter. The Install Additional Device Software window highlights the SOFTWARE to install option.
 6. Press F4 to display the SOFTWARE to install window.
 7. Enter **/** to display the Find window.
 8. For the adapter, type the following device package name: `devices.pci.1410e501`
 9. Press Enter. The system finds and highlights this device driver software.
10. Press F7 to select the highlighted device driver software.

11. Press Enter. The INSTALL ADDITIONAL DEVICE SOFTWARE menu displays. The entry fields are automatically updated.
12. Press Enter to accept the information. The ARE YOU SURE menu displays.
13. Press Enter to accept the information. The COMMAND STATUS menu displays.
    - The term RUNNING is highlighted to indicate that the installation and configuration command is in progress.
    - When RUNNING changes to OK, scroll to the bottom of the page and locate the Installation Summary.
    - After a successful installation, SUCCESS displays in the Result column of the Installation Summary at the bottom of the display.
14. Remove the installation media from the drive.
15. Press F10 to exit SMIT.
16. Verify the device driver. See "Verifying the device driver"
17. Install the adapter. See "Installing the adapter."

Verifying the device driver

To verify that the device driver for the adapter is installed, do the following steps:
1. If necessary, log in as root user.
2. At the command line, enter: `lslpp -l devices.pci.1410e501.rte`
3. Press Enter.

If the adapter device driver is installed, the following is an example of the data that displays on your display:

Fileset	Level	State	Description
Path: /usr/lib/objrepos devices.pci.1410e501.rte	5.2.0.95	COMMITTED	Cryptographic Coprocessor

Verify that the filesets devices.pci.1410e501.rte are at level 5.2.0.95 or later.

If no data displays on your display, the adapter device driver did not install correctly. Reinstall the driver.

Installing the adapter

Attention: While installing the coprocessor, observe the following precautions:
- The coprocessor is always powered by the batteries, even when it is not installed in the system.
- The battery power is necessary to keep the coprocessor operational.
- The loss of battery power or a voltage drop triggers a Tamper Event and permanently renders the coprocessor inoperable.
- Any short on the battery power distribution circuits causes a voltage drop and a Tamper Event.
- Do not lay the coprocessor on or cause the coprocessor to come in contact with any conductive surface.
- Do not touch the coprocessor circuits with metal or conductive tools.
- Use static-protective measures at all times when handling the coprocessor.

For instructions on how to install PCI adapters, refer to the PCI adapters topic.

After you have installed the adapter, verify the adapter installation.

Verifying the adapter installation

To verify that your system unit recognizes the PCI adapter, do the following steps:

1. If necessary, log in as root user.
2. At the command line, type: `lsdev -Cs pci`
3. Press Enter.

A list of PCI devices displays. If the adapter is installed correctly, an Available status for each port indicates that the adapter is installed and ready to use. If the message on your display indicates that any of the ports are DEFINED instead of AVAILABLE, shut down the system and verify that the adapter was installed correctly. The adapters appear as Crypt0, Crypt1, and so on.

Running coprocessor diagnostics

Diagnostics are provided with the device driver software.

If you remove a cryptographic adapter and do not replace it, and you run diagnostics on the remaining cryptographic adapters, the results might not be correct. As a result, always run the **cfgmgr -v** command after removing a cryptographic adapter.

Replacing the batteries

Two lithium batteries that are mounted on the adapter supply power to the adapter's components, including protected memory. Support software or application software can query the coprocessor to determine whether the batteries need to be replaced. When the batteries need replacing, have the procedure done by trained service providers using the 41V1061 Battery kit for the 4764.

CAUTION:
Only trained service personnel may replace this battery. The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do Not:
- ___ **Throw or immerse into water**
- ___ **Heat to more than 100 degrees C (212 degrees F)**
- ___ **Repair or disassemble**

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C002)

The Battery Replacement Kit includes:
- Two replacement batteries
- A battery tray with connecting wires
- Two sets of spare battery attention labels

To replace the batteries, follow these steps:

1. Turn off the computer and all attached devices.
2. Disconnect all cables, including the power cable.

   CAUTION:
   The battery is a nickel-cadmium battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C005)

3. Remove the cover from the expansion slots according to the directions provided with your computer.
4. Open the Battery Replacement Kit.

   Attention: Electrostatic discharge (ESD) can damage the card and its components. Wear an ESD wrist strip while handling and installing the card, or take the following precautions:
   - Limit your movements, this helps prevent static electricity building up around you.
   - Prevent others from touching the card or other components.
   - Handle the card by its edges only. Do not touch exposed circuitry and components.
5. Remove the card from the bus slot in the host computer.
6. Insert one of the new batteries into the battery tray provided with the kit. Align the + on the battery with the + on the battery tray (the end with the red wire). Connect the tray wires to the J10 connector located near the RS-232 serial port, as shown in Figure 8 on page 43. The connector is polarized to ensure a proper connection.

   Attention: Any loss of power erases data stored in the card's protected memory. To prevent loss, ensure that the battery tray contains a fresh battery and is attached to the J10 connector.
7. Remove the battery attention labels from the battery holders on the card. These labels can be torn off and discarded. They are to be replaced by the spare labels included in the kit.
8. Remove the battery from the BT1 position. To eject the battery, turn the coprocessor over and insert a small object, such as a screwdriver, through the hole to eject the battery.
9. Replace the battery in the BT1 position with a new battery.
10. Replace the battery in the BT2 position with the battery in the battery tray. The new battery already installed in the BT1 position provides power to the adapter while you perform this step.
11. Remove the battery holder from the J10 connector.
12. Reapply the spare battery attention labels onto the holders on the card covering the batteries.
13. Reinstall the coprocessor into the PCI-X bus slot, and be sure the card is fully seated.
14. Replace the host computer's cover.
15. Reconnect the power cable and any other cables you disconnected.
16. Power on the computer. The card runs its power on self-test (POST).
17. Reinstall the adapter.

Connectors

Table 10. Connectors and jumpers on the PCI-X Cryptographic Coprocessor

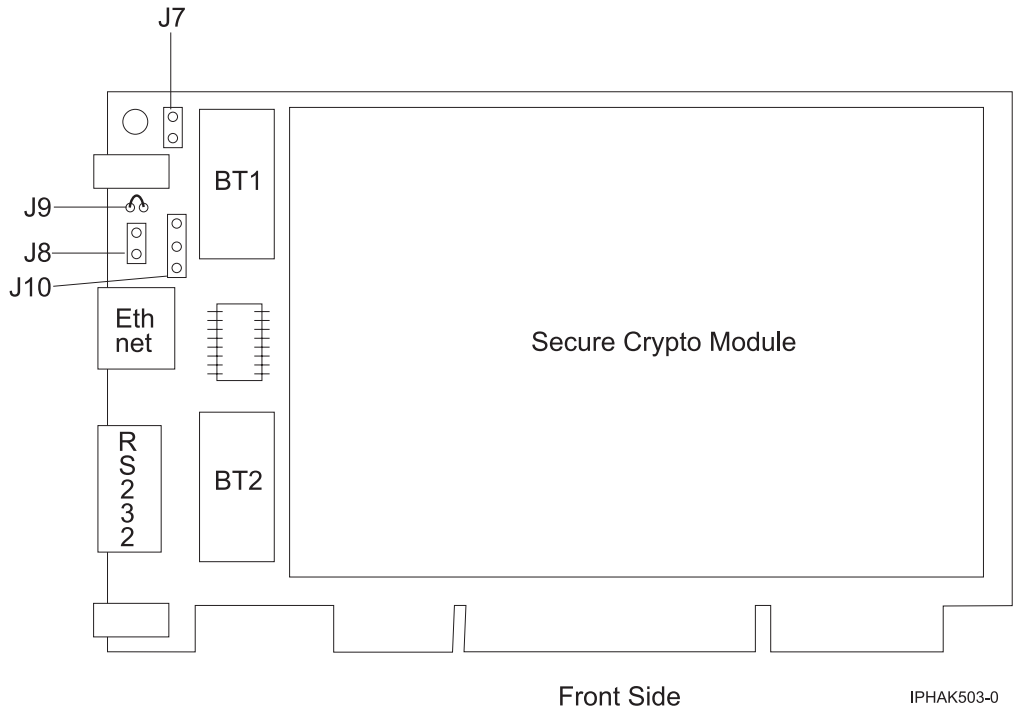| Connectors	Name of jumper	Default position
J7	PCI-X EEPROM write	Jumper installed
J8	External intrusion latch disable	Jumper not installed
J9	Battery disconnect wire	Jumper (wire loop) installed
J10	Temporary-battery connector	Jumper not installed
J11	External intrusion latch	Jumper not installed

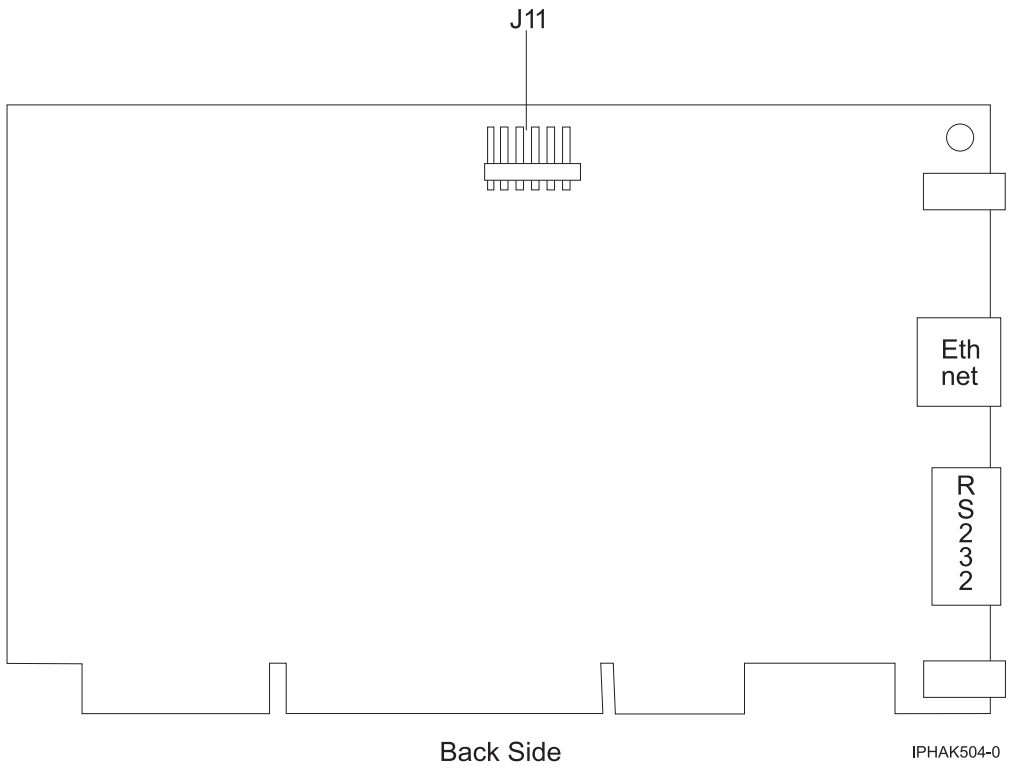*Figure 8. Front side of the adapter*

Figure 9. Back side of the adapter

Related tasks

➡ Installing PCI adapters

➡ Removing and replacing parts on type 2748, 2757, 2763, 2778, 2780, 2782, 4758, 4764, 5703, 5708, 5709, 571B, 571E, 571F, 573D, 574F, 575B
Find instructions for removing and replacing parts.

Related reference

➡ IBM Prerequisite Web page

Parts information

➡ Parts information

PCI adapter placement

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe Cryptographic Coprocessor (FC 4807 and FC 4809)

Learn about the specifications for the PCIe Cryptographic Coprocessor.

The PCIe Cryptographic Coprocessor (FC 4807 and FC 4809) provide the secure-key cryptographic accelerator and the cryptographic coprocessor functions in a single PCIe card. The coprocessor functions are targeted to banking and finance applications. The financial personal identification number (PIN) processing and Euro pay, Mastercard, Visa (EMV) credit card functions are provided. EMV is a standard for the integrated-chip based credit cards. The secure-key accelerator functions are targeted to improving the performance of Secure Sockets Layer (SSL) transactions. The FC 4807 and FC 4809 provide the security and performance required to support emerging digital signature applications. The Host application access to the cryptographic services of the FC 4807 and FC 4809 are by the Common Cryptographic Architecture (CCA) application programming interfaces (APIs) and by the Public-Key Cryptographic Standards (PKCS11). The FC 4807 and FC 4809 provide secure storage of cryptographic keys in a tamper-resistant hardware security module which is designed to meet FIPS PUB 140-2 on security requirements. The FC 4809 is shipped with a custom blind swap cassette.

IBM PCIe Cryptographic Adapter – Highlights
* PCIe 4x standard height - half length
* Integrated Dual PPC processors
* Othello ASIC (Accelerator engines)
* Supports the Common Cryptographic Architecture (CCA) application programming interfaces (APIs) and the Public-Key Cryptographic Standards (PKCS11) on the single FW load.
* 3072, 4096 bit Rational Software Architect CRT HW (including routing)
* SHA 256 Required HW or FW within secure module (including routing)
* Secure Key AES 128,192,256b keys
* Fast path – Symmetric and Asymmetric (secure and clear key)

Supported operating systems

The following operating systems are supported:
* AIX 5.3 with the 5300-08 Technology Level and Service Pack x, or later.
* AIX 5.3 with the 5300-09 Technology Level and Service Pack x, or later.
* AIX 5.3 with the 5300-10 Technology Level and Service Pack x, or later.
* AIX 5.3 with the 5300-11 Technology Level, or later.

- AIX 6.1 with the 6100-01 Technology Level and Service Pack x, or later.
- AIX 6.1 with the 6100-02 Technology Level and Service Pack x, or later.
- AIX 6.1 with the 6100-03 Technology Level and Service Pack x, or later.
- AIX 6.1 with the 6100-04 Technology Level, or later.

Specifications and requirements

FRU number:
> 45D6680

> RoHS compliant with server exemption

Placement information
> For system-specific adapter placement information, see the PCI adapter placement topic collections.

I/O bus architecture
> PCI Express v1.1a

Storage

> Shipping and storage temperature below -35°C ± 60°C or above 1°C ± 60°C (33.8°F ± 140°F) limits

Operation (ambient in system)

> This component collects and controls all the sensors to prevent the physical penetration and any abnormal environmental condition within its wide operational range of 10°C ± 35°C (50°F ± 95°F).

Tamper protection range
> Outside of the tamper protection range limits of -38°C ±3°C to +90°C ± 2°C , the card will be permanently disable.

Handling requirements
> Each PCIe Cryptographic Coprocessor is shipped from the factory with a certified device key. This electronic key, which is stored in the adapter's battery-powered and protected memory, digitally signs status messages to confirm that the PCI Cryptographic Coprocessor is genuine and that no tampering has occurred.

> If any of the secure module's tamper sensors are triggered by tampering or by accident, the PCIe Cryptographic Coprocessor erases all data in the protected memory, including the certified device key. Incorrect removal of the batteries triggers the tamper sensors and destroys the certified device keys. The PCI Cryptographic Coprocessor cannot operate without the certified device keys. To protect the keys, follow the guidelines given in the documentation provided with the coprocessor.

> **Attention:** The batteries keep the coprocessor powered on even when it is not installed in a system. When handling, installing, or removing the adapter, do not let the adapter circuits come in contact with any conductive surface or tools. Doing so can render the adapter permanently inoperable.

> Do not remove the adapter's batteries. Data in the protected memory is lost when battery power is removed. For information about replacing the batteries, see the Installation Manual at the IBM Cryptocard Web site at http://www-03.ibm.com/security/cryptocards/.

Attention: While installing the coprocessor, observe the following precautions:

- The coprocessor is always powered by the batteries, even when it is not installed in the system.
- The battery power is necessary to keep the coprocessor operational.
- The loss of battery power or a voltage drop triggers a Tamper Event and permanently renders the coprocessor inoperable.
- Any short on the battery power distribution circuits causes a voltage drop and a Tamper Event.
- Do not lay the coprocessor on or cause the coprocessor to come in contact with any conductive surface.
- Do not strike the coprocessor circuits with metal or conductive tools.
- Use static-protective measures at all times when handling the coprocessor.

175MB Cache RAID - Dual IOA Enablement Card (FC 5662)

Learn about the specifications for the Dual IOA Enablement Card.

The Dual IOA Enablement Card (FC 5662) is used to enable write cache on the two embedded SAS RAID controllers of the Disk/Media Backplane (FC 5652) by providing the necessary rechargeable batteries for memory backup. It also enables the two embedded SAS RAID controllers to work as Dual Storage IOAs. The Dual IOA Enablement Card (FC 5662) plugs into the Disk/Media Backplane (FC 5652) and enables a 175 MB write cache on each of the two embedded RAID controllers by providing two rechargeable batteries with associated charger circuitry. The write cache can provide additional I/O performance for attached disk or solid state drives, particularly for RAID 5 and RAID 6. The write cache contents are mirrored for redundancy between the two RAID adapters resulting in an effective write cache size of 175 MB. The batteries provide power to maintain both copies of write-cache information in the event power is lost.

Important: It is important to understand that this new feature provides enabling Write Cache and enabling or changing the embedded SAS adapter configuration into a dual IOA (HA RAID) configuration.
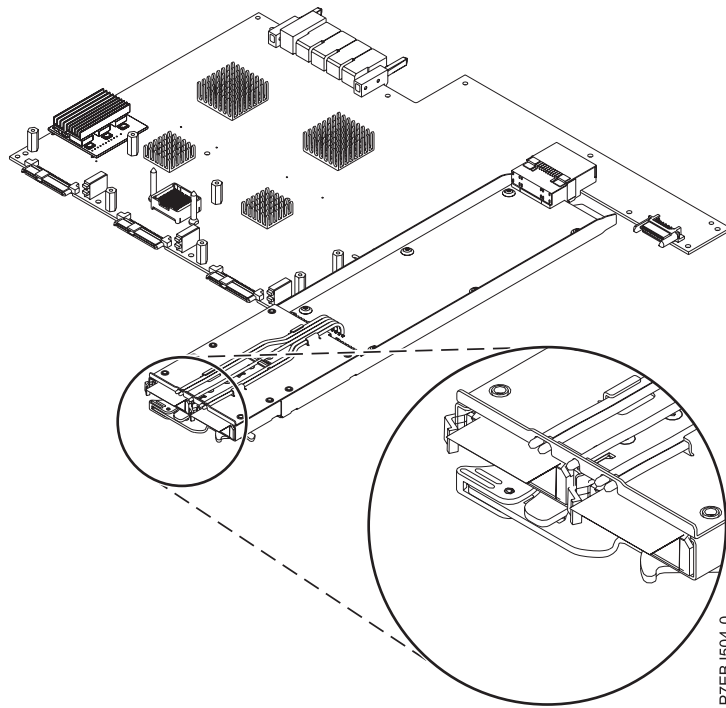
Figure 10. CCIN 57CF PCI Express x8 Planar 3 Gb SAS RAID Adapter with 175MB Cache RAID - Dual IOA Enablement Card

10 Gb FCoE PCIe Dual Port Adapter (FC 5708; CCIN 2B3B)

Learn about the features, operating system requirements, and installation notes for the 5708 adapter.

Overview

The 10 Gb FCoE PCIe Dual Port Adapter is a high-performance, converged network adapter (CNA). The adapter supports data networking and storage networking traffic on a single I/O adapter using Enhanced Ethernet and Fibre Channel over Ethernet (FCoE). Both FCoE and network interface controller (NIC) functions are available for both ports simultaneously. Using FCoE requires Convergence Enhanced Ethernet (CEE) switches.

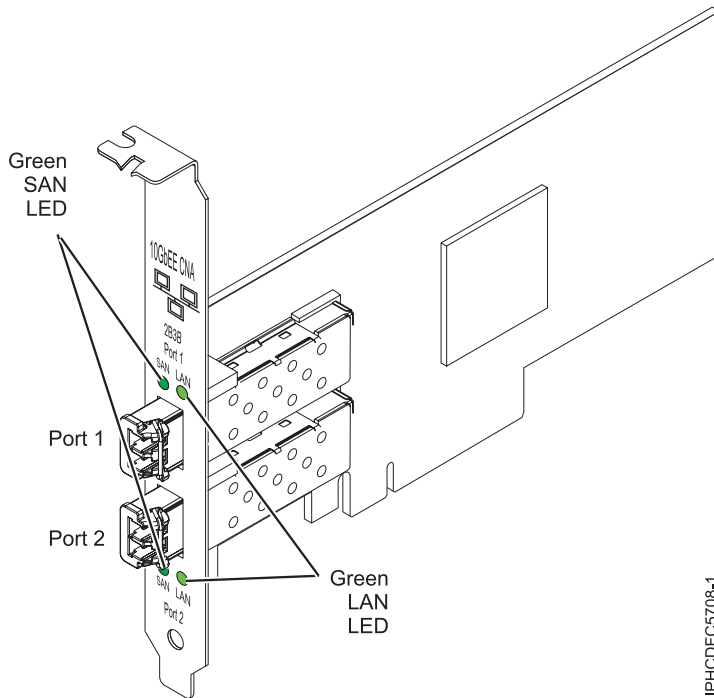The following figure shows the adapter LEDs and connectors.

Figure 11. 10 Gb FCoE PCIe Dual Port Adapter

The LEDs on the adapter provide information about the operation status of the adapter.

Table 11. Adapter LEDs

Green SAN LED	Green LAN LED	Activity
Off	Off	Power off
Slow flashing (unison)	Slow flashing (unison)	Power on, no link
On	On	Link established, no activity
On	Flashing	Link established, TX/RX LAN only activity
Flashing	On	Link established, TX/RX SAN only activity
Flashing	Flashing	Link established, TX/RX LAN and SAN activity
Slow flashing (alternating)	Slow flashing (alternating)	Beaconing

Specifications

Item   Description

FRU number

46K8088 (Designed to comply with RoHS requirement.)

Wrap plug FRU number

12R9314 (Designed to comply with RoHS requirement.)

I/O bus architecture

PCI Express x8 Gen 1 and x4 Gen 2

PCI Express (PCIe) Base and CEM 2.0

Maximum number

For system-specific adapter placement information, see the PCI adapter placement topic collection.

Connectors

LC multimode fiber optic

SFP+ (small form-factor pluggable) with SR optics

Voltage

3.3 V and 12 V

Form factor

Short, low-profile with standard size bracket

Cables

Cables are the responsibility of the customer. Use multimode fibre optic cables with short-wave lasers that adhere to the following specifications:

- OM1
  - Multimode 62.5/125 micron fibre
  - 200 MHz*km bandwidth
  - Maximum cable distance 1 is 33 m (108 ft)
- OM2
  - Multimode 50/125 micron fibre
  - 500 MHz*km bandwidth
  - Maximum cable distance is 82 m (269 ft)
- OM3
  - Multimode 50/125 micron fibre
  - 2000 MHz*km bandwidth
  - Maximum cable distance is 300 m (984 ft)

Operating system or partition requirements

The adapter is supported on the following versions of the AIX and Linux operating systems:

- AIX Version 6.1 with the 6100-04 Technology Level, or later
- AIX 5L Version 5.3 with the 5300-11 Technology Level, or later
- Virtual I/O Server (VIOS) 2.1.2
- Red Hat Enterprise Linux version 5 Update 4, or later
- SUSE Linux Enterprise Server 10 SP3, or later

Note: If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the http://www-912.ibm.com/e_dir/eServerPrereq.nsf.

Replacing FCoE adapters using hot swap

When hot swapping FCoE adapters, be aware that device-related software for the storage devices might have additional devices that need to be removed. Refer to specific storage device documentation for information about how to remove these additional devices. The new adapter has a unique worldwide port name (WWPN). When using the Fibre Channel function, check the zoning and LUN assignments to ensure that the Fibre Channel function is functioning as expected.

4-Port 10/100/1000 Base-TX PCI Express Adapter (FC 5717; CCIN 5717)

Learn about features, requirements, and specifications for the 5717 adapter.

The 4-Port 10/100/1000 Base-TX PCI Express Adapter is a full duplex, four ported, Gigabit Ethernet adapter that can be configured to run either port at 1000, 100, or 10 Mbps data rate. This adapter interfaces to the system through a PCIe bus and connects to a network using a 4-pair CAT-5 Unshielded Twisted Pair (UTP) cable for distances of up to 100 m. The adapter conforms to the IEEE 802.3ab 1000Base-T standard. The 5717 also supports jumbo frames when running at the 1000 Mbps speed.

The adapter provides the following features:

- Supports interrupt moderation to deliver increased performance while significantly reducing CPU utilization
- Allows quad-port operation in x4, x8, x16 slots, and each port operates without interfering with the other
- Each port operates without interfering with the other
- Auto-negotiation, full-duplex (half-duplex available for 10/100)
- Integrated media access control (MAC) and physical layer (PHY)
- Supports Fast EtherChannel (FEC) and Gigabit EtherChannel (GEC) when used with capable switch
- Supports IEEE 802.3ad Link Aggregation control protocol when used with capable switch
- IEEE 802.1Q VLANs, IEEE 802.3 (z, ab, u, x) flow control support, IEEE 802.1p
- TCP checksum offload -- transmission control protocol (TCP), Internet Protocol (IP) for IPv4
- TCP Segmentation Offload (TSO) / Large Send Offload (LSO)
- Bus width x4 lane; operable in x4, x8, or x16 slots
- Bus speed (x4, encoded rate) 10 Gbps unidirectional and 20 Gbps bidirectional
- EEPROM SPI and single EEPROM support
- Interrupt levels INTA and MSI (requires system and software support for MSI)
- IEEE 802.3ab
- Hardware certifications FCC B, UL, CE, VCCI, BSMI, CTICK, MIC
- Four RJ-45 connectors
- LEDs on each port identifying speed and link activity
- Compliant with European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

Adapter specifications

Item   Description
FRU number
> 10N8556[*]

> [*]Designed to comply with RoHS requirement
I/O bus architecture
> - PCI Express V1.0a compliant
> - Bus width x4 lane PCI Express, operable in x4, x8, x16 slots
> - Bus speed (x4, encoded rate) 10 Gbps unidirectional; 20 Gbps bidirectional
Busmaster
> Yes
Maximum number
> For system-specific adapter placement, see PCI adapter placement.
Adapter size
> PCIe short form
Connector information
> - Four RJ-45 ports
> - Two LED adapter status indicators per port, for link activity and speed
Wrap plug
> RJ-45, part number 10N7405
Cabling
> Customers supply their own cables. For best performance, use cables that meet Cat 5e cabling standards, or later.

Adapter LED states

The LEDs on the adapter provide information about the adapter's operation status. The LEDs are visible through the adapter's mounting bracket. 4-Port 10/100/1000 Base-TX PCI Express Adapter shows the location of the LEDs. Table 12 describes the different LED states and what those states indicate.
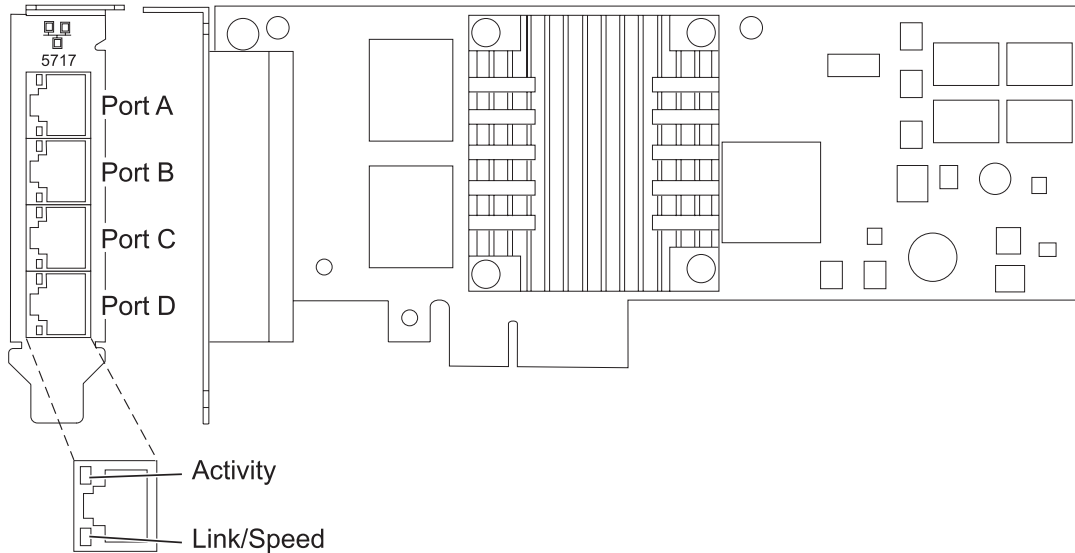

Figure 12. 4-Port 10/100/1000 Base-TX PCI Express Adapter

Table 12. Adapter LEDs and descriptions

LED	Light	Description
Activity/link	Green	Active link
	Off	No link
		The absence of a link can indicate a defective cable, defective connector, or a configuration mismatch.
	Blinking	Data activity
Speed	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

Operating system or partition requirements

The adapter is supported under the following operating systems:
- AIX 5L Version 5.3 with the 5300-06 Technology Level or later
- AIX 5L Version 5.2 with the 5200-10 Technology Level or later
- Red Hat Enterprise Linux version 4, update 6
- Red Hat Enterprise Linux version 5, update 1
- SUSE Linux Enterprise Server 10, SP1

If you are using another release of AIX, ensure that the adapter is supported on that release before you install the adapter. Contact service and support for assistance.

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web

site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Preparing for installation

If you are installing the operating system at this time, install the adapter before you install the operating system. See "Installing the adapter" on page 53 for instructions.

If you are installing only the device driver for this adapter, install the device driver software before you install the adapter. See "Installing the device driver software" for instructions.

If you already have one of these adapters installed and working with your AIX operating system and you are preparing to install additional adapters, the device driver is already installed and you do not need to reinstall the device drive.

Verifying the hardware requirements

The adapter requires the following hardware:
- A wrap plug for the RJ-45 connector, if you are running the total diagnostics package
- Cat 5e (or later) UTP cables for 1000 Mbps network attachment
- Cat 5 or Cat 3 UTP cables for 100 Mbps or 10 Mbps network attachment

Restriction: The cables can be no longer than 100 meters (including patch cables) from the adapter to the local switch.

Verifying the software requirements

You can use the adapter on operating systems shown in "Operating system or partition requirements" on page 51.

Gathering tools and documentation

To install the adapter, make sure you have access to the following items:
- The adapter
- The operating system documentation
- The system unit documentation for removing and replacing features
- The PCI adapter placement documentation.
- A flat-blade screwdriver
- The AIX base operating system CD, which includes the device driver, or the AIX device driver CD

Installing the device driver software

This section explains how to install device driver software. The device driver is provided for the AIX 5L operating system on the AIX base operating system CD, which includes the device driver, or the AIX device driver CD.

To install device driver software, do the following steps:
1. Log in to the system unit as root user.
2. Insert the media containing the device driver software (for example, the CD) into the media device.

   If your system does not have a CD-ROM drive, refer to your system documentation for performing a Network Installation Management (NIM) installation.
3. Type the following System Management Interface Tool (SMIT) fast path command: `smit devinst`

4. Press Enter. The Install Additional Device Software window highlights the **INPUT device / directory for software** option.
5. Type the name of the input device that you are using, or press F4 to select the input device from a list.
6. Press Enter. The Install Additional Device Software window highlights the SOFTWARE to install option.
7. Press F4 to select List.
8. Type / to display the Find window.
9. Type the device package name `devices.pciex.14106803` .
10. Press Enter. The system finds and highlights this device driver software.
11. Press F7 to select the highlighted device driver software.
12. Press Enter. The INSTALL ADDITIONAL DEVICE SOFTWARE window displays. The entry fields are automatically updated.
13. Press Enter to accept the information. The ARE YOU SURE window displays.
14. Press Enter to accept the information. The COMMAND STATUS window displays.
    - The message RUNNING is highlighted to indicate that the installation and configuration command is in progress.
    - When RUNNING changes to OK, scroll to the bottom of the page and locate the installation summary.
    - After a successful installation, SUCCESS displays in the Result column of the installation summary at the bottom of the page.
15. Remove the installation media from the drive.
16. Press F10 to exit SMIT.

Verifying the AIX software installation

To verify that the device driver for the adapter is installed, do the following steps:
1. If necessary, log in as root user.
2. Type `lslpp -l devices.pciex.14106803.rte` and press Enter.

    If the device driver is installed, the following table is an example of the data that appears.

Fileset	Level	State	Description
Path: /usr/lib/objrepos devices.pciex.14106803.rte	5.*x*.0.0	COMMITTED	4-Port 10/100/1000 Base-TX PCI Express Software

3. Confirm that the devices.pciex.14106803.rte filesets are installed. If no data displays in the window, reinstall the driver.

Installing the adapter

This section explains how to install the adapter. If you are installing the operating system at this time, install the adapter before you install the operating system. If the operating system is already installed and you need to install the device driver for this adapter, install the device driver software before you install the adapter.

Attention: Before installing an adapter, review the precautions in "Safety information" on page 3 and "Handling static sensitive devices" on page 4. Do not remove the adapter from its anti-static package until you are ready to place it in the system unit.

To install the adapter, follow these steps:

1. Determine the PCIe slot in which to place the adapter.

   The adapter has an x4 PCIe connector and can be placed in a x4, x8 or x16 slot. See the PCI adapter placement for information about the PCIe slots on your system unit.
2. Install the adapter using the instructions in the system unit service guide.

Verifying the adapter installation

To verify that the system unit recognizes the adapter, type `lsdev -Cs pci` at the command line and press Enter.

A list of PCI devices displays. If the adapter is installed correctly, the status of available for each port indicates that the adapter is installed and ready to use. If a message indicates that any of the ports are defined instead of available, shut down the server and verify that the adapter was installed correctly.

Related tasks

➡ Installing PCI adapters

Related reference

➡ IBM Prerequisite Web page

Parts information

➡ Parts information

PCI adapter placement

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

10 Gigabit Ethernet-CX4 PCI Express Adapter (FC 5732; CCIN 5732)

Learn about the features, operating system requirements, and installation procedures for the 5732 adapter.

Overview

The 10 Gigabit Ethernet-CX4 PCI Express Adapter is a low-profile, high performance CX4 copper network interface controller (NIC). The product conforms to the IEEE, 802.3ae 10GBASE-CX specification for Ethernet transmission. 10GBase-CX4 uses the XAUI (10 Gigabit attachment unit interface) specified in 802.3ae, and the 4X connector that is used for InfiniBand technology. The adapter is used to connect servers or switches over short distances of up to 15 meters.

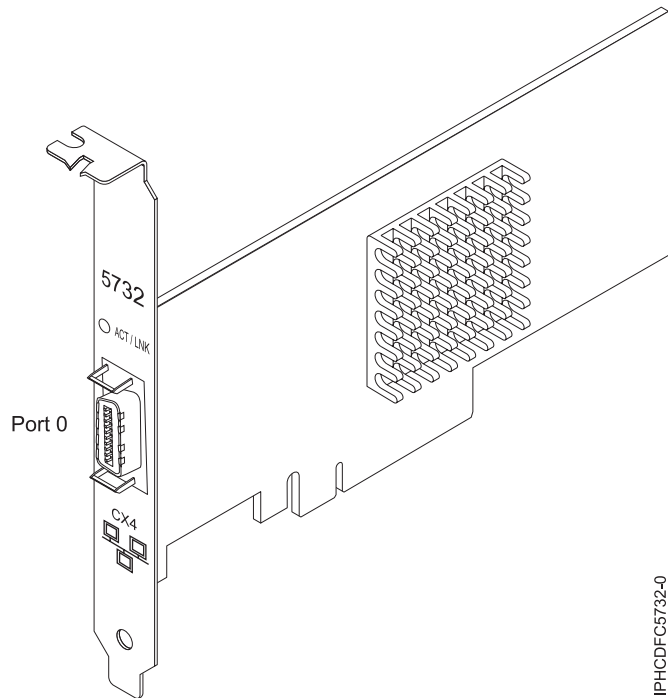The following figure shows the adapter.

Figure 13. 10 Gigabit Ethernet-CX4 PCI Express Adapter

The LED on the adapter provides information about the operation status of the adapter.

Table 13. Adapter LED

LED	Light	Description
Activity/Link	Green	Good link, no activity
	Blinking	Transmit activity
	Off	No link[*]
[*]The absence of a link could be the result of a defective cable, a defective connector, or a configuration mismatch.		

Specifications

Item   Description
FRU number
    10N9505 (Designed to comply with RoHS requirement.)
I/O bus architecture
    PCIe-V1.1 x8
Busmaster
    Yes
Maximum number
    For system-specific adapter placement information, see the topic collections.
Adapter size
    PCIe x8, short form
Connector information
    10G Ethernet CX4 cable
Wrap plug
    4x IB wrap plug, part number 45D4771 (Designed to comply with RoHS requirement)
Cables
    Customers supply the cables. The CX4 adapter supports copper CX4 cables. Cables can be
    ordered through a cable supplier.

Attributes

The 5769 and 5732 adapters provide the following features:

- PCIe 1.1 x8
- MSI-X, MSI and support of traditional pin interrupts
- 10GBASE-SR short-reach optics (850 nm) (feature 5769 only)
- 10GBASE-CX (feature 5732 only)
- IEEE 802.3ae (10 GbE)
- IEEE 802.1p priority and 802.1Q VLAN tagging
- IEEE 802.3x flow control
- Link aggregation, 802.3ad 802.3 compliance
- IEEE 802.3ad load-balancing and failover
- Ethernet II and 802.3 encapsulated frames
- Multiple MAC addresses per interface
- Jumbo frames up to 9.6 KB
- TCP checksum offload for IPv4 and IPv6
- TCP segmentation offfload (TSO) for IPv4 and IPv6
- User datagram protocol (UDP) checksum offload for IPv4 and IPv6
- Receive side scaling and packet steering
- Line rate packet filtering and attack protection
- IETF RDDP and RDMAC iWARP compliance (Linux only)
- APIs: RNIC-PI, kDAPL and Open Fabrics Enterprise Distribution (OFED) 1.4 (Linux only)
- Full iSCSI software and hardware initiator support (Linux only)

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

The 10 Gigabit Ethernet-CX4 PCI Express Adapter is supported on the following versions of the AIX and operating systems:

- AIX Version 6.1 with the 6100-03 Technology Level, or later
- AIX 5L Version 5.3 with the 5300-10 Technology Level, or later
- Red Hat Enterprise Linux version 5 Update 3, or later
- SUSE Linux Enterprise Server 11, or later

AIX host bus adapter (HBA) and Ethernet drivers are contained in the following filesets:

    devices.ethernet.ct3
    devices.ethernet.ct3.rte //HBA
    devices.ethernet.ct3.cdli //ENT

AIX adapter specific device attributes are contained in the following filesets:

    devices.pciex.251430001410a303 (CX4 adapter)
    devices.pciex.2514310025140100 (BladeCenter® hardware)

Preparing for installation

If you are installing your operating system at this time, install your adapter before you install the operating system. If you are installing only the device driver for this adapter, install your device driver software before you install the adapter. Ensure that your operating system supports this adapter before you install it. See "Operating system or partition requirements" on page 56.

Installing the AIX device driver software

To install device driver software, follow the steps in "Installing the AIX device driver software" on page 124.

Installing the adapter

For general instructions on how to install a PCI adapter, see the Installing PCI adapters topic. Return here to verify the adapter installation.

Verifying the adapter installation

To verify that your system recognizes the PCI adapter, do the following steps:
1. If necessary, log in as root user.
2. At the command line, type: `lsdev -Cs pci`
3. Press Enter.

A list of PCI devices is displayed. If the adapter is installed correctly, the status of available for each port indicates that the adapter is installed and ready to use. If a message indicates that any of the ports are defined instead of available, shut down your server and verify that the adapter was installed correctly.

Related tasks

"Installing the AIX device driver software" on page 124
Learn how to install the AIX device driver software for a PCI adapter.

"Verifying the AIX device driver software" on page 124
Learn how to verify the AIX device driver is installed for a PCI adapter.

➡ Installing PCI adapters

Related reference

➡ IBM Prerequisite Web page

Parts information

➡ Parts information

PCI adapter placement

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

8 Gigabit PCI Express Dual Port Fibre Channel Adapter (FC 5735; CCIN 577D)

Learn about the specifications and operating system requirements for the 5735 adapter.

Overview

The 8 Gigabit PCI Express Dual Port Fibre Channel Adapter is a high-performance adapter based on the Emulex LPe12002 PCIe Host Bus Adapter (HBA). Each port provides single initiator capability over a

fibre link. The ports have LC type connectors and utilize shortwave laser optics. The adapter connects to fibre channel switches and operates at link speeds of 2, 4, and 8 Gbps. The adapter automatically negotiates with the switch to the highest speed of which the switch is capable. LEDs on each port provide information on the status and link speed of the port.
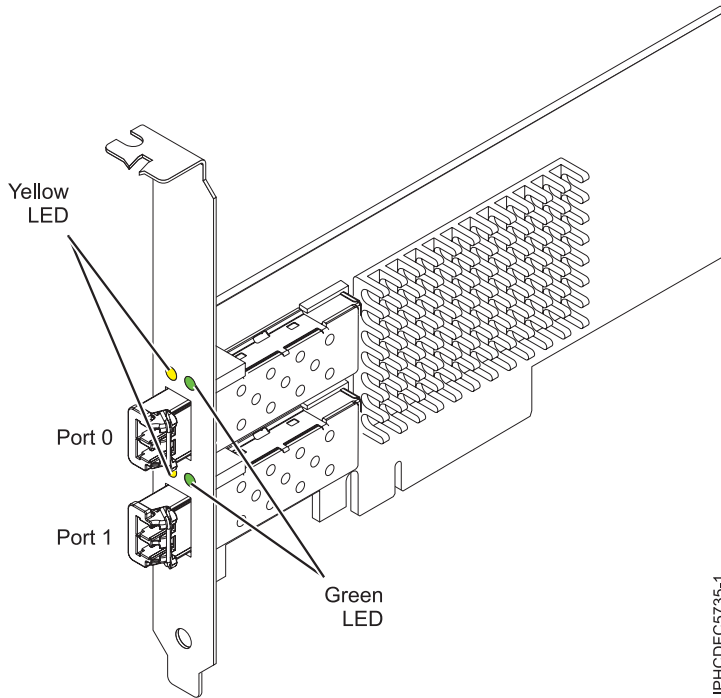

Figure 14. 5735 adapter

Adapter specifications

Item   Description

FRU number
> 10N9824 (Designed to comply with RoHS requirement)

Wrap plug FRU number
> 12R9314 (Designed to comply with RoHS requirement)

> 11P3847 (Not designed to comply with RoHS requirement)

I/O bus architecture
> PCI Express (PCIe) Base and CEM 2.0
> x8 PCIe bus interface

Slot requirement
> One available PCIe x8 or x16 slot

Voltage
> 3.3V

Form factor
> Short, low-profile with standard size bracket

FC compatibility
> 2, 4, 8 gigabit

Cables
> Cables are the responsibility of the customer. Use multimode fibre optic cables with short-wave lasers that adhere to the following specifications:
> - OM3: Multimode 50/125 micron fibre, 2000 MHz*km bandwidth
> - OM2: Multimode 50/125 micron fibre, 500 MHz*km bandwidth
> - OM1: Multimode 62.5/125 micron fibre, 200 MHz*km bandwidth

Because core sizes are different, OM1 cables can only be connected to other OM1 cables. For best results, OM2 cables should not be connected to OM3 cables. However, if an OM2 cable is connected to an OM3 cable, the characteristics of the OM2 cable apply to the entire length of the cables.

The following table shows the supported distances for the three different cable types at the three different link speeds.

Table 14. Supported cable distances by link speed

Cable type	2.125 Gbps	4.25 Gbps	8.5 Gbps
OM3	0.5 m - 500 m	0.5 m - 380 m	0.5 m - 150 m
OM2	0.5 m - 300 m	0.5 m -150 m	0.5 m - 50 m
OM1	0.5 m - 150 m	0.5 m - 70 m	0.5 m - 21 m

Maximum number
For system-specific adapter placement information, see the PCI adapter placement topic.

Operating system or partition requirements

The adapter is supported under the following operating systems:

- AIX 5L Version 5.3 with the 5300-09 Technology Level, or later
- AIX Version 6.1 with the 6100-02 Technology Level, or later
- IBM i 6.1, or later
- Red Hat Enterprise Linux version 4 U7
- Red Hat Enterprise Linux version 5 U2
- SUSE Linux Enterprise Server 10, SP2

Note: If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the http://www-912.ibm.com/e_dir/eServerPrereq.nsf.

Adapter LED

Green and yellow LEDs can be seen through openings in the adapter's mounting bracket. Green indicates firmware operation and yellow signifies port activity. Table 15 summarizes the link rate conditions. There is a 1–second pause when the LED is off between each group of fast blinks (2, 3, or 4). Observe the LED sequence for several seconds to be sure that you have correctly identified the state.

Table 15. Normal LED states

Green LED	Yellow LED	State
Slow blink	Off	Normal, link inactive or not started
On	2 fast blinks	2 Gbps link rate - normal, link active
On	3 fast blinks	4 Gbps link rate - normal, link active
On	4 fast blinks	8 Gbps link rate - normal, link active

Power-on self test (POST) conditions and results are summarized in Table 16. These states can be used to identify abnormal states or problems. Follow the action to be taken for each condition.

Table 16. POST conditions and results

Green LED	Yellow LED	State	Action to be taken
Off	Off	Wake-up failure (dead board)	Perform AIX or IBM i operating system diagnostics.

Table 16. POST conditions and results (continued)

Green LED	Yellow LED	State	Action to be taken
Off	On	POST failure (dead board)	Perform AIX or IBM i operating system diagnostics.
Off	Slow blink	Wake-up failure monitor	Perform AIX or IBM i operating system diagnostics.
Off	Fast blink	POST failure	Perform AIX or IBM i operating system diagnostics.
Off	Flashing	POST processing in progress	None
On	Off	Failure while functioning	Perform AIX or IBM i operating system diagnostics.
On	On	Failure while functioning	Perform AIX or IBM i operating system diagnostics.
Slow blink	Slow blink	Offline for download	None
Slow blink	Fast blink	Restricted offline mode, waiting for restart	None
Slow blink	Flashing	Restricted offline mode, test active	None

Replacing fibre channel adapters using hot swap

When hot swapping fibre channel adapters, be aware that device-related software for the storage devices might have additional devices (for example, the dar device associated with the FAStT or DS4800) that need to be removed. Refer to specific storage device documentation for information about how to remove these additional devices.

The new adapter has a unique worldwide port name (WWPN). Check the zoning and LUN assignments to ensure that the new adapter will function as expected.

POWER GXT145 PCI Express Graphics Accelerator (FC 5748)

Learn about the features, requirements, installation notes, and troubleshooting tips for the POWER® GXT145 PCI Express Graphics Accelerator.

Overview

The POWER GXT145 graphics adapter is a PCI Express (PCIe) adapter that accelerates and enhances the system unit video. The adapter has no hardware switches to set. Mode selection is made through the software. shows the adapter and its connectors.

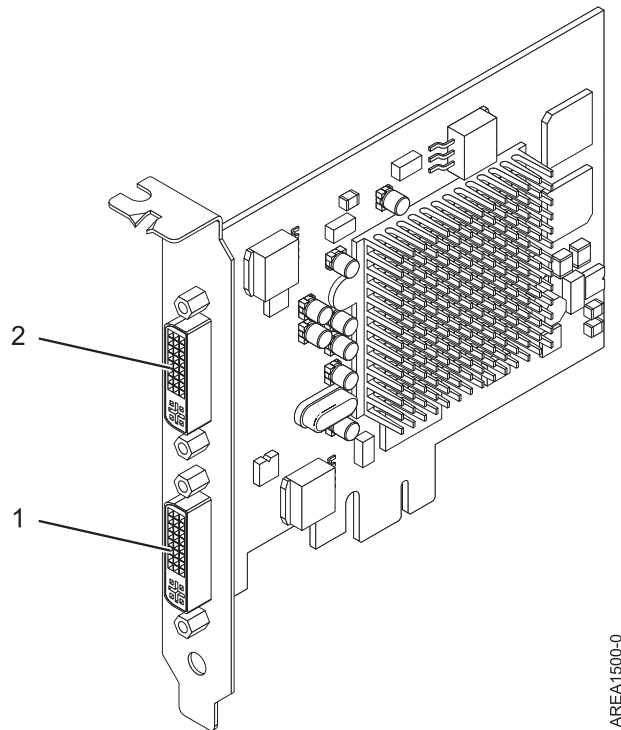*Figure 15. POWER GXT145 PCI Express Graphics Accelerator*

| **1** | Primary DVI connector, 28 pin, analog or digital |
| **2** | Secondary DVI connector, 28 pin, analog or digital |

Connect the primary monitor to connector 1. If you are using an optional, secondary monitor, connect the secondary monitor to connector 2. For AIX, the video that is displayed on the secondary monitor is the same as the video displayed the primary monitor, and at the same resolution and refresh rate.

The following table shows the feature code, custom card identification number and field-replaceable unit part number for the adapter.

feature code (FC)	custom card identification number (CCIN)	field-replaceable unit (FRU) part number
5748	5748	10N7756[*]
[*]Designed to comply with RoHS requirement		

This adapter provides the following features:
- 8-bit indexed or 24-bit true color.
- 32 MB SDRAM frame buffer.
- x1 PCIe bus interface.
- Two DVI-I analog or digital connectors.
- One monitor connected, analog, up to 2048 x 1536 resolution.
- One monitor connected, digital, up to 1280 x 1024 resolution.
- A second monitor supported on secondary connector at up to 1600 x 1200 analog or 1280 x 1024 digital.
  - For Linux, a second monitor is supported on the secondary connector at resolutions up to 1600 x 1200 analog or 1280 x 1024 digital.

– For AIX, when running with two monitors, both monitors must have an analog connection with the same resolution, up to 1600 x 1200. The image on the primary monitor will also be displayed on the secondary monitor.
- Display power management: Video Electronics Standards Association (VESA), Display Power Management Signaling (DPMS)

Operating system or partition requirements

The adapter is supported under the following operating systems:
- AIX 5L Version 5.3 with the 5300-06 Technology Level or later
- AIX 5L Version 5.2 with the 5200-10 Technology Level or later
- Red Hat Enterprise Linux version 4.5
- SUSE Linux Enterprise Server 10 SP1

If you require support on another AIX release, ensure that the adapter is supported on that release before you install the adapter. Contact service and support for assistance.

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Preparing for installation

If you are installing the operating system at this time, install the adapter before you install the operating system. See "Installing the adapter" on page 63 for instructions. If you are installing only the device driver for this adapter, install the device driver software before you install the adapter. See "Installing the device driver software" for instructions.

Gathering tools and documentation

To install the adapter, make sure you have access to the following items:
- The adapter
- The operating system documentation
- The system service guide for removing and replacing features
- The PCI adapter placement documentation
- A flat-blade screwdriver
- The media containing the device driver software

Installing the device driver software

This section explains how to install device driver software for the adapter. The device driver is provided for the AIX 5L operating system.

To install device driver software, do the following steps:
1. Log in to the system unit as root user.
2. Insert the media containing the device driver software (for example, the CD) into the media device.

   If your system does not have a CD-ROM drive, refer to your system documentation for performing a Network Installation Management (NIM) installation.
3. Type the following System Management Interface Tool (SMIT) fast path command: `smit devinst`
4. Press Enter. The Install Additional Device Software window highlights the **INPUT device / directory for software** option.

5. Type the name of the input device that you are using, or press F4 to select the input device from a list.

6. Press Enter. The Install Additional Device Software window highlights the SOFTWARE to install option.

7. Press F4 to select List.

8. Type / to display the Find window.

9. Type the device package name `devices.pci.2b102725`.

10. Press Enter. The system finds and highlights this device driver software.

11. Press F7 to select the highlighted device driver software.

12. Press Enter. The INSTALL ADDITIONAL DEVICE SOFTWARE window displays. The entry fields are automatically updated.

13. Press Enter to accept the information. The ARE YOU SURE window displays.

14. Press Enter to accept the information. The COMMAND STATUS window displays.

   - The message RUNNING is highlighted to indicate that the installation and configuration command is in progress.
   - When RUNNING changes to OK, scroll to the bottom of the page and locate the installation summary.
   - After a successful installation, SUCCESS displays in the Result column of the installation summary at the bottom of the page.

15. Remove the installation media from the drive.

16. Press F10 to exit SMIT.

Installing the adapter

This section explains how to install the adapter. If you are installing your operating system at this time, install your adapter before you install the operating system. If the operating system is already installed and you need to install the device driver for this adapter, install the device driver software before you install the adapter. See "Installing the device driver software" on page 62 for instructions.

Attention: Before installing an adapter, review the precautions in "Safety information" on page 3 and "Handling static sensitive devices" on page 4. Do not remove the adapter from its anti-static package until you are ready to place it in the system unit.

To install the adapter, follow these steps:

1. Determine the PCIe slot in which to place the adapter.

   The POWER GXT145 graphics adapter has an x1 PCIe connector and can be placed in a PCIe x1, x4, x8 or x16 slot. See PCI adapter placement for information about the PCIe slots on your system unit.

2. Shut down the system unit and install the adapter using the instructions in the system unit documentation.

3. Connect the monitor cable to the adapter.

   If necessary, you can use a DVI-A dongle (feature code 4276) for connecting a VGA 15-pin connector on a monitor cable to the DVI connector on the adapter. For example, a DVI-A dongle is needed to connect to a 7316-TF3 console or a KVM switch.

4. Start the system unit and the monitor.

5. When prompted, configure the adapter by following the online configuration instructions.

6. When **Select Display** (console) appears, press the number key on your keyboard for the monitor that is to be the default.

Troubleshooting

If you have video problems after the initial installation, follow these procedures to troubleshoot the problem:

- Check the cables.
- Check the device driver software installation.
- Check the console.
- Check the adapter installation.

Checking the cables

1. Ensure the monitor cables are connected to the correct adapter.
2. If you have more than one video adapter, be sure that each adapter is connected to a monitor.
3. Verify that the connections are secure.
4. If no log-in prompt appears, restart the system unit.

Checking the device driver software installation

Verify that the device driver for the POWER GXT145 is installed by typing the following command and then pressing Enter:

```
lslpp -l all | grep GXT145
```

If the GXT145 device driver is installed, the following table is an example of the data that appears if you are running AIX Version 5.2:

```
devices.pci.2b102725.X11 5.2.0.105 COMMITTED AIXwindows GXT145 Graphics
devices.pci.2b102725.diag 5.2.0.105 COMMITTED GXT145 Graphics Adapter
devices.pci.2b102725.rte   5.2.0.105  COMMITTED GXT145 Graphics Adapter
```

If the POWER GXT145 device driver did not fully install, reinstall the driver.

See "Installing the device driver software" on page 62.

Checking the console

1. If you continue to experience problems, you can redirect the monitor to the new adapter using the chdisp command.
2. If you continue to experience problems after you have checked your cables and tried the chdisp command, run diagnostics.

Checking the adapter installation

Verify that the system unit recognizes the POWER GXT145 adapter. At the AIX command line type lsdev -Cs pci.

If the POWER GXT145 adapter is correctly installed, the following is an example of the data that appears:

```
cor0 Available 0K-00 GXT145 Graphics Adapter
```

If the message indicates the adapter is DEFINED instead of AVAILABLE, shut down the system unit and check the GXT145 adapter to ensure it is installed correctly.

If you continue to experience problems after following the steps in this section, contact service and support for assistance.

Related tasks

➦ Installing PCI adapters

Related reference

➦ IBM Prerequisite Web page

Parts information

➦ Parts information

PCI adapter placement

➦ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR Adapter (FC 5749; CCIN 576B)

Learn about the specifications and operating system requirements for the 4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR Adapter.

The 4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR Adapter is a 64-bit address/data, short form factor Peripheral Component Interconnect-X (PCI-X) adapter with an LC type external fiber connector that provides single or dual initiator capability over an optical fiber link or loop. With the use of appropriate optical fiber cabling, this adapter provides the capability for a network of high-speed local and remote located storage. The adapter will auto-negotiate for the highest data rate between adapter and an attaching device at 1 Gbps, 2 Gbps or 4 Gbps of which the device or switch is capable. Between the adapter and an attaching device or switch, the distances supported are up to: 500 meters running at 1 Gbps data rate, 300 meters running at 2 Gbps data rate, and 150 meters running at 4 Gbps data rate. When used with IBM fibre channel storage switches supporting long-wave optics, distances of up to 10 kilometers are capable running at either 1 Gbps, 2 Gbps, or 4 Gbps data rates.

The 4 Gb Dual-Port Fibre Channel PCI-X Adapter can be used to attach devices either directly, or by means of fibre channel switches. If attaching a device or switch with a SC type fiber connectors, use a LC-SC 50 micron fiber converter cable (#2456) or a LC-SC 62.5 micron fiber converter cable (#2459).

Adapter specifications

Item   Description
Adapter FRU number
        32N1294[*]

        [*] Designed to comply with RoHS requirement.
Wrap plug FRU number
        11P3847
I/O bus architecture
        PCI-X 2.0a, PCI 3.0, PCI-X Mode 2 - 266 MHz, PCI-X Mode 1 - 133 MHz, PCI - 66 MHz
Slot requirement
        One available 3.3 volt PCI or PCI-X slot
FC compatibility
        1, 2, 4 gigabit
Cables

        50/125 micron fiber (500 MHz*km bandwidth cable)
        • 1.0625 Gbps 2 – 500 m
        • 2.125 Gbps 2 – 300 m
        • 4.25 Gbps 2 – 150 m

        62.5/125 micron fiber (200 MHz*km bandwidth cable)

- 1.0625 Gbps 2 – 300 m
- 2.125 Gbps 2 – 150 m
- 4.25 Gbps 2 – 70 m

Maximum number

    For system-specific adapter placement information, see PCI adapter placement.

Operating system or partition requirements

    IBM i 6.1, or later

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web

site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Related tasks

Installing PCI adapters

Related reference

IBM Prerequisite Web page

Parts information

Parts information

PCI adapter placement

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1

Find links to topics that cover Backplane daughter cards and RAID enablement cards.

2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter (FC 5767; CCIN 5767)

Learn about features, requirements, and specifications for the 2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter.

The 2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter is a full duplex, dual ported, gigabit Ethernet adapter. This adapter can be configured to run each port at 10, 100, or 1000 Mbps data rates. The adapter connects to a network using unshielded twisted pair (UTP) cable for distances of up to 100 meters. The adapter supports AIX Network Installation Management (NIM) boot capability. The adapter conforms to the IEEE 802.3ab 1000Base-T standard. The adapter supports jumbo frames when running at the 1000 Mbps speed.

The adapter provides the following features:
- Supports interrupt moderation to deliver increased performance while significantly reducing CPU utilization
- Supports dual port operation in almost any PCIe slot, except x1
- Supports auto-negotiation, full-duplex only
- Supports integrated media-access control (MAC) and physical layer (PHY)
- Supports Fast EtherChannel (FEC) with the existing software
- Supports gigabit EtherChannel (GEC) with the existing software
- Supports IEEE 802.3ad (Link Aggregation control protocol)
- Supports IEEE 802.1Q VLANs
- Supports IEEE 802.3 z, ab, u, x flow control support
- Supports IEEE 802.1p
- Supports IEEE 802.3ab for TX

- Supports TCP checksum offload transmission control protocol (TCP), user datagram protocol (UDP), Internet protocol (IP) for IPv4 and IPv6
- Supports TCP segmentation or large send offload
- Supports EEPROM-SPI and single EEPROM
- Supports interrupt levels INTA and MSI
- Hardware certifications FCC B, UL, CE, VCCI, BSMI, CTICK, MIC
- Network Controller (MAC) Intel® 82571EB
- Compliant with European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

Adapter specifications

Item   Description
FRU number
10N6845*

*Designed to comply with RoHS requirement
I/O bus architecture
- PCI Express V1.0a compliant
- Bus width x4 lane PCI Express, operable in x4, x8, x16 slots
- Bus speed (x4, encoded rate) 10 Gbps unidirectional; 20 Gbps bidirectional

Busmaster
Yes
Maximum number
For system-specific adapter placement, see PCI adapter placement.
Adapter size
PCIe short form
Connector information
- Two RJ-45 ports
- Two LED adapter status indicators per port, for link activity and speed

Wrap plug
RJ-45, part number 10N7405
Cabling
Customers supply their own cables. For best performance, use cables that meet Cat 5e cabling standards, or later.

Adapter LED states

The LEDs on the adapter provide information about the adapter's operation status. The LEDs are visible through the adapter's mounting bracket. 2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter shows the location of the LEDs. Table 17 on page 68 describes the different LED states and what those states indicate.
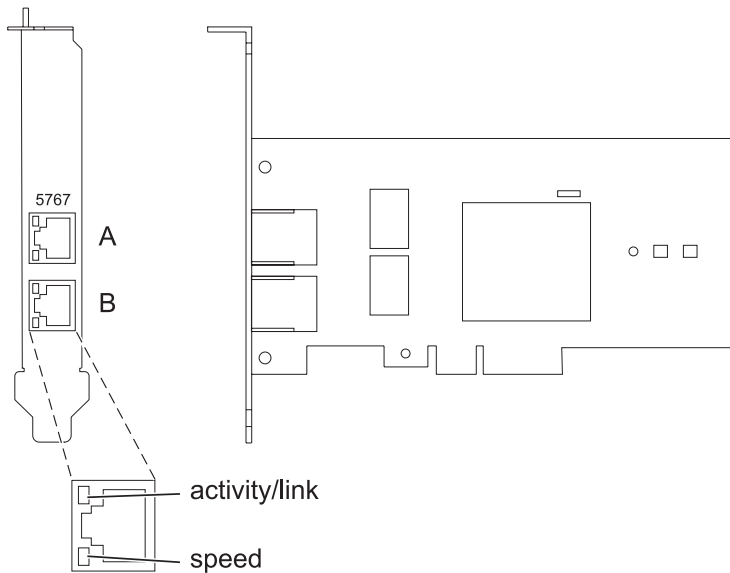
Figure 16. 2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter

Table 17. Adapter LEDs and descriptions

LED	Light	Description
Activity/link	Green	Active link
	Off	No link

The absence of a link can indicate a defective cable, defective connector, or a configuration mismatch. |
	Blinking	Data activity
Speed	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

Operating system or partition requirements

The adapter is supported under the following operating systems:
- AIX 5L Version 5.3 with the 5300-06 Technology Level or later
- AIX 5L Version 5.2 with the 5200-10 Technology Level or later
- Red Hat Enterprise Linux version 4, update 5
- Red Hat Enterprise Linux version 5
- SUSE Linux Enterprise Server 9, SP4
- SUSE Linux Enterprise Server 10, SP1

If you are using another release of AIX, ensure that the adapter is supported on that release before you install the adapter. Contact service and support for assistance.

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web

site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Preparing for installation

If you are installing the operating system at this time, install the adapter before you install the operating system. See "Installing the adapter" on page 70 for instructions.

If you are installing only the device driver for this adapter, install the device driver software before you install the adapter. See "Installing the device driver software" for instructions.

If you already have one of these adapters installed and working with your AIX operating system and you are preparing to install additional adapters, the device driver is already installed and you do not need to reinstall the device drive.

Verifying the hardware requirements

The adapter requires the following hardware:
- A wrap plug for the RJ-45 connector, if you are running the total diagnostics package
- Cat 5e (or later) UTP cables for 1000 Mbps network attachment
- Cat 5 or Cat 3 UTP cables for 100 Mbps or 10 Mbps network attachment

Restriction: The cables can be no longer than 100 meters (including patch cables) from the adapter to the local switch.

Verifying the software requirements

You can use the adapter on operating systems shown in "Operating system or partition requirements" on page 68.

Gathering tools and documentation

To install the adapter, make sure you have access to the following items:
- The adapter
- The operating system documentation
- The system unit documentation for removing and replacing features
- The PCI adapter placement documentation
- A flat-blade screwdriver
- The AIX base operating system CD, which includes the device driver, or the AIX device driver CD

Installing the device driver software

This section explains how to install device driver software. The device driver is provided for the AIX 5L operating system on the AIX base operating system CD, which includes the device driver, or the AIX device driver CD.

To install device driver software, do the following steps:
1. Log in to the system unit as root user.
2. Insert the media containing the device driver software (for example, the CD) into the media device.

   If your system does not have a CD-ROM drive, refer to your system documentation for performing a Network Installation Management (NIM) installation.
3. Type the following System Management Interface Tool (SMIT) fast path command: `smit devinst`
4. Press Enter. The Install Additional Device Software window highlights the **INPUT device / directory for software** option.

5. Type the name of the input device that you are using, or press F4 to select the input device from a list.

6. Press Enter. The Install Additional Device Software window highlights the SOFTWARE to install option.

7. Press F4 to select List.

8. Type / to display the Find window.

9. Type the device package name `devices.pciex.14104003` .

10. Press Enter. The system finds and highlights this device driver software.

11. Press F7 to select the highlighted device driver software.

12. Press Enter. The INSTALL ADDITIONAL DEVICE SOFTWARE window displays. The entry fields are automatically updated.

13. Press Enter to accept the information. The ARE YOU SURE window displays.

14. Press Enter to accept the information. The COMMAND STATUS window displays.

   - The message RUNNING is highlighted to indicate that the installation and configuration command is in progress.

   - When RUNNING changes to OK, scroll to the bottom of the page and locate the installation summary.

   - After a successful installation, SUCCESS displays in the Result column of the installation summary at the bottom of the page.

15. Remove the installation media from the drive.

16. Press F10 to exit SMIT.

Verifying the AIX software installation

To verify that the device driver for the adapter is installed, do the following steps:

1. If necessary, log in as root user.

2. Type `lslpp -l devices.pciex.14104003.rte` and press Enter.

   If the device driver is installed, the following table is an example of the data that appears.

Fileset	Level	State	Description
Path: /usr/lib/objrepos devices.pciex.14104003.rte	5.x.0.0	COMMITTED	adapter description

3. Confirm that the devices.pciex.14104003.rte filesets are installed. If no data displays in the window, reinstall the driver.

Installing the adapter

This section explains how to install the adapter. If you are installing the operating system at this time, install the adapter before you install the operating system. If the operating system is already installed and you need to install the device driver for this adapter, install the device driver software before you install the adapter.

Attention: Before installing an adapter, review the precautions in "Safety information" on page 3 and "Handling static sensitive devices" on page 4. Do not remove the adapter from its anti-static package until you are ready to place it in the system unit.

To install the adapter, follow these steps:

1. Determine the PCIe slot in which to place the adapter.

   The adapter has an x4 PCIe connector and can be placed in a x4, x8 or x16 slot. See the PCI adapter placement for information about the PCIe slots on your system unit.

2. Install the adapter using the instructions in the system unit service guide.

Verifying the adapter installation

To verify that the system unit recognizes the adapter, type `lsdev -Cs pci` at the command line and press Enter.

A list of PCI devices displays. If the adapter is installed correctly, the status of available for each port indicates that the adapter is installed and ready to use. If a message indicates that any of the ports are defined instead of available, shut down the server and verify that the adapter was installed correctly.

Related tasks

⇨ Installing PCI adapters

Related reference

⇨ IBM Prerequisite Web page

Parts information

⇨ Parts information

PCI adapter placement

⇨ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

2-Port Gigabit Ethernet-SX PCI Express Adapter (FC 5768; CCIN 5768)

Learn about features, requirements, and specifications for the 5768 adapter.

The 2-Port Gigabit Ethernet-SX PCI Express Adapter provides two 1 Gbps (1000 Base-SX) full-duplex Ethernet LAN connections. The adapter connects to a network using a standard shortwave multimode optical cable that conforms to the IEEE 802.3z standard. The adapter supports distances of 260 m for 62.5 micron Multi Mode Fiber (MMF) and 550 m for 50.0 micron MMF. AIX Network Installation Management (NIM) boot capability is supported with this adapter.

The adapter provides the following features:

- Supports interrupt moderation to deliver increased performance while significantly reducing CPU utilization
- Supports dual port operation in almost any PCIe slot, except x1
- Supports auto-negotiation, full-duplex only
- Supports integrated media-access control (MAC) and physical layer (PHY)
- Supports Fast EtherChannel (FEC) with the existing software
- Supports gigabit EtherChannel (GEC) with the existing software
- Supports IEEE 802.3ad (Link Aggregation control protocol)
- Supports IEEE 802.1Q VLANs
- Supports IEEE 802.3 z, ab, u, x flow control support
- Supports IEEE 802.1p
- Supports IEEE 802.3ab for TX
- Supports TCP checksum offload transmission control protocol (TCP), user datagram protocol (UDP), Internet protocol (IP) for IPv4 and IPv6
- Supports TCP segmentation or large send offload
- Supports EEPROM-SPI and single EEPROM
- Supports interrupt levels INTA and MSI

- Hardware certifications FCC B, UL, CE, VCCI, BSMI, CTICK, MIC
- Network Controller (MAC) Intel 82571EB
- Compliant with European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

Adapter specifications

Item   Description
FRU number
    10N6846[*]

    [*]Designed to comply with RoHS requirement
I/O bus architecture
- PCI Express V1.0a compliant
- Bus width x4 lane PCI Express, operable in x4, x8, x16 slots
- Bus speed (x4, encoded rate) 10 Gbps unidirectional; 20 Gbps bidirectional

Busmaster
    Yes
Maximum number
    For system-specific adapter placement, see PCI adapter placement.
Adapter size
    PCIe short form
Connector information
    Two fiber optic ports, LC connector

    LED status indicators for link activity and speed
Wrap plug
    LC fiber optic, part number 12R9314
Cabling
    Optional LC-SC converter cables are available:
- LC-SC 62.5 micron converter cable , part number 12R9322, FC 2459.
- LC-SC 50 micron use converter cable, part number 12R9321, FC 2456.

Adapter LED states

The LEDs on the adapter provide information about the adapter's operation status. The LEDs are visible through the adapter's mounting bracket. Figure 17 shows the location of the LEDs. Table 18 on page 73 describes the different LED states and what those states indicate.
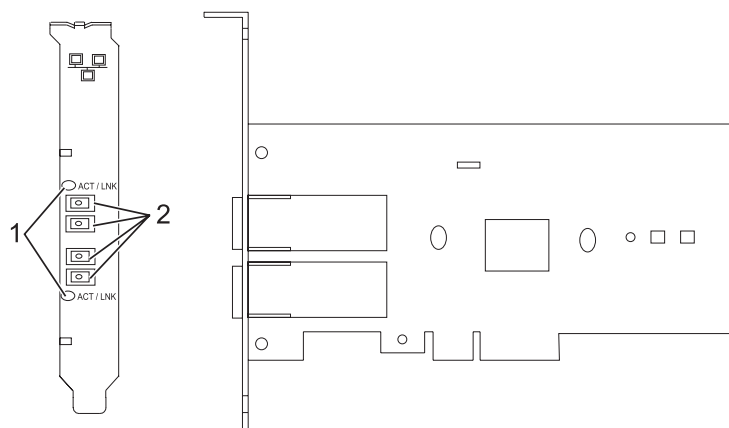

Figure 17. 2-Port Gigabit Ethernet-SX PCI Express Adapter

1   LEDs

2   Multimode Fiber LC receptacles

Table 18. Adapter LEDs and descriptions

LED	Description
Off	No link (The absence of a link could indicate a bad cable, bad connector, or a configuration mismatch.)
Green	Good link, no activity
Flashing Green	Good link, data activity

Operating system or partition requirements

The adapter is supported under the following operating systems:
- AIX 5L Version 5.3 with the 5300-06 Technology Level or later
- AIX 5L Version 5.2 with the 5200-10 Technology Level or later
- Red Hat Enterprise Linux version 4, update 5
- Red Hat Enterprise Linux version 5
- SUSE Linux Enterprise Server 9, SP4
- SUSE Linux Enterprise Server 10, SP1

If you are using another release of AIX, ensure that the adapter is supported on that release before you install the adapter. Contact service and support for assistance.

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web

site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Preparing for installation

If you are installing the operating system at this time, install the adapter before you install the operating system. See Installing the adapter for instructions.

If you are installing only the device driver for this adapter, install the device driver software before you install the adapter. See "Installing the device driver software" on page 74 for instructions.

If you already have one of these adapters installed and working with your AIX operating system and you are preparing to install additional adapters, the device driver is already installed and you do not need to reinstall the device drive.

Verify you hardware requirements

The adapter requires the following hardware:
- A wrap plug for the multimode fiber connector, if you are running the total diagnostics package
- Shortwave (850 nm) 50/62.5 micron multimode fiber network attachment

The following table indicates the allowable cable lengths from the adapter to the gigabit Ethernet switch, including patch cables.

Table 19. Adapter cable information

Cable type	Physical connector type	Maximum range
62.5 m MMF	LC	260 meters
50 m MMF	LC	550 meters

Verify your software requirements

The adapter is supported on operating systems shown in Operating system or partition requirements. Ensure that your operating system supports this adapter before you install it. Contact service and support if you need assistance.

Gather tools and documentation

To install the adapter, make sure you have access to the following items:
- The adapter
- The operating system documentation
- The system unit documentation for removing and replacing features
- The PCI adapter placement documentation
- A flat-blade screwdriver
- The AIX base operating system CD, which includes the device driver, or the AIX device driver CD

Installing the device driver software

This section explains how to install device driver software. The device driver is provided for the AIX 5L operating system on the AIX base operating system CD, or the AIX device driver CD.

To install device driver software, do the following steps:
1. Log in to the system unit as root user.
2. Insert the media containing the device driver software (for example, the CD) into the media device.

   If your system does not have a CD-ROM drive, refer to your system documentation for performing a Network Installation Management (NIM) installation.
3. Type the following System Management Interface Tool (SMIT) fast path command: `smit devinst`
4. Press Enter. The Install Additional Device Software window highlights the **INPUT device / directory for software** option.
5. Type the name of the input device that you are using, or press F4 to select the input device from a list.
6. Press Enter. The Install Additional Device Software window highlights the SOFTWARE to install option.
7. Press F4 to select List.
8. Type / to display the Find window.
9. Type the device package name `devices.pciex.14103f03`.
10. Press Enter. The system finds and highlights this device driver software.
11. Press F7 to select the highlighted device driver software.
12. Press Enter. The INSTALL ADDITIONAL DEVICE SOFTWARE window displays. The entry fields are automatically updated.
13. Press Enter to accept the information. The ARE YOU SURE window displays.
14. Press Enter to accept the information. The COMMAND STATUS window displays.
    - The message RUNNING is highlighted to indicate that the installation and configuration command is in progress.
    - When RUNNING changes to OK, scroll to the bottom of the page and locate the installation summary.
    - After a successful installation, SUCCESS displays in the Result column of the installation summary at the bottom of the page.

15. Remove the installation media from the drive.

16. Press F10 to exit SMIT.

Verify the AIX software installation

To verify that the device driver for the adapter is installed, do the following steps:

1. If necessary, log in as root user.

2. Type `lslpp -l devices.pciex.14103f03.rte` and press Enter.

   If the device driver is installed, the following is an example of the data that is displayed.

Fileset	Level	State	Description
Path: /usr/lib/objrepos devices.pciex.14103f03.rte	5.x.0.0	COMMITTED	2-Port Gigabit Ethernet-SX PCI Express Adapter software

3. Confirm that the devices.pciex.14103f03.rte filesets are installed. If no data displays, try reinstalling the driver.

Installing the adapter

This section explains how to install the adapter. If you are installing the operating system at this time, install the adapter before you install the operating system. If the operating system is already installed and you need to install the device driver for this adapter, install the device driver software before you install the adapter.

Attention: Before installing an adapter, review the precautions in "Safety information" on page 3 and "Handling static sensitive devices" on page 4. Do not remove the adapter from its anti-static package until you are ready to place it in the system unit.

To install the adapter, follow these steps:

1. Determine the PCIe slot in which to place the adapter.

   The adapter has an x4 PCIe connector and can be placed in a x4, x8 or x16 slot. See the PCI adapter placement for information about the PCIe slots on your system unit.

2. Install the adapter using the instructions in the system unit service guide.

Connecting to an Ethernet network

Refer to your local procedures for information about connecting the adapter to your Ethernet network.

Notes:
- Only one type of network can be attached to the adapter at one time.
- If your switch has an SC receptacle, you need an LC-SC converter cable.
- You must configure an IP network interface to enable the adapter to detect the link and illuminate the link LED.

To connect the adapter to a multimode fiber network, do the following steps:

1. Insert the male fiber LC connector of the fiber cable into the adapter LC connector.

2. Insert the male fiber LC connector of the other end of the cable into the network switch.

Verifying the adapter installation

To verify that the system unit recognizes the adapter, type `lsdev -Cs pci` at the command line and press Enter.

A list of PCI devices displays. If the adapter is installed correctly, the status of available for each port indicates that the adapter is installed and ready to use. If a message indicates that any of the ports are defined instead of available, shut down the server and verify that the adapter was installed correctly.

Related tasks

➱ Installing PCI adapters

Related reference

➱ IBM Prerequisite Web page

Parts information

➱ Parts information

PCI adapter placement

➱ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

10 Gigabit Ethernet-SR PCI Express Adapter (FC 5769; CCIN 5769)

Learn about the features, operating system requirements, and installation procedures for the 5769 adapter.

Overview

The 10 Gigabit Ethernet-SR PCI Express Adapter is a low-profile, high performance fiber network interface controller (NIC). The product conforms to the IEEE, 802.3ae 10GBASE-SR specification for Ethernet transmission.

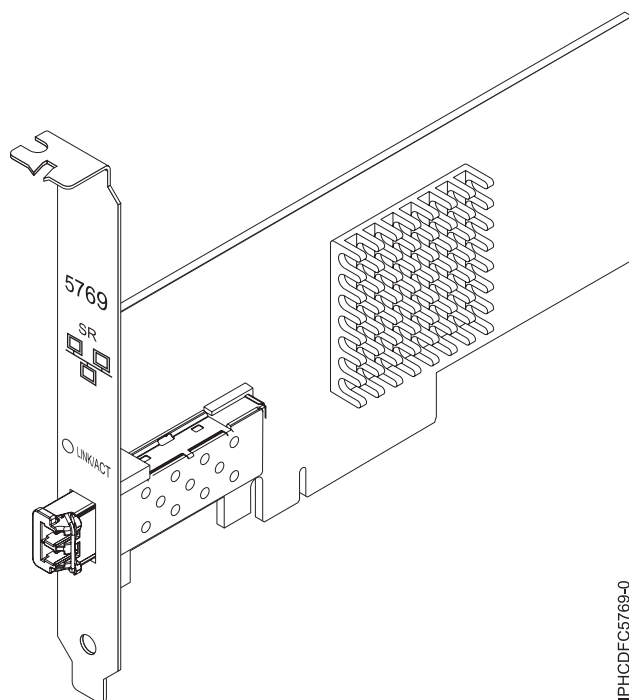The following figure shows the adapter LED and network connector.

Figure 18. 10 Gigabit Ethernet-SR PCI Express Adapter

The LED on the adapter provides information about the operation status of the adapter.

Table 20. Adapter LED

LED	Light	Description
Activity/Link	Green	Good link, no activity
	Blinking	Transmit activity
	Off	No link[*]
[*]The absence of a link could be the result of a defective cable, a defective connector, or a configuration mismatch.		

Specifications

Item   Description

FRU number
> 10N9505 (Designed to comply with RoHS requirement.)

I/O bus architecture
> PCIe-V1.1 x8

Busmaster
> Yes

Maximum number
> For system-specific adapter placement information, see the topic collections.

Adapter size
> PCIe x8, short form

Connector information
> LC multimode fiber optic

Wrap plug
> LC wrap plug-d, part number 12R9314 (Designed to comply with RoHS requirement.)

Cables
> Customers supply the cables. Optional LC-SC 62.5 micron converter cable, part number 12R9322, FC 2459, is available. For 50 micron LC-SC connections, use converter cable part number 12R9321, FC 2456.

Attributes
> The 5769 and 5732 adapters provide the following features:
> - PCIe 1.1 x8
> - MSI-X, MSI and support of traditional pin interrupts
> - 10GBASE-SR short-reach optics (850 nm) (feature 5769 only)
> - 10GBASE-CX (feature 5732 only)
> - IEEE 802.3ae (10 GbE)
> - IEEE 802.1p priority and 802.1Q VLAN tagging
> - IEEE 802.3x flow control
> - Link aggregation, 802.3ad 802.3 compliance
> - IEEE 802.3ad load-balancing and failover
> - Ethernet II and 802.3 encapsulated frames
> - Multiple MAC addresses per interface
> - Jumbo frames up to 9.6 KB
> - TCP checksum offload for IPv4 and IPv6
> - TCP segmentation offfload (TSO) for IPv4 and IPv6
> - User datagram protocol (UDP) checksum offload for IPv4 and IPv6
> - Receive side scaling and packet steering
> - Line rate packet filtering and attack protection
> - IETF RDDP and RDMAC iWARP compliance (Linux only)
> - APIs: RNIC-PI, kDAPL and Open Fabrics Enterprise Distribution (OFED) 1.4 (Linux only)
> - Full iSCSI software and hardware initiator support (Linux only)

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

The 10 Gigabit Ethernet-SR PCI Express Adapter is supported on the following versions of the AIX and Linux operating systems:

- AIX Version 6.1 with the 6100-03 Technology Level, or later
- AIX 5L Version 5.3 with the 5300-10 Technology Level, or later
- Red Hat Enterprise Linux version 5 Update 3, or later
- SUSE Linux Enterprise Server 11, or later

AIX host bus adapter (HBA) and Ethernet drivers are contained in the following filesets:

devices.ethernet.ct3

devices.ethernet.ct3.rte //HBA

devices.ethernet.ct3.cdli //ENT

AIX device attributes are contained in the following file sets:

devices.pciex.2514300014108c03 (SR adapter)

devices.pciex.2514310025140100 (BladeCenter hardware)

Preparing for installation

If you are installing your operating system at this time, install your adapter before you install the operating system. If you are installing only the device driver for this adapter, install your device driver software before you install the adapter.

If you are running the total diagnostics package you need a wrap plug for the multimode fiber connector used for the adapter. To connect to a network, you need a shortwave (850 nm) 50/62.5 micron multimode fiber network attachment.

The following tables indicates the allowable cable lengths from the adapter to the gigabit Ethernet switch, including patch cables:

Table 21. Cable information

Fiber cable type	Connector type	Minimum modal bandwidth at 850 nm (MHz x km)	Operating range in meters
62.5 μm MMF	LC	160	2 to 26
		200	2 to 33
50 μm MMF	LC	400	2 to 66
		500	2 to 82
		2000	2 to 300

Ensure that your operating system supports this adapter before you install it. See "Operating system or partition requirements."

Installing the AIX device driver software

To install device driver software, follow the steps in "Installing the AIX device driver software" on page 124.

Installing the adapter

For general instructions on how to install a PCI adapter, see the Installing PCI adapters topic. Return here to verify the adapter installation.

Verifying the adapter installation

To verify that your system recognizes the PCI adapter, do the following steps:
1. If necessary, log in as root user.
2. At the command line, type: `lsdev -Cs pci`
3. Press Enter.

A list of PCI devices is displayed. If the adapter is installed correctly, the status of available for each port indicates that the adapter is installed and ready to use. If a message indicates that any of the ports are defined instead of available, shut down your server and verify that the adapter was installed correctly.

Connecting to an Ethernet network

This section explains how to connect the adapter to the multimode fiber network. Refer to your local procedures for information about connecting the adapter to your Ethernet network.

Note: Only one type of network can be attached to the adapter at one time.

To connect the adapter to a multimode fiber network, do the following steps:
1. Insert the male fiber LC connector of the fiber cable into the adapter LC connector.
2. Insert the male fiber LC connector of the other end of the cable into the network switch.

Notes:
- The adapter requires an 850 nm multimode fiber optic cable. See Table 21 on page 78.
- If your switch has an SC receptacle, you need an LC-SC converter cable.
- It is necessary to configure an IP network interface to enable the adapter to detect a link and to illuminate the link LED.

Related tasks

"Installing the AIX device driver software" on page 124
Learn how to install the AIX device driver software for a PCI adapter.

"Verifying the AIX device driver software" on page 124
Learn how to verify the AIX device driver is installed for a PCI adapter.

Installing PCI adapters

Related reference

IBM Prerequisite Web page

Parts information

Parts information

PCI adapter placement

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

10 Gigabit Ethernet-LR PCI Express Adapter (FC 5772; CCIN 576E)

Learn about the features, operating system requirements, and installation notes for the 5772 Adapter.

Overview

The 10 Gigabit Ethernet-LR PCI Express Adapter is a low-profile, fiber network interface controller (NIC). This adapter is based on the dual port 82598EB 10 GbE controller. The product conforms to the IEEE 802.3 standard and supports standards for system manageability and power management. Additionally, it conforms to the 802.3ae 10GBASE-LR specification for Ethernet transmissions over 1310 nm single-mode fiber optic cable for distances up to 10 kilometers.

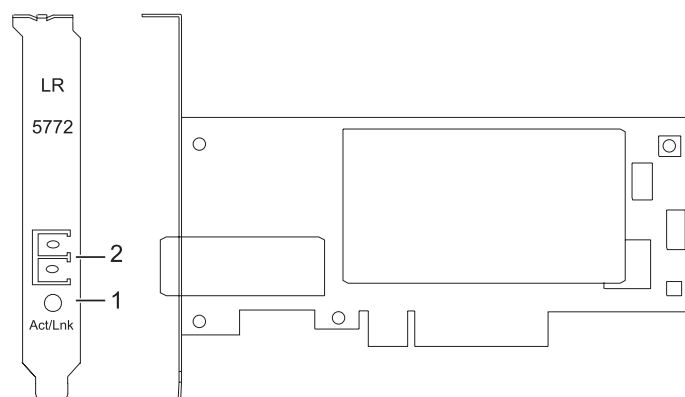The following figure shows the adapter LEDs and network connector.

Figure 19. 10 Gigabit Ethernet-LR PCI Express Adapter

1   Activity/Link LED
2   Multimode fiber LC receptacle

Specifications

Item   Description
FRU number
        10N9034 (Designed to comply with RoHS requirement.)

I/O bus architecture

PCI-Express V1.1 and v2.0 (gen 1 only)

Busmaster

Yes

Maximum number

For system-specific adapter placement information, see the topic collections.

Adapter size

PCIe short form

Connector information

LC single mode fiber optic

Wrap plug

LC fiber optic, part number 12R9313

Cables

Customers supply the cables.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web

site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

The adapter is supported on the following versions of the AIX operating system:
- AIX 5L Version 5.3 with the 5300-07 Technology Level and Service Pack 4, or later
- AIX 5L Version 5.3 with the 5300-08 Technology Level, or later
- AIX Version 6.1 with the 6100-00 Technology Level and Service Pack 5, or later
- AIX Version 6.1 with the 6100-01 Technology Level, or later

Preparing for installation

This section helps you prepare to install your adapter. Preparing to install the adapter involves the following tasks:
- Verifying your hardware requirements
- Verifying your software requirements
- Gathering tools and documentation

If you are installing your operating system at this time, install your adapter before you install the operating system. See "Installing the adapter" on page 83 for instructions.

If you are installing only the device driver for this adapter, install your device driver software before you install the adapter. See "Installing the device driver software" on page 82 for instructions.

Verifying your hardware requirements

The adapter requires the following hardware:
- If you are running the total diagnostics package you will need a wrap plug for the single mode fiber connector used on the LR adapter.
- To connect to a network you will need a 1310 nm single mode fiber network attachment for the LR adapter.

The following tables indicates the allowable cable lengths from the adapter to the gigabit Ethernet switch, including patch cables:

Table 22. 10 Gigabit Ethernet-LR PCI Express Adapter cable information

Fiber cable type	Connector type	Operating range in meters
9 µm SMF	LC	10 Km

Verifying your software requirements

Ensure that your operating system supports this adapter before you install it. See "Operating system or partition requirements" on page 81.

Gathering tools and documentation

To install the adapter, make sure you have access to the following items:
- The adapter
- The operating system documentation
- The system unit documentation
- The PCI adapter placement information for the system unit
- Wrap plugs
- A flat-blade screwdriver
- The operating system CD, which includes the device driver, or the device driver CD-ROM

Installing the device driver software

This section explains how to install device driver software for the adapter. The device driver is provided for the AIX operating system.

Be sure you have read "Preparing for installation" on page 81 to determine which of the following tasks to do:
- If you should install your device driver software first, go to step 1 of this section.
- If you should install your adapter hardware first, go to "Installing the adapter" on page 83. When you install AIX, your adapter device driver is automatically installed.

To install device driver software, do the following steps:
1. Log in to the system unit as root user.
2. Insert the media that contains the device driver software (for example, a CD-ROM) into the appropriate media device.
3. Type the following System Management Interface Tool (SMIT) fast path: `smitty devinst`
4. Press Enter. The Install Additional Device Software screen highlights the INPUT device/directory for software option.
5. Select or type your input device:
   - Press F4 to display the input device list.
   - Select the name of the device (for example, CD-ROM) that you are using and press Enter.

   or
   - In the entry field, type the name of the input device you are using and press Enter.
   - The Install Additional Device Software window highlights the SOFTWARE to install option.
6. Press F4 to display the SOFTWARE to install window.
7. Type the following to display the Find window: /
8. Type the device package name: `devices.pciex.8680c71014108003.rte`.
9. Press Enter. The system finds and highlights this device driver software.

10. Press F7 to select the highlighted device driver software.
11. Press Enter. The INSTALL ADDITIONAL DEVICE SOFTWARE window is shown. The entry fields are automatically updated.
12. Press Enter to accept the information. The ARE YOU SURE window is shown.
13. Press Enter to accept the information. The COMMAND STATUS window is shown.
    - The term RUNNING is highlighted to indicate that the installation and configuration command is in progress.
    - When RUNNING changes to OK, scroll to the bottom of the page and locate the Installation Summary.
    - After a successful installation, SUCCESS is displayed in the Result column of the Installation Summary at the bottom of the page.
14. Remove the installation media from the drive.
15. Press F10 to exit SMIT.
16. Go to the adapter installation procedure, "Installing the adapter."

Verify AIX software installation

To verify that the device driver for the adapter is installed, do the following steps:
1. If necessary, log in as root user.
2. At the command line, type `lslpp -l devices.pciex.8680c71014108003.rte`.
3. Press Enter.

If the adapter device driver is installed, the following is an example of the data that is displayed on the window:

Fileset	Level	State	Description
Path: /usr/lib/objrepos devices.pciex.8680c71014108003.rte	5.3.8.0	COMMITTED	10 Gigabit Ethernet-LR PCI Express Adapter Software

Verify that the file sets are installed at the AIX version level you are running. Level 5.3.8.0 is an example. If the correct information is displayed, continue to the next section, Installing the adapter. If no data is displayed on your screen, the adapter device driver did not install correctly. Try reinstalling the driver.

Installing the adapter

For instructions on how to install PCI adapters, refer to the PCI adapters topic.

Verifying the adapter installation

To verify that your system unit recognizes the PCI adapter, do the following steps:
1. If necessary, log in as root user.
2. At the command line, type: `lsdev -Cs pci`
3. Press Enter.

A list of PCI devices are displayed. If the adapter is installed correctly, an Available status for each port indicates that the adapter is installed and ready to use. If the message on your screen indicates that any of the ports are DEFINED instead of AVAILABLE, shut down your server and verify that the adapter was installed correctly.

Connecting to an Ethernet network

This section explains how to connect the adapter to the multimode fiber network. Refer to your local procedures for information about connecting the adapter to your Ethernet network.

Note: Only one type of network can be attached to the adapter at one time.

To connect the adapter to a multimode fiber network, do the following steps:

1. Insert the male fiber LC connector of the fiber cable into the adapter LC connector.
2. Insert the male fiber LC connector of the other end of the cable into the network switch.

Notes:

- The adapter requires a 1310 nm single-mode fiber optic cable. See Table 22 on page 82.
- If your switch has an SC receptacle, you need an LC-SC converter cable.
- It is necessary to configure an IP network interface to enable the adapter to detect a link and to illuminate the link LED.

Adapter LEDs

The LEDs on the adapter provide information about the operation status of the adapter. The LEDs are visible through the mounting bracket and, when lit, indicate the following conditions:

Table 23. Adapter LEDs

LED	Light	Description
Activity/Link	Green	Good link, no activity
	Blinking	Transmit activity
	Off	No link[*]

[*]The absence of a link could be the result of a defective cable, a defective connector, or a configuration mismatch.

Related tasks

➡ Installing PCI adapters

Related reference

➡ IBM Prerequisite Web page

Parts information

➡ Parts information

PCI adapter placement

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

4 Gigabit PCI Express Single Port Fibre Channel Adapter (FC 5773; CCIN 5773)

Learn about the specifications and operating system requirements for the 5773 adapter.

Overview

The 4 Gigabit PCI Express Single Port Fibre Channel Adapter is a 64-bit, short form factor x4, PCIe adapter with an LC-type external fiber connector that provides single initiator capability over an optical fiber link or loop. The adapter automatically negotiates the highest data rate between the adapter and an

attaching device at 1 Gbps, 2 Gbps, or 4 Gbps of which the device or switch is capable. Distances between the adapter and an attaching device or switch can reach up to 500 meters running at 1 Gbps data rate, up to 300 meters running at 2 Gbps data rate, and up to 150 meters running at 4 Gbps data rate. When used with IBM Fibre Channel storage switches supporting long-wave optics, the adapter can reach distances of up to 10 kilometers running at either 1 Gbps, 2 Gbps, or 4 Gbps data rates.

The adapter can be used to attach devices either directly, or by means of Fibre Channel switches. If you are attaching a device or switch with a SC type fiber connector, you must use an LC-SC 50 micron fiber converter cable (#2456) or a LC-SC 62.5 micron fiber converter cable (#2459).

The adapter has the following features:
- Compliant with the PCIe Base and CEM 1.0a specifications:
  - x1 and x4 lane link interface at 2.5 Gbit/s (auto-negotiated with system)
  - Supports VC0 (1 Virtual Channel) and TC0 (1 Traffic Class)
  - Configuration and IO Memory read/write, completion, message
  - Support for 64 bit addressing
  - ECC error protection
  - Link CRC on all PCIe packets and message information
  - Large payload size: 2048 bytes for read and write
  - Large read request size: 4096 bytes
- Compatible with 1, 2, and 4 Gb Fibre Channel interface:
  - Auto-negotiate between 1 Gb, 2 Gb or 4 Gb link attachments
  - Support for all Fibre Channel topologies: point-to-point, arbitrated loop, and fabric
  - Support for Fibre Channel class 2 and 3
  - Maximum Fibre Channel throughput achieved using full duplex hardware support
- End-to-end data path parity and CRC protection, including internal data path RAMs
- Architectural support for multiple upper layer protocols
- Internal high-speed SRAM memory
- ECC protection of local memory, includes single-bit correction and double-bit protection
- Embedded short-wave optical (LC) connection with diagnostics capability
- Onboard Context Management by firmware (per port):
  - Up to 510 FC Port Logins
  - Up to 2047 concurrent Exchanges
  - I/O multiplexing down to the FC Frame level
- Data buffers capable of supporting 64+ buffer-to-buffer (BB) credits per port for short-wave applications
- Link management and recovery handled by firmware
- Onboard diagnostic capability accessible by optional connection
- Parts and construction compliant with the European Union Directive of Restriction of Hazardous Substances (RoHS)
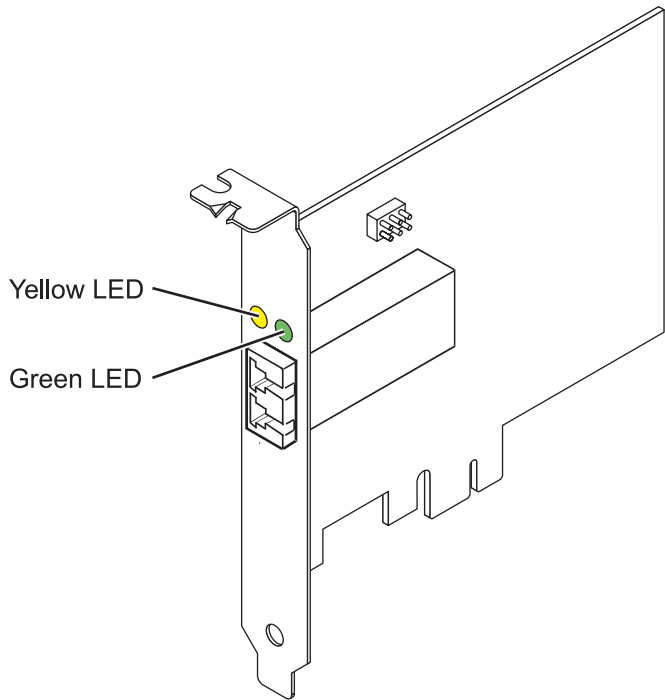- Performance up to 4.25 Gbps full duplex

Figure 20. 5773 adapter

Adapter specifications

Item   Description
FRU number
　　10N7249*

　　*Designed to comply with RoHS requirement.
Wrap plug FRU number
　　11P3847
I/O bus architecture
　　PCI Express (PCIe) Base and CEM 1.0a
　　x4 PCIe bus interface
Slot requirement
　　One available PCIe x4, x8, or x16 slot
Voltage
　　3.3V
Form factor
　　Short, low-profile
FC compatibility
　　1, 2, 4 gigabit
Cables

　　50/125 micron fiber (500 MHz*km bandwidth cable)
　　• 1.0625 Gbps 0.5 – 500 m
　　• 2.125 Gbps 0.5 – 300 m
　　• 4.25 Gbps 0.5 – 150 m

　　62.5/125 micron fiber (200 MHz*km bandwidth cable)
　　• 1.0625 Gbps 0.5 – 300 m
　　• 2.125 Gbps 0.5 – 150 m
　　• 4.25 Gbps 0.5 – 70 m
Maximum number
　　For system-specific adapter placement information, see PCI adapter placement.

Operating system or partition requirements

The adapter is supported under the following operating systems:

- AIX 5L Version 5.3 with the 5300-06 Technology Level, or later
- Red Hat Enterprise Linux version 4 U5
- IBM i 6.1, or later
- Red Hat Enterprise Linux version 5
- SUSE Linux Enterprise Server 9 SP4
- SUSE Linux Enterprise Server 10, SP1

Note: If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the http://www-912.ibm.com/e_dir/eServerPrereq.nsf.

Adapter LED states

Green and yellow LEDs can be seen through openings in the adapter's mounting bracket. Green indicates firmware operation and yellow signifies port activity. Table 24 summarizes normal LED states. There is a 1 Hz pause when the LED is off between each group of fast blinks (1, 2 or 3). Observe the LED sequence for several seconds to ensure that you correctly identify the state.

Table 24. Normal LED states

Green LED	Yellow LED	State
On	1 fast blink	1 Gbps link rate - normal, link active
On	2 fast blinks	2 Gbps link rate - normal, link active
On	3 fast blinks	4 Gbps link rate - normal, link active

Power-On Self Test (POST) conditions and results are summarized in Table 25. These states can be used to identify abnormal states or problems.

Table 25. POST conditions and results

Green LED	Yellow LED	State
Off	Off	Wake-up failure (dead board)
Off	On	POST failure (dead board)
Off	Slow blink	Wake-up failure monitor
Off	Fast blink	Failure in post
Off	Flashing	Post processing in progress
On	Off	Failure while functioning
On	On	Failure while functioning
Slow blink	Off	Normal, link down
Slow blink	On	Not defined
Slow blink	Slow blink	Offline for download
Slow blink	Fast blink	Restricted offline mode, waiting for restart
Slow blink	Flashing	Restricted offline mode, test active
Fast blink	Off	Debug monitor in restricted mode
Fast blink	On	Not defined

Table 25. POST conditions and results (continued)

Green LED	Yellow LED	State
Fast blink	Slow blink	Debug monitor in test fixture mode
Fast blink	Fast blink	Debug monitor in remote debug mode
Fast blink	Flashing	Not defined

Device ID jumper

The default setting for the device ID jumper labeled P0_JX is to set the jumper on pins 1 and 2 as shown in Figure 21. Do not change the jumper settings for a standard installation.
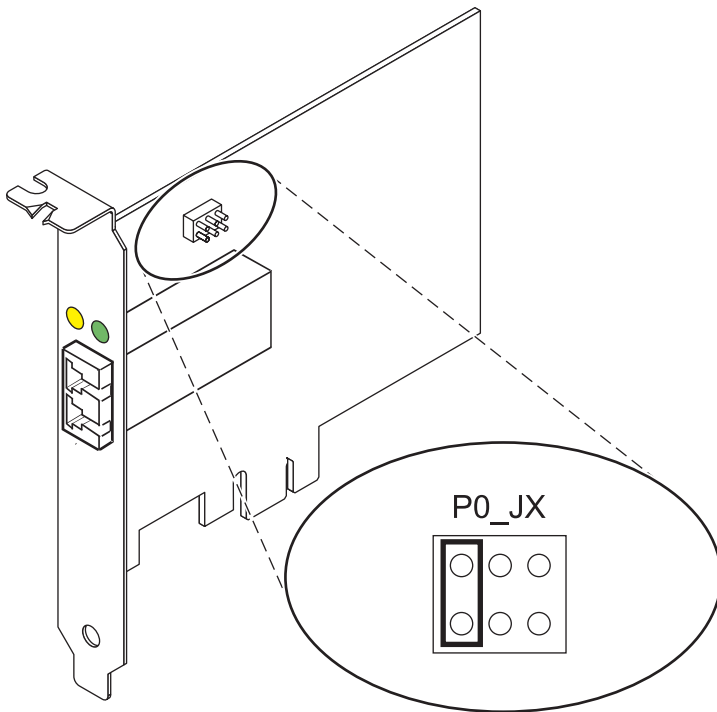

Figure 21. Device ID jumper

Replacing hot swap HBAs

Fibre Channel host bus adapters (HBAs) connected to a FAStT or DS4000® storage subsystem have a child device called a disk array router (dar). You must unconfigure the disk array router before you can hot swap an HBA that is connected to a FAStT or DS4000 storage subsystem. For instructions, refer to *Replacing hot swap HBAs* in the *IBM System Storage™ DS4000 Storage Manager Version 9, Installation and Support Guide for AIX, HP-UX, Solaris, and Linux on POWER*, order number GC26-7848.

Related tasks

➥ Installing PCI adapters

Related reference

➥ IBM Prerequisite Web page

Parts information

➥ Parts information

PCI adapter placement

➥ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1

Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCI-X Double-Wide, Quad-Channel Ultra320 SCSI RAID Controller (FC 5778, 5782; CCIN 571F, 575B)

Learn about the features, specifications and installation notes for the PCI-X Double-Wide, Quad-Channel Ultra320 SCSI RAID Controller for IBM System i models.

The PCI-X Double-Wide, Quad-Channel Ultra320 SCSI RAID Controller is a high-performance SCSI adapter combined with an auxiliary-write cache adapter to form a double-wide, adapter pair. The two adapters are screwed together. This topic contains the following sections:

- "Features"
- "Specifications" on page 90
- "Placement information" on page 90
- "Logical partitioning" on page 91
- "Installing the adapter in a cassette" on page 91
- "Power LED" on page 91
- "Concurrent maintenance procedure" on page 91

Features

- 3 external U320 SCSI ports
- 1 internal U320 SCSI port dedicated to connecting the controller to the auxiliary-write cache adapter
- Up to 36 Direct Access Storage Devices (DASD) can be externally attached per adapter
- 320 MB/s data rate per SCSI bus
- Supports low voltage differential (LVD) disk devices only
- Supports RAID 5 and 6 (3–18 drive sets)
- 390 MB/1.5 GB compressed write cache
- 415 MB/1.6 GB compressed read cache
- PCI-X DDR support (storage adapter side)
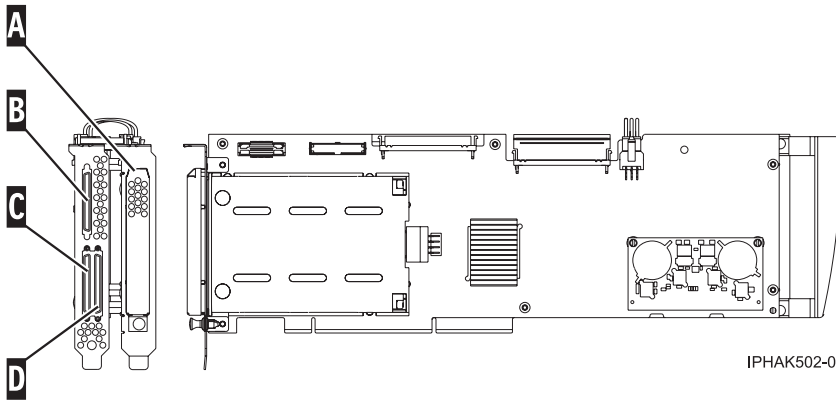- IOP or IOPless (5739 requires an IOP. 5778 does not.)

Figure 22. Adapter

A   Battery cover

B   SCSI port 2

C   SCSI port 0

D   SCSI port 1

Specifications

Item	Description
Adapter FRU number	42R6578
Cache battery FRU number	42R3965
Series type	IBM System i models
Unit description	• 64 bit, 133 MHz, 3.3 V • Peripheral Component Interconnect-X (PCI-X) 2.0 compliant • Double-wide adapter, requires 2, adjacent, long slots. The SCSI controller side of the adapter pair requires a 64-bit slot. (The controller side is the side with the external SCSI connectors.) • The auxiliary-write cache adapter contains a dual, concurrently maintainable, cache-battery pack, which maintains cache memory on both adapters in the event of an abnormal termination.
Operating system or partition requirements	• IBM i V5R3 and V5R3M5 • IBM i V5R4 with PTFs • AIX 5L Version 5.2 with the 5200-10 Technology Level, or later • AIX 5L Version 5.3 with the 5300-06 Technology Level, or later • Red Hat Enterprise Linux version 4 U4, or later • SUSE Linux Enterprise Server 10, or later Check the IBM Prerequisite Web site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf ![icon] for further details and updates.
Maximum number	For system-specific adapter placement information, see PCI adapter placement.

Placement information

For placement information for this adapters, see PCI adapter placement, including the section High-end SCSI controller placement.

Logical partitioning

When used in a logical partition (LPAR) environment, this double-wide adapter must have both slots of the adapter assigned to the same logical partition. When implementing dynamic LPAR (DLPAR), both slots of the adapter must be managed together.

Installing the adapter in a cassette

To install this adapter in a cassette, first remove the adapter handle (**B**), and the two plastic covers from the SCSI jumper cable (**A**), as shown in the following figure.
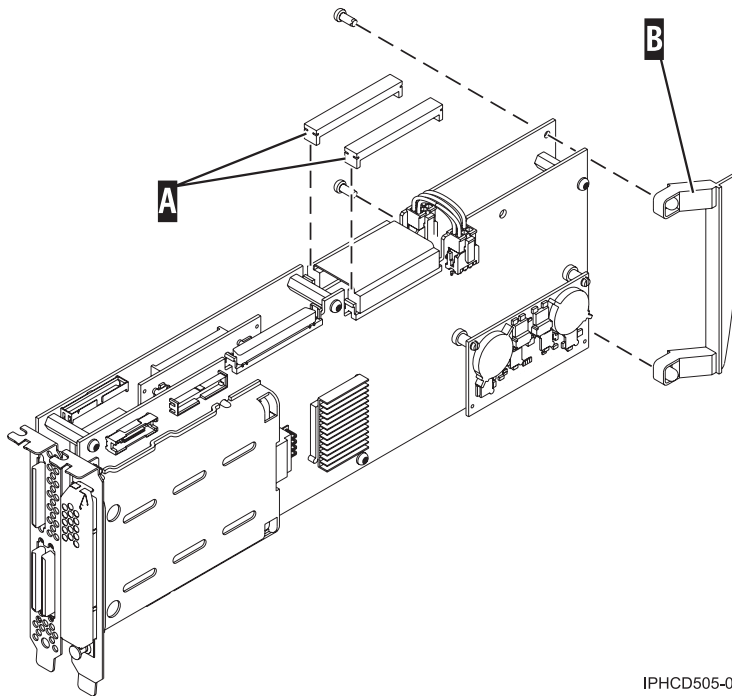
IPHCD505-0

Figure 23. Preparing the adapter for placement in a cassette

Power LED

For a double-wide adapter, there is only one power LED visible for both slots.

Concurrent maintenance procedure

Concurrent maintenance of this adapter is not supported through the Hardware Management Console (HMC). Concurrent maintenance must be done from the Hardware Service Manager (HSM) of the system or owning partition. The HSM will automatically power off both PCI slots when either slot is selected.

Important:
- Both PCI slots must be powered off when installing or removing this adapter with the system power on.
- If this adapter is the load source IOA, or under the load source IOP, or any other storage IOA/IOP with critical DASD attached for the system, this concurrent maintenance procedure should be done by a qualified service provider. At step 12 on page 92, the HSM will direct you to use control panel functions 68 and 69 to power off the domain.

Follow this procedure:

1. Start an IBM i operating system session for the system or logical partition that contains the adapter, and sign on to the system or logical partition.
2. Type **strsst** on the command line of the Main Menu and then press Enter.
3. Type your service tools user ID and service tools password on the System Service Tools (SST) Sign On display and press Enter.
4. Select **Start a service tool** from the System Service Tools (SST) display and press Enter.
5. Select **Hardware service manager** from the Start a Service Tools display and press Enter.
6. Select **Logical hardware resources (system, frames, cards)** from the Hardware Service Manager display and press Enter.
7. Select **System bus resources** and press Enter. The display changes to the Logical Hardware Resources on System Bus display.
8. Page down and locate **Combined Function IOP** that controls the IOA to be serviced.
9. Enter 9 in the Opt field for the **Combined Function IOP** to be serviced.
10. Locate the **Storage IOA** resource for the adapter to be serviced and enter 8 in the Opt field for that resource.
11. Enter 3 for **Concurrent maintenance** in the Opt field for the **Storage IOA** resource to be serviced. The display changes to the Hardware Resource Concurrent Maintenance display.
12. Press F9 to power off the domain.
13. Press Enter to confirm start power off. The display changes to the Hardware Resource Concurrent Maintenance Status display, which shows the status of the power off.

    When the power off is complete, the display returns to the Hardware Resource Concurrent Maintenance display. The display will show that the **Power Status** is off for **Storage IOA**. Leave this display up on the HSM while you remove and replace the adapter.
14. Check the slot power LED state for the slot in which the adapter resides to verify that the adapter is powered off.

    For a double-wide adapter, there is only one power LED visible for both slots.
15. Remove and replace the adapter. Removal and replacement procedures are covered in the customer-installable features publication.
16. After the replacement is complete, return to the Hardware Resource Concurrent Maintenance display on the HSM.
17. If you were previously instructed to use operator panel function 69 to power on the adapter, do so now. Then go to step 22, otherwise continue with next step.
18. Enter F10 to power the adapter on.
19. Press Enter to begin power on.
20. If the Work with Controlling Resource display appears, enter 7 in the Opt field for the **Combined function IOP** to assign the IOA to.

    The Hardware Resource Concurrent Maintenance Status display shows the status of the power on.
21. When the power on is complete, the display returns to the Hardware Resource Concurrent Maintenance display. The display will show that the **Power Status** is on for the **Storage IOA**.
22. Check the LED status to verify that the adapter is powered on.

    For a double-wide adapter, there is only one power LED visible for both slots.
23. Return to the procedure that sent you here.

Related tasks

➡ Installing PCI adapters

Related reference

"Important partitioning considerations with dual-slot and multi-adapter configurations" on page 4
Learn about partitioning considerations with dual-slot and multi-adapter configurations.

➡ IBM Prerequisite Web page

Parts information

➡ Parts information

PCI adapter placement

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

4 Port Async EIA-232 PCIe Adapter (FC 5785)

Learn about the features, operating system requirements, and installation procedures for the 5785 adapter.

Overview

The 4 Port Async EIA-232 PCIe Adapter provides connections for four asynchronous EIA-232 devices using a 4-port DB-9F DTE fan-out cable. Ports are programmable to support EIA-232 protocols at a line speed of 128 Kbps.

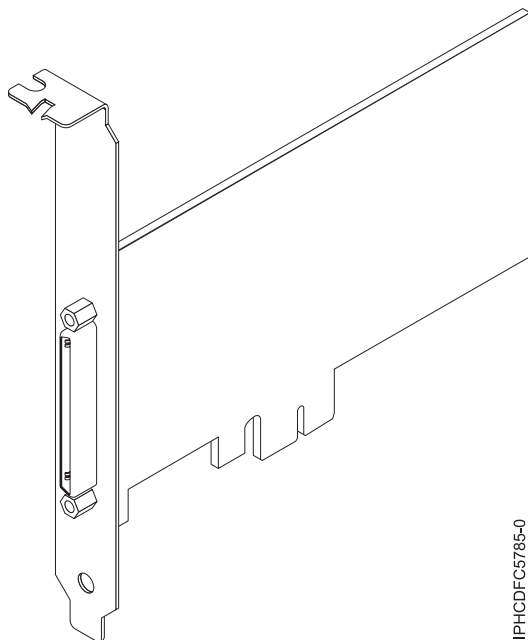The following figures show the adapter and cable.

IPHCDFC5785-0

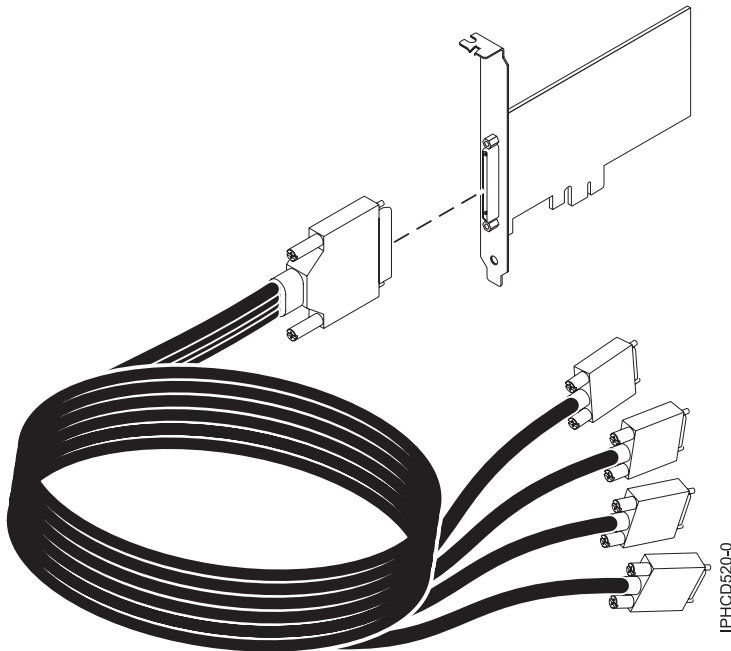Figure 24. Adapter

Figure 25. Cable

Specifications

Item   Description
FRU number
Adapter: 46K6734[*]

Cable: 46K6735[*]

[*]Designed to comply with RoHS requirement.
I/O bus architecture
PCIe-V1.0a 1x
Busmaster
No
Maximum number
For system-specific adapter placement information, see PCI adapter placement.
Adapter size
PCIe 1x, short form factor
Connectors
Adapter: 68-pin SCSI

Cable: 68-pin SCSI to DB 9-pin shell
Wrap plug
42R5143

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web

site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

The adapter is supported on the following versions of the AIX operating system:
- AIX 5L Version 5.3 with the 5300-07 Technology Level, or later
- AIX 6.1, or later

The AIX device package name is `devices.pci.1410a803.rte`.

Preparing for installation

If you are installing your operating system at this time, install your adapter before you install the operating system. If you are installing only the device driver for this adapter, install your device driver software before you install the adapter.

Installing the AIX device driver software

To install device driver software, follow the steps in "Installing the AIX device driver software" on page 124.

Installing the adapter

For general instructions on how to install a PCI adapter, see the Installing PCI adapters topic. Return here to verify the adapter installation.

Verifying the adapter installation

To verify that your system unit recognizes the PCI adapter, do the following steps:
1. If necessary, log in as root user.
2. At the command line, type: `lsdev -Cs pci`
3. Press Enter.

A list of PCI devices is displayed. If the adapter is installed correctly, the status of available for each port indicates that the adapter is installed and ready to use. If a message indicates that any of the ports are defined instead of available, shut down your server and verify that the adapter was installed correctly.

Related tasks

"Installing the AIX device driver software" on page 124
Learn how to install the AIX device driver software for a PCI adapter.

"Verifying the AIX device driver software" on page 124
Learn how to verify the AIX device driver is installed for a PCI adapter.

Installing PCI adapters

Related reference

IBM Prerequisite Web page
Parts information

Parts information
PCI adapter placement

PCI adapter placement
"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe Dual - x4 SAS Adapter (FC 5901; CCIN 57B3)

Learn about the specifications and operating system requirements for the 5901 adapter.

Overview

The PCI Express (PCIe) Dual - 4x SAS Adapter is a low-profile short form factor adapter for high-performance and high-density, Serial Attached SCSI (SAS) applications. It supports the attachment of

SAS disk, tape, and DVD using a pair of mini SAS 4x connectors which allow the eight physical links to be used in various narrow and wide-port configurations. The adapter does not have write cache.

The adapter is a 64-bit, 3.3 V, bootable SAS adapter that provides RAID 0, 5, 6, and 10 capability. Some RAID level support is operating system dependent. The adapter provides RAID 0, RAID 5, RAID 6 and RAID 10 for AIX and Linux. Under the IBM i operating system, mirroring and data spreading is provided by the operating system and RAID 5 and RAID 6 is provided by the adapter. The adapter does not have write cache. (The write performance of RAID level 5 and RAID level 6 may be poor on adapters which do not provide write cache. Consider using an adapter which provides write cache when using RAID level 5 or RAID level 6.)

The adapter can address up to 48 SAS disk drives, although the actual number of drives in a system is subject to the physical placement limitations of the system. Externally attached devices are designed to run at a data rate of 1.5 Gbps for serial ATA (SATA) devices, and 3 Gbps for SAS devices. This card supports RAID and non-RAID DASD, tape, and optical devices. This adapter supports the multi-initiator and high availability configurations in AIX and Linux. IBM i does not support feature 5901 in multi-initiator and high availability configurations.

Important: See the SAS RAID controller for AIX or SAS RAID controller for Linux topics for more information and important considerations for multi-initiator and high availability configurations. See also PCI-X DDR 1.5 GB cache SAS RAID Adapter (FC 5904 and 5908; CCIN 572F and 575C).

The 5901 supports SAS SFF disk drives located in a PCIe 12X I/O Drawer or SAS disk drives located in an EXP 12S Disk Drawer or SAS disk drives located in a supported Power system unit (split disk backplane).
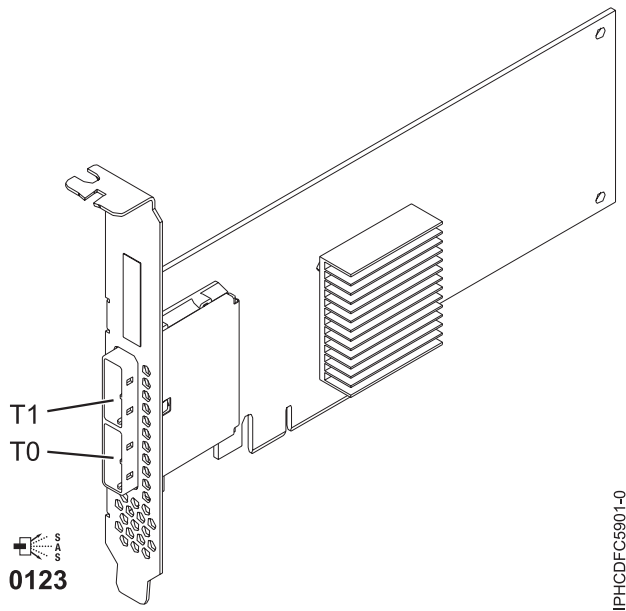

Figure 26. PCIe Dual - x4 SAS Adapter

Specifications

Item   Description
Adapter FRU number
    44V4852 (Designed to comply with RoHS requirement)
I/O bus architecture
    PCIe

Slot requirement
> One available PCIe x8 slot

Cables
> SAS device attachment requires specific cables that are provided with the subsystem or device features being attached. Special cabling is required for multi-initiator and high availability configurations. See Serial attached SCSI cable planning.

Voltage
> 3.3V

Form factor
> Short, low-profile

Maximum number
> Refer to PCI adapter placement.

Attributes
> - Two external mini SAS 4x connectors provide attachment of SAS and Serial Advanced Technology Attachment (SATA) device enclosures
> - SAS Serial SCSI Protocol (SSP), Serial ATA Tunneling Protocol (STP), and Serial Management Protocol (SMP)
> - RAID 0, 5, 6, 10
>
>   The write performance of RAID 5 and RAID 6 may be poor on adapters that do not provide write cache. Consider using an adapter that provides write cache when using RAID 5 or RAID 6.
> - Concurrent firmware update
> - Removable media device supported (Removable media is not supported in multi-initiator and high availability configurations)
> - Removable media device supported
> - 440 - 500 Mhz PowerPC® (PPC)
> - Support for multi-initiator and high availability configurations

Operating system or partition requirements

This adapter is supported for the following operating systems:
- AIX:
  - AIX 5.3 with the 5300-07 Technology Level and Service Pack 9, or later
  - AIX 5.3 with the 5300-08 Technology Level and Service Pack 7, or later
  - AIX 5.3 with the 5300-09 Technology Level and Service Pack 4, or later
  - AIX 5.3 with the 5300-10 Technology Level, or later
  - AIX 6.1 with the 6100-00 Technology Level and Service Pack 9, or later
  - AIX 6.1 with the 6100-01 Technology Level and Service Pack 5, or later
  - AIX 6.1 with the 6100-02 Technology Level and Service Pack 4, or later
  - AIX 6.1 with the 6100-03 Technology Level, or later
- Linux:
  - Red Hat Enterprise LinuxAS version 4, with update 7, or later
  - Red Hat Enterprise Linux AS version 5, with update 2, or later
  - SUSE Linux Enterprise Server 10, with service pack 2, or later
  - SUSE Linux Enterprise Server 11, or later
- IBM i:
  - IBM i 6.1 with service pack 1, or later

This adapter requires the following drivers:
- AIX: devices.pci.1410bd02 device driver package
- Linux:

- iprutils version 2.4.1 and ipr driver version 2.0.11.6 (or newer) for RHEL4 kernels
- iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or newer) for RHEL5 kernels
- iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or newer) for SLES10 kernels

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web

site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Related tasks

"Installing the AIX device driver software" on page 124
Learn how to install the AIX device driver software for a PCI adapter.

"Verifying the AIX device driver software" on page 124
Learn how to verify the AIX device driver is installed for a PCI adapter.

Installing PCI adapters

Related reference

IBM Prerequisite Web page

Parts information

Parts information

PCI adapter placement

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Serial-attached SCSI cable planning

SAS RAID controllers for AIX

SAS RAID controllers for Linux

PCI-X DDR Dual –x4 Port SAS RAID Adapter (FC 5902; CCIN 572B)

Learn about the specifications and operating system requirements for the 5902 adapter.

Overview

The PCI-X DDR Dual –x4 Port SAS RAID Adapter is a long-form factor adapter for high-performance, serial-attached SCSI (SAS) applications. FC 5902 is always to be used in a high availability, multi-initiator RAID configuration using two adapters in dual-controller mode. Two 5902 adapters provide for mirrored-write cache data and mirrored-RAID parity footprints between the two adapters. If the 5902 pairing is broken, then write cache is disabled. With correct cabling, multiple wide ports are used to provide redundant paths to each dual port SAS disk. The adapter manages SAS path redundancy and path switching should a SAS failure occur. The adapter is a 64-bit, 3.3 V, bootable SAS adapter that supports RAID levels 0, 5, 6, and 10. The adapter pairs are used primarily with EXP 12S SAS disk expansion drawers, FC 5886, but can also be connected to the internal disk drives in the system unit using the appropriate split disk backplane feature and cabling.

Important: See the SAS RAID controller for AIX or SAS RAID controller for Linux topics for more information and important considerations for multi-initiator and high availability configurations. See also PCI-X DDR 1.5 GB cache SAS RAID Adapter (FC 5904 and 5908; CCIN 572F and 575C).
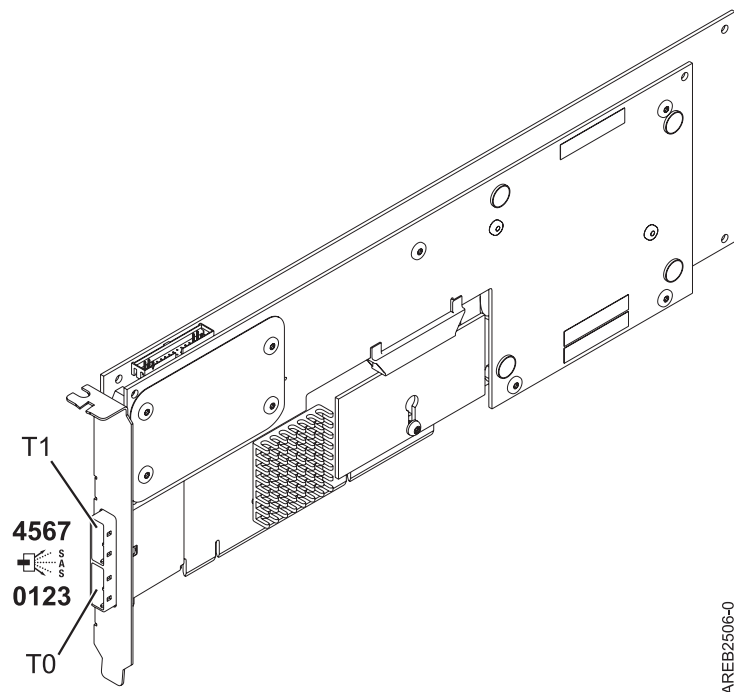
Figure 27. PCI-X DDR Dual –x4 Port SAS RAID Adapter

Specifications

Item   Description
Adapter FRU number
> 44V5194 (Designed to comply with RoHS requirement.)

Battery FRU number
> 39J5555 (Designed to comply with RoHS requirement.)

I/O bus architecture
> PCI-X DDR

Slot requirement
> One long, 64-bit, 3.3 V, Peripheral Component Interconnect-X (PCI-X) slot for each adapter.
>
> Adapters are installed in pairs.
>
> Adapter pairs do not need to be in the same enclosure. For higher availability, place adapters in separate enclosures. See the PCI adapter placement for supported placement rules.

Cables
> SAS device attachment requires specific cables that are provided with the subsystem or device features being attached. Special cabling is required for multi-initiator and high availability configurations. See Serial attached SCSI cable planning.

Voltage
> 3.3V

Form factor
> Long

Maximum number
> Refer to the PCI adapter placement.

Attributes provided
> • Eight physical links by way of two external x4 SAS ports provides attachment of SAS disk enclosures only
> • Supports up to 48 SAS disks when configured with four FC 5886 EXP 12S disk expansion drawers

- Removable media devices are not supported
- SAS Serial SCSI Protocol (SSP), and Serial Management Protocol (SMP)
- 175 MB of nonvolitile fast write cache
- RAID 0, 5, 6, 10
- Concurrent firmware update
- 440 - 500 Mhz PowerPC (PPC)

Operating system or partition requirements

This adapter is supported for the following operating systems:
- AIX Version 6.1 with the 6100-01 Technology Level, or later
- AIX 5L Version 5.3 with the 5300-08 Technology Level, or later
- Red Hat Enterprise Linux version 4, with update 7, or later
- Red Hat Enterprise Linux version 5, with update 2, or later
- SUSE Linux Enterprise Server 10, with service pack 2, or later

This adapter requires the following drivers:
- AIX: devices.pci.1410bd02 device driver package
- Linux:
  - iprutils version 2.2.8 and ipr driver version 2.0.11.6 (or newer) for RHEL4 kernels
  - iprutils version 2.2.8 and ipr driver version 2.2.0.2 (or newer) for RHEL5 kernels
  - iprutils version 2.2.8 and ipr driver version 2.2.0.2 (or newer) for SLES10 kernels

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Related tasks

Installing PCI adapters

Related reference

IBM Prerequisite Web page

Parts information

Parts information

PCI adapter placement

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Serial-attached SCSI cable planning

SAS RAID controllers for AIX

SAS RAID controllers for Linux

PCIe Dual - x4 3Gb SAS RAID Adapter (FC 5903; CCIN 574E)

Learn about the specifications and operating system requirements for the 5903 adapter.

Overview

The PCI Express (PCIe) Dual - x4 3Gb SAS RAID Adapter supports the attachment of Serial attached SCSI (SAS) disk and SAS solid-state drives using a pair of mini SAS 4x connectors. The 5903 has a 380

MB write cache and a concurrently replaceable cache battery pack. The adapter must always be installed in pairs and is always to be used in a high availability, multi-initiator RAID configuration using two adapters in dual-controller mode. Two 5903 adapters provide mirrored write-cache data and mirrored RAID parity footprints between the adapters. If the 5903 pairing is broken, then write cache is disabled.

Important: See the SAS RAID controller for AIX or SAS RAID controller for Linux topics for more information and important considerations for multi-initiator and high availability configurations. See also PCI-X DDR 1.5 GB cache SAS RAID Adapter (FC 5904 and 5908; CCIN 572F and 575C).

The 5903 supports SAS small form factor (SFF) disk drives located in a PCIe 12X I/O Drawer or SAS disk drives located in an EXP 12S Disk Drawer. It can also be connected to the internal disk drives in the system unit using the appropriate split disk backplane feature and cabling.

The adapter is a 3.3 V, PCI-e x8 bootable SAS adapter that supports RAID levels 0, 5, 6, and 10

With proper cabling and configuration, multiple wide ports are used to provide redundant paths to each dual port SAS drive or solid-state drive. The adapter manages SAS path redundancy and path switching should a SAS failure occur.
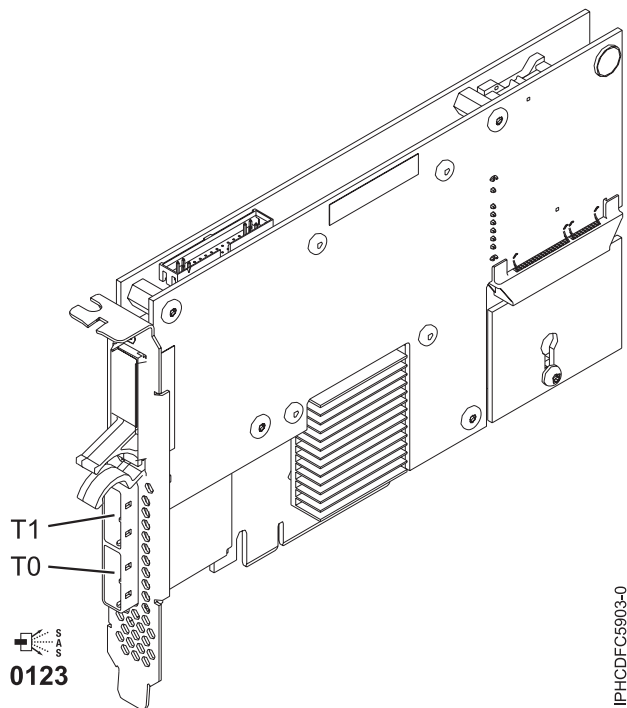

Figure 28. PCIe Dual - x4 3Gb SAS RAID Adapter

Specifications

Item   Description
Adapter FRU number
        44V4198 (Designed to comply with RoHS requirement.)
Battery FRU number
        39J5555 (Designed to comply with RoHS requirement.)
I/O bus architecture
        PCIe x8
Slot requirement
        One PCIe x8 slot per adapter.

Adapters are installed in pairs.

Adapter pairs do not need to be in the same enclosure. For higher availability, place adapters in separate enclosures. See the PCI adapter placement for placement rules.

Cables

When you attach 5886 EXP 12S Disk Drawer, at least one of the following SAS (X) cables must be used: 3661, 3662 or 3663.

SAS device attachment requires specific cables that are provided with the subsystem or device features being attached. Special cabling is required for multi-initiator and high availability configurations. See Serial attached SCSI cable planning.

Voltage

3.3V

Form factor

Short

Maximum number

Refer to the PCI adapter placement.

Attributes

- 48 SAS disk dives supported when the adapter is configured with four 5886 EXP 12S Disk Drawers
- 42 SAS disk drives supported when the adapter is configured with a 19-inch PCIe 12X I/O Drawer and two 5886 EXP 12S Disk Drawers (18 SFF disk drives plus up to 24 SAS disk drives)
- SAS speed: 3 Gbs
- SAS Serial-SCSI Protocol (SSP) and Serial Management Protocol (SMP) are supported
- 380 MB of non-volatile fast write cache can increase disk subsystem performance
- Dual controller supports mirrored-write cache data and mirrored-RAID parity footprints
- Concurrent firmware update supported
- Eight physical links from two mini SAS 4x connectors are provided
- Concurrent replaceable cache battery pack
- Removable media devices are not supported

Operating system or partition requirements

This adapter is supported for the following operating systems:

- AIX:
  - AIX 5L Version 5.3 with the 5300-07 Technology Level and Service Pack 8, or later
  - AIX 5L Version 5.3 with the 5300-08 Technology Level and Service Pack 6, or later
  - AIX 5L Version 5.3 with the 5300-09 Technology Level and Service Pack 2, or later
  - AIX 5L Version 5.3 with the 5300-10 Technology Level, or later
  - AIX 6.1 and Service Pack 8, or later
  - AIX Version 6.1 with the 6100-01 Technology Level and Service Pack 4, or later
  - AIX Version 6.1 with the 6100-02 Technology Level and Service Pack 3, or later
  - AIX Version 6.1 with the 6100-03 Technology Level, or later
- Linux:
  - Red Hat Enterprise Linux version 4, with update 7, or later
  - Red Hat Enterprise Linux version 5, with update 2, or later
  - SUSE Linux Enterprise Server 10, with service pack 2, or later

This adapter requires the following drivers:

- AIX: devices.pci.1410bd02 device driver package
- Linux:
  - iprutils version 2.4.1 and ipr driver version 2.0.11.6 (or newer) for RHEL4 kernels

- iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or newer) for RHEL5 kernels
- iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or newer) for SLES10 kernels

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Cables

When you attach 5886 EXP 12S Disk Drawer, at least one of the following SAS (X) cables must be used: 3661, 3662 or 3663.

SAS device attachment requires specific cables that are provided with the subsystem or device features being attached. Special cabling is required for multi-initiator and high availability configurations. See Serial attached SCSI cable planning.

Related tasks

 Installing PCI adapters

Related reference

 IBM Prerequisite Web page

Parts information

 Parts information

PCI adapter placement

 PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

 Serial-attached SCSI cable planning

 SAS RAID controllers for AIX

 SAS RAID controllers for Linux

PCI-X DDR 1.5 GB cache SAS RAID Adapter (FC 5904, 5906, 5908; CCIN 572F and 575C)

Learn about the specifications and operating system requirements for the 5904, 5906, and 5908 adapter.

Overview

The PCI-X DDR 1.5 GB cache SAS RAID Adapter is a SAS disk controller with a maximum of 1.5 GB compressed write cache and a maximum 1.6 GB compressed read cache. Auxiliary write cache and concurrent battery maintenance are provided. The controller is implemented using two physical adapters that are securely connected to form a double-wide adapter. The double-wide adapter requires two adjacent Peripheral Component Interconnect-X (PCI-X) slots. The auxiliary write cache side of the double-wide adapter contains a dual, concurrently maintainable cache battery pack which maintains cache memory on both adapters in the event of an abnormal termination.

When used in a logical partition (LPAR) environment, this double-wide adapter must have both slots of the adapter assigned to the same logical partition. When implementing dynamic LPAR (DLPAR), both slots of the adapter must be managed together.

Feature 5904, 5906, and 5908 are all feature codes representing the same PCI-X DDR 1.5 GB cache SAS RAID Adapter. Different feature codes indicate if a blind swap cassette is used and its type:

- Feature 5904 indicates no blind swap cassette. The feature is used in enclosures that do not use blind swap cassettes.
- Feature 5906 indicates a gen-2.5 blind swap cassette. The feature is used in the 5797 and 5798 enclosures.
- Feature 5908 indicates a gen-3 blind swap cassette. This feature is used in the 5790 and 5796 enclosures.

572F is the CCIN number on the RAID adapter side of the double-wide adapter pair. 575C is the CCIN number on the write-cache adapter.

The adapter provides RAID 0, RAID 5, RAID 6, and RAID 10 for the AIX and Linux operating systems. Under the IBM i operating system, mirroring and data spreading are provided by the operating system, and RAID 5 and RAID 6 are provided by the adapter. [1]

The adapter provides three mini-SAS 4x connectors for the attachment of SAS drives located in 5886 EXP 12S Expansion Drawers. The adapter supports a maximum of five 5886 EXP 12S Expansion Drawers.[1] With proper cabling and configuration, multiple wide ports are used to provide redundant paths to each dual port SAS drive. The adapter manages SAS path redundancy and path switching should a SAS failure occur.

With the optional pairing of adapter sets, an even higher level of protection is provided by using a dual controller I/O configuration[1] to protect against the failure of an entire adapter set. In such a high availability I/O configuration, SAS X cables are used to attach 5586 EXP 12S Expansion Drawers, and the fourth mini-SAS connector on each card set is used to directly connect the card sets by using a SAS AA cable.

Important: See the SAS RAID controller for AIX or SAS RAID controller for Linux topics for more information and important considerations for multi-initiator and high availability configurations. See also PCI-X DDR 1.5 GB cache SAS RAID Adapter (FC 5904 and 5908; CCIN 572F and 575C).
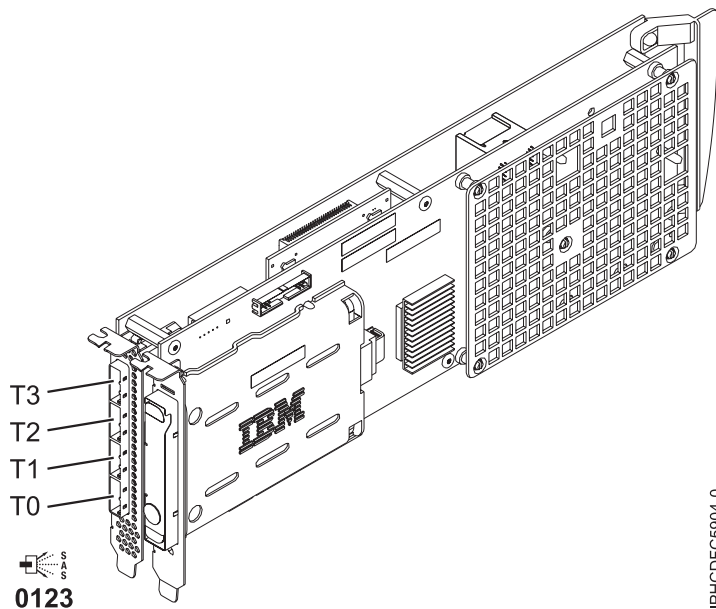
The following figure shows the adapter.

Figure 29. PCI-X DDR 1.5GB cache SAS RAID Adapter

Note: Port T3 does not support any device attachment. T3 is only used in dual controller I/O configurations for adapter to adapter communication.

Specifications

Item   Description

Adapter FRU number

44V8622 (Designed to comply with RoHS requirement.)

Battery FRU number

39J5555 (Designed to comply with RoHS requirement.)

I/O bus architecture

PCI-X

Slot requirement

Two, long, adjacent PCI-X slots.

Cables

SAS device attachment requires specific cables that are provided with the subsystem or device features being attached. Special cabling is required for multi-initiator and high availability configurations. See Serial attached SCSI cable planning.

Voltage

3.3V

Form factor

Long

Maximum number

See PCI adapter placement.

Attributes

- SAS speed: 3 Gbps
- SAS, SAS Serial SCSI Protocol (SSP) and Serial Management Protocol (SMP) supported
- Single controller supported with SAS y cables (3692, 3693, 3694)
- Dual controller supported with SAS x cables (3661, 3662, 3663) and SAS 2:6 cable (3681, 3682)
- Single controller supports mirrored write cache data with auxiliary cache
- Dual controller supports mirrored-write cache data and mirrored-RAID parity footprints between card sets
- Removable media devices are not supported

Operating system or partition requirements

This adapter is supported for the following operating systems:

- AIX:
  - AIX 5L Version 5.3 with the 5300-07 Technology Level and Service Pack 8, or later
  - AIX 5L Version 5.3 with the 5300-08 Technology Level and Service Pack 6, or later
  - AIX 5L Version 5.3 with the 5300-09 Technology Level and Service Pack 2, or later
  - AIX 5L Version 5.3 with the 5300-10 Technology Level, or later
  - AIX 6.1 and Service Pack 8, or later
  - AIX Version 6.1 with the 6100-01 Technology Level and Service Pack 4, or later
  - AIX Version 6.1 with the 6100-02 Technology Level and Service Pack 3, or later
  - AIX Version 6.1 with the 6100-03 Technology Level, or later
- Linux:
  - Red Hat Enterprise Linux version 4, with update 7, or later
  - Red Hat Enterprise Linux version 5, with update 2, or later
  - SUSE Linux Enterprise Server 10, with service pack 2, or later
- IBM i
  - IBM i V5R4M5 and Resave F, or later
  - IBM i 6.1 and Resave F, or later

This adapter requires the following drivers:

- AIX: devices.pci.1410bd02 device driver package
- Linux:
  - iprutils version 2.4.1 and ipr driver version 2.0.11.6 (or newer) for RHEL4 kernels
  - iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or newer) for RHEL5 kernels
  - iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or newer) for SLES10 kernels

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf .

Concurrent maintenance procedure

Concurrent maintenance of this double-wide adapter is not supported through the Hardware Management Console (HMC). Concurrent maintenance must be done from within the partition operating system. In IBM i, the Hardware Service Manager (HSM) of the system or owning partition will automatically power off or on both PCI slots when either slot is selected. In AIX or Linux, you must manually power off and on each slot separately.

Important:
- Both PCI slots must be powered off when installing or removing this adapter with the system power on.
- If this adapter is the load source IOA, or any other storage IOA with critical DASD attached for the system, this concurrent maintenance procedure should be done by a qualified service provider.

Related tasks

Installing PCI adapters

Related reference

"Important partitioning considerations with dual-slot and multi-adapter configurations" on page 4
Learn about partitioning considerations with dual-slot and multi-adapter configurations.

IBM Prerequisite Web page

Parts information

Parts information

PCI adapter placement

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Serial-attached SCSI cable planning

SAS RAID controllers for AIX

SAS RAID controllers for Linux

PCI-X DDR External Dual – x4 Port SAS Adapter (FC 5912; CCIN 572A)

Learn about the specifications and operating system requirements for the 5912 adapter.

Overview

The Peripheral Component Interconnect-X (PCI-X) DDR External Dual – x4 Port SAS Adapter is a low-profile adapter for high-performance and high-density, serial-attached SCSI (SAS) applications. The adapter provides two mini SAS 4x connectors, which allow the eight physical links to be used in various narrow and wide-port configurations. The adapter is a 64-bit, 3.3 V, bootable SAS adapter that provides

RAID 0, 5, 6, and 10 capability. Some RAID level support is operating system dependent. The adapter provides RAID 0, RAID 5, RAID 6 and RAID 10 for AIX and Linux. Under the IBM i operating system, mirroring and data spreading is provided by the operating system and RAID 5 and RAID 6 is provided by the adapter.

The adapter does not have write cache. (The write performance of RAID level 5 and RAID level 6 may be poor on adapters which do not provide write cache. Consider using an adapter which provides write cache when using RAID level 5 or RAID level 6.)

The adapter can address up to 48 SAS disk drives, although the actual number of drives in a system is subject to the physical placement limitations of the system. Externally attached devices are designed to run at a data rate of 1.5 Gb/s for Serial Advanced Technology Attachment (SATA) devices, and 3 Gb/s for SAS devices. This card supports RAID and non-RAID DASD, tape, and optical devices. Feature 5912 supports the multi-initiator and high availability configurations.

Important: See the SAS RAID controller for AIX or SAS RAID controller for Linux topics for more information and important considerations for multi-initiator and high availability configurations. See also PCI-X DDR 1.5 GB cache SAS RAID Adapter (FC 5904 and 5908; CCIN 572F and 575C).
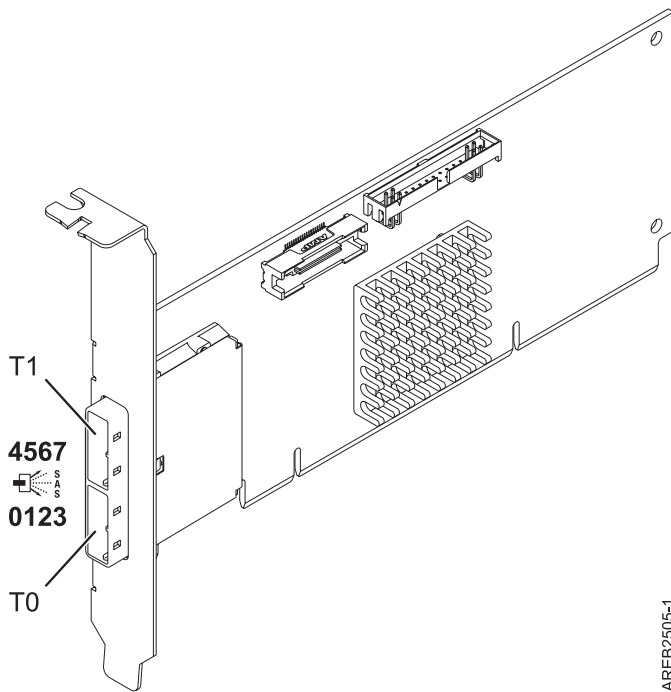

Figure 30. PCI-X DDR External Dual – x4 Port SAS Adapter

Specifications

Item   Description
Adapter FRU number
          5912: 44V4413[*]

          [*] Designed to comply with RoHS requirement.
I/O bus architecture
          PCI-X DDR
Slot requirement
          One available PCI-X slot

Cables

SAS device attachment requires specific cables that are provided with the subsystem or device features being attached. Special cabling is required for multi-initiator and high availability configurations. See Serial attached SCSI cable planning.

Voltage

3.3V

Form factor

Short, low-profile

Maximum number

For system-specific adapter placement information, see the topic collections.

Attributes provided

- Two external mini SAS 4x connectors provide attachment of SAS and SATA device enclosures
- SAS Serial SCSI Protocol (SSP), Serial ATA Tunneling Protocol (STP), and Serial Management Protocol (SMP)
- RAID 0, 5, 6, 10

  The write performance of RAID level 5 and RAID level 6 may be poor on adapters which do not provide write cache. Consider using an adapter which provides write cache when using RAID level 5 or RAID level 6.
- Concurrent firmware update
- Removable media device supported (Removable media is not supported in multi-initiator and high availability configurations)
- 440 - 500 Mhz PowerPC (PPC)
- Support for multi-initiator and high availability configurations (5912)

Operating system or partition requirements

This adapter is supported for the following operating systems:

- AIX 5L Version 5.3 with the Technology Level 6 and Service Pack 4 (5300-06-04), or later
- AIX 5L Version 5.3 with the 5300-07 Technology Level, or later
- AIX 6.1
- Red Hat Enterprise Linux version 5, with update 1, or later
- SUSE Linux Enterprise Server 10, with service pack 1, or later
- IBM i V5R4m5, or later (5912 only)
- IBM i 6.1, or later (5912 only)

The following versions are required for multi-initiator and high availability support:

- AIX Version 6.1 with the 6100-01 Technology Level, or later
- AIX 5L Version 5.3 with the 5300-08 Technology Level, or later
- Red Hat Enterprise Linux version 4, with update 7, or later
- Red Hat Enterprise Linux version 5, with update 2, or later
- SUSE Linux Enterprise Server 10, with service pack 2, or later

This adapter requires the following drivers:

- AIX: devices.pci.1410bd02 device driver package
- Linux:
  - Version 2.0.11.5, or later, for RHEL 4 kernels
  - Version 2.2.0.1, or later, for RHEL 5 kernels
  - Version 2.2.0.1, or later, for SLES 10 kernels
  - Version 2.3.0, or later, for kernel.org kernels (kernel version 2.6.20, or later)

If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite Web site at http://www-912.ibm.com/e_dir/eServerPrereq.nsf ▶ .

Related tasks

▣▶ Installing PCI adapters

Related reference

"Important partitioning considerations with dual-slot and multi-adapter configurations" on page 4
Learn about partitioning considerations with dual-slot and multi-adapter configurations.

▣▶ IBM Prerequisite Web page

Parts information

▣▶ Parts information

PCI adapter placement

▣▶ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 1
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

▣▶ Serial-attached SCSI cable planning

▣▶ SAS RAID controllers for AIX

▣▶ SAS RAID controllers for Linux

Replacing a battery pack

Follow these guidelines before replacing your battery pack.

Note: When replacing the cache battery pack, the battery must be disconnected for at least 60 seconds before connecting the new battery. This duration is the minimum amount of time needed for the card to recognize that the battery has been replaced.

Note: The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call.

Attention: To prevent data loss, if the cache battery pack is not already in the error state, follow the steps described in Forcing a rechargeable battery error before proceeding. If the cache data present LED is flashing, do not replace the cache battery pack or data will be lost. See the feature descriptions and the figures in the following sections to determine if your adapter has a cache data present LED and the location of the LED.

Attention: Static electricity can damage this device and your system unit. To avoid damage, keep this device in its antistatic protective bag until you are ready to install it. To reduce the possibility of electrostatic discharge, read the following precautions:

- 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 printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its antistatic package, touch it to an unpainted metal part of the system unit for at least 2 seconds. (This duration drains static electricity from the package and from your body.)
- Remove the device from its package and install it directly into your system unit without setting it down. If it is necessary to set the device down, place it on its static-protective package. (If your device is a controller, place it component-side up.) Do not place the device on your system unit cover or on a metal table.
- Take additional care when handling devices during cold weather, as heating reduces indoor humidity and increases static electricity.

Replacing a 572B nonconcurrent maintainable battery pack

Use this procedure to replace the nonconcurrent maintainable battery pack on adapter type CCIN 572B.

Attention: Before continuing with this procedure, determine that it is safe to replace the cache battery pack. See "Displaying rechargeable battery information" on page 116. It is safe to replace the cache battery pack when **Yes** is displayed next to **Battery pack can be safely replaced**.

Complete the following steps to replace a nonconcurrent maintainable battery pack.

1. Remove the controller from the system. See your system documentation for instructions.
2. Place the controller on a surface that is electrostatic-discharge protected.
3. Unplug the battery connector **(B)** from its connector on the adapter, squeezing the retaining latch while gently pulling on the plug. The plug connects to the board in only one way, so it cannot be inserted incorrectly during the replacement procedure.

   Note: Ensure that the cache battery pack is disconnected for at least 60 seconds before connecting the new battery. This duration is the minimum amount of time needed for the adapter to recognize that the battery has been replaced.
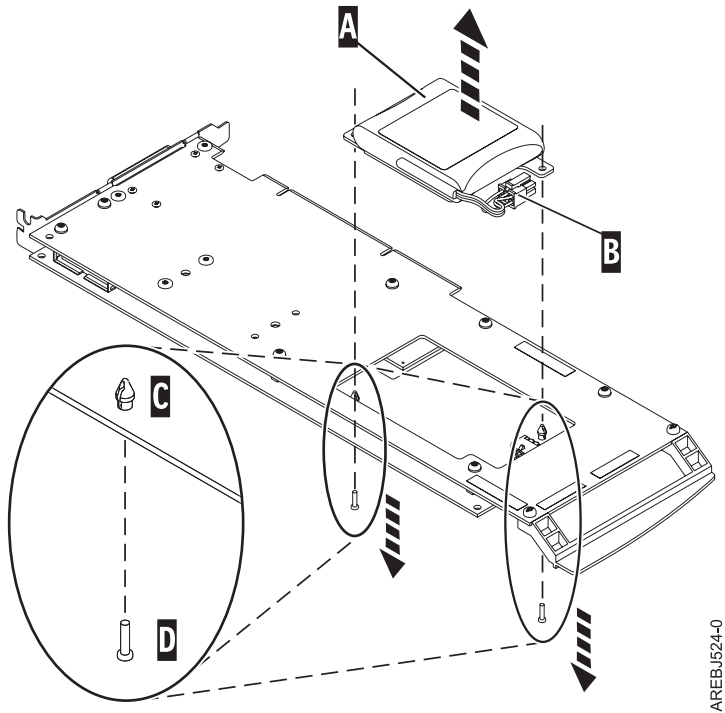
AREBJ524-0

Figure 31. Removing the cache battery

(A) Cache battery pack

(B) Battery connector

(C) Plastic rivet

(D) Plastic pin

4. Locate the two plastic rivets **(C)** that hold the cache battery pack in place. From the back of the adapter, remove the two pins **(D)** that are inserted inside of the rivets.

5. Release the rivets **(C)** that secure the battery assembly to the adapter. Press the rivets through the back of the adapter and remove the battery pack **(A)** from the adapter. If the rivets **(C)** cannot be pressed through the back of the adapter, follow these steps to press out the rivets with a ballpoint pen:

   a. Locate a retractable ballpoint pen.

      Note: A medium-sized retractable ballpoint pen is preferred, or an equivalent item with a small opening can be used. The small opening must be large enough so that the pen (or equivalent) can go around the tip of the rivet, but small enough that it does not slide over the rivet and contact the battery assembly bracket.

   b. Slide the card off the edge of the work area enough so rivet **(C)** can be pressed out of the back of the adapter.

   c. Hold the pen with the ballpoint retracted, place the pen on top of rivet **(C)**, and gently press straight down until rivet **(C)** presses out.

   d. Repeat steps 5b and 5c for the other rivet **(C)**.

   e. Remove the cache battery pack **(A)** from the adapter.

   f. Turn the adapter over and press the rivets **(C)** back into the adapter.

6. Install the new battery pack. **(A)** onto the press rivets **(C)** of the adapter.

7. Reinsert the pins **(D)** into the rivets from the back of the adapter.

8. Connect the cache battery pack connector **(B)** to the adapter. The plug connects to the adapter in only one way, so it cannot be inserted incorrectly.

9. Reinstall the adapter.

Replacing a 57CF cache battery pack

Use this procedure to replace the 57CF cache battery pack.

To replace the 57CF cache battery pack, see Removing and replacing the 9117-MMB or 9179-MHB 175 MB cache RAID - dual IOA enablement card cache battery pack.
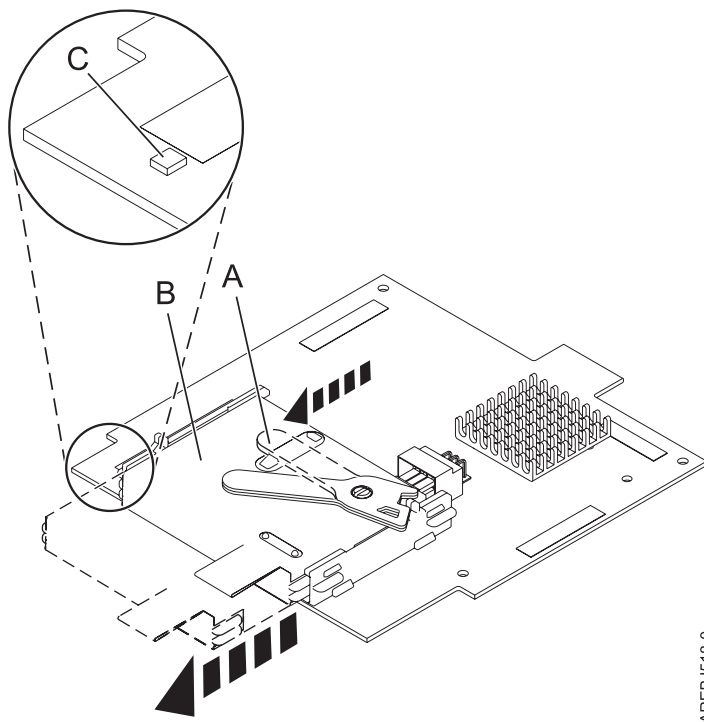
Replacing a 57B7 concurrent maintainable battery pack

Use this procedure to replace the concurrent maintainable battery pack on adapter type CCIN 57B7.

Attention: Before continuing with this procedure, determine that it is safe to replace the cache battery pack. See "Displaying rechargeable battery information" on page 116. It is safe to replace the cache battery pack when **Yes** is displayed next to **Battery pack can be safely replaced**. If the cache data present LED is flashing, do not replace the cache battery pack or data will be lost. See the feature comparison tables for PCIe and PCI-X cards and the following figures to determine whether your adapter has a cache data present LED and its location.

Complete the following steps to replace a 57B7 concurrent maintainable battery pack.

1. Using the following illustration to locate the battery components, verify that the cache data present LED **(C)** is not flashing. If it is flashing, do not continue; return to "Forcing a rechargeable battery error" on page 117.

(A) Cache battery lever
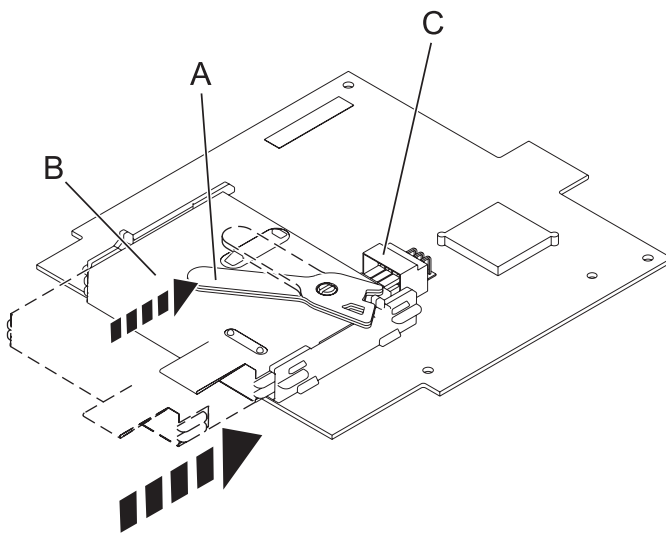**(B)** Cache battery pack
(C) Cache present LED

Figure 32. Removing the 57B7 cache battery

2. Move the cache battery lever **(A)** away from the connector to disengage the battery from the connector.

3. Continue to slide the cache battery pack out of the mounting guides and remove it from the controller.

   Note: Ensure that the cache battery pack is disconnected for at least 60 seconds before connecting the new battery. This duration is the minimum amount of time needed for the card to recognize that the battery has been replaced.

4. Using the following illustration to locate the battery components, move the lever to the unlatched position (away from the connector).

Figure 33. Replacing the 57B7 cache battery

   (A) Cache battery lever

   (B) Cache battery pack

   (C) Cache battery connector

5. Slide the new cache battery pack into the mounting guides on the controller until it is seated in the battery connector.

6. After the battery is seated in the connector, move the lever to the latched position to fully seat the battery into the connector.

7. Restart the adapter's write cache by doing the following:

   a. Return to the **Work with Resources containing Cache Battery Packs display** and select the **Start IOA cache**. Press Enter.

   b. Ensure that you get the message `Cache was started`.

Replacing a 574E concurrent maintainable battery pack

Use this procedure to replace the concurrent maintainable battery pack on adapter type CCIN 574E.

Attention: Before continuing with this procedure, determine that it is safe to replace the cache battery pack. See "Displaying rechargeable battery information" on page 116. It is safe to replace the cache battery pack when **Yes** is displayed next to **Battery pack can be safely replaced**. If the cache data present LED is flashing, do not replace the cache battery pack or data will be lost. See the feature comparison tables for PCIe and PCI-X cards and the following figures to determine whether your adapter has a cache data present LED and its location.

Complete the following steps to replace a 574E concurrent maintainable battery pack.

1. Using the following illustration to locate the battery components, verify that the cache data present LED **(C)** is not flashing. If it is flashing, do not continue; return to Forcing a rechargeable battery error.
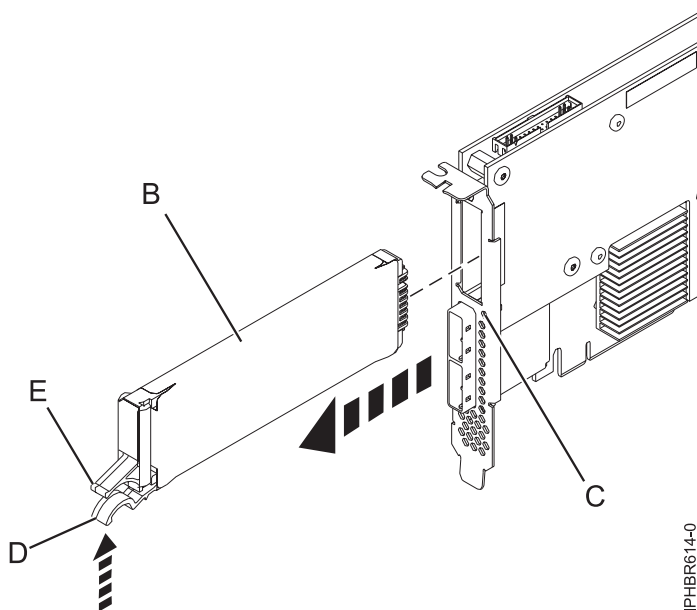

Figure 34. Replacing the 574E cache battery

> **(B)** Cache battery pack
> **(C)** Cache data present LED
> **(D)** Cache battery tab
> **(E)** Cache battery tab

2. Squeeze tab **(D)** against tab **(E)** to disengage the battery retaining tab, pull out the cache battery pack **(B)**, and remove it from the controller.

   Important: Use caution when squeezing tabs because the plastic parts can be fragile.

   Note: Ensure that the cache battery pack is disconnected for at least 60 seconds before connecting the new battery. This duration is the minimum amount of time needed for the card to recognize that the battery has been replaced.

3. Install the new cache battery pack by reversing this procedure. Ensure that the replacement cache battery back is fully seated.

4. Restart the adapter's write cache by doing the following:

a. Return to the **Work with Resources containing Cache Battery Packs display** and select the **Start IOA cache**. Press Enter.

b. Ensure that you get the message `Cache was started`.

Replacing a 572F/575C card set concurrent maintainable battery pack

Use this procedure to replace the concurrent maintainable battery pack on adapter type CCIN 572F/575C card set.

Attention: Before continuing with this procedure, determine that it is safe to replace the cache battery pack. See "Displaying rechargeable battery information" on page 116. It is safe to replace the cache battery pack when **Yes** is displayed next to **Battery pack can be safely replaced**. If the cache data present LED is flashing, do not replace the cache battery pack or data will be lost. See the feature comparison tables for PCIe and PCI-X cards present LED and its location.

Complete the following steps to replace a 572F/575C concurrent maintainable battery pack.

1. Using the following illustration to locate the battery components, locate the metal cover **(A)** that holds the battery pack. Pull out on the push-rivet **(B)** to release the metal cover **(A)**.

Figure 35. Replacing the 572F/575C cache battery

      (A) Metal cover

      (B) Push-rivet

      (C) Tab

2. Remove the battery unit by pulling on tab **(C)**.

   Note: Ensure that the cache battery pack is disconnected for at least 60 seconds before connecting the new battery. This duration is the minimum amount of time needed for the card to recognize that the battery has been replaced.

3. Install the new cache battery pack by reversing this procedure. Ensure that the replacement cache battery pack is fully seated.

4. Restart the adapter's write cache by doing the following:
   a. Return to the **Work with Resources containing Cache Battery Packs display** and select the **Start IOA cache**. Press Enter.
   b. Ensure that you get the message `Cache was started`.

Maintaining the rechargeable battery on the 57B7, 57CF, 574E, and 572F/575C SAS adapters

Rechargeable battery maintenance tasks include displaying rechargeable battery information, forcing a rechargeable battery error, and replacing the rechargeable cache battery pack.

Attention: Only use these procedures if directed from an isolation procedure or a maintenance analysis procedure (MAP).

This topic applies to the IBM i operating system. For information about maintaining the rechargeable battery using the AIX or Linux operating systems, see SAS RAID controller for AIX or SAS RAID controller for Linux.

Displaying rechargeable battery information

Use this procedure to display information about the controller's rechargeable battery using the Hardware Service Manager in the IBM i operating system.

This topic applies to the IBM i operating system. For information about maintaining the rechargeable battery using the AIX or Linux operating systems, see SAS RAID controller for AIX or SAS RAID controller for Linux.

1. Sign on to the system with at least service level authority.
2. On the command line, type `strsst`. Press Enter.
3. On the System Service Tools (SST) Sign On display, type your service tools user ID and service tools password. Press Enter.
4. On the System Service Tools (SST) display, select **Start a Service Tool**. Press Enter.
   a. On the Start a Service Tool display, select **Hardware Service Manager**. Press Enter.
   b. On the hardware Service Manager display, select **Work with resources containing cache battery packs**. Press Enter.
   c. Select **Display battery information**.

Error state

The cache battery pack should be in an error state before you replace it.

To prevent possible data loss, ensure that the cache battery pack is in an error state before replacing it. This will ensure all cache data is written to disk before battery replacement. Forcing the battery error will result in the following:

- The system logs an error.
- Data caching becomes disabled on the selected controller.
- System performance could become significantly degraded until the cache battery pack is replaced on the selected controller.
- The **Battery pack can be safely replaced** field on the controller rechargeable battery information screen indicates Yes.
- Cache data present LED stops flashing. See the feature descriptions and the figures in the "Replacing a battery pack" on page 109 section to determine if your adapter has a cache data present LED and the location of the LED.

This error state requires replacement of the cache battery. Ensure that you have the correct type and quantity of cache battery packs to do the replacement. To resume normal operations, replace the cache battery pack.

The cache battery pack for the 572F storage I/O adapter and the 575C auxiliary cache adapter is contained in a single battery field replacement unit (FRU) that is physically located on the 575C auxiliary cache adapter. The functions of forcing a battery pack error and starting the adapter cache on either adapter in the card set results in the same function automatically being performed on the other adapter in the card set.

Forcing a rechargeable battery error

Use this procedure to place the controller's rechargeable battery into an error state using the Hardware Service Manager in the IBM i operating system.

This topic applies to the IBM i operating system. For information about maintaining the rechargeable battery using the AIX or Linux operating systems, see SAS RAID controller for AIX or SAS RAID controller for Linux.

To force the cache battery pack into an error state, do the following steps on the system or partition that is using the adapter.

1. Sign on to the system with at least service level authority.
2. On the command line, type strsst. Press Enter.
3. On the System Service Tools (SST) Sign On display, type your service tools user ID and service tools password. Press Enter.
4. On the System Service Tools (SST) display, select **Start a Service Tool**. Press Enter.
   a. On the Start a Service Tool display, select **Hardware Service Manager**. Press Enter.
   b. On the hardware Service Manager display, select **Work with resources containing cache battery packs**. Press Enter.
   c. On the Work with Resources containing Cache Battery Packs display, select **Force battery pack into error state for the I/O card**. Press Enter.
   d. On the **Force Battery Packs Into Error State** display, verify that the correct I/O adapter has been selected, and press the function key that confirms your choice.
   e. Return to the **Work with Resources containing Cache Battery Packs** display and select **Display battery information** and verify that the **Battery pack can be safely replaced** field indicates yes. If it does not indicate yes, contact your next level of support before continuing this procedure.
5. Verify that the cache data present light emitting diode (LED) is no longer flashing before replacing the cache battery pack. See the feature descriptions and the figures in the "Replacing a battery pack" on page 109 section to determine if your adapter has a cache data present LED and the location of the LED.
6. Replace the cache battery pack using the procedure that sent you here. For a list of replacement procedures, see "Replacing a battery pack" on page 109.
7. Restart the adapter's write cache by doing the following:
   a. Return to the **Work with Resources containing Cache Battery Packs display** and select the **Start IOA cache**. Press Enter.
   b. Ensure that you get the message Cache was started.

Replacing a battery pack

Follow these guidelines before replacing your battery pack.

Note: When replacing the cache battery pack, the battery must be disconnected for at least 60 seconds before connecting the new battery. This duration is the minimum amount of time needed for the card to recognize that the battery has been replaced.

Note: The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call.

Attention: To prevent data loss, if the cache battery pack is not already in the error state, follow the steps described in Forcing a rechargeable battery error before proceeding. If the cache data present LED is flashing, do not replace the cache battery pack or data will be lost. See the feature descriptions and the figures in the following sections to determine if your adapter has a cache data present LED and the location of the LED.

Attention: Static electricity can damage this device and your system unit. To avoid damage, keep this device in its antistatic protective bag until you are ready to install it. To reduce the possibility of electrostatic discharge, read the following precautions:

* 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 printed circuitry.
* Do not leave the device where others can handle and possibly damage the device.
* While the device is still in its antistatic package, touch it to an unpainted metal part of the system unit for at least 2 seconds. (This duration drains static electricity from the package and from your body.)
* Remove the device from its package and install it directly into your system unit without setting it down. If it is necessary to set the device down, place it on its static-protective package. (If your device is a controller, place it component-side up.) Do not place the device on your system unit cover or on a metal table.
* Take additional care when handling devices during cold weather, as heating reduces indoor humidity and increases static electricity.

Replacing a 572B nonconcurrent maintainable battery pack

Use this procedure to replace the nonconcurrent maintainable battery pack on adapter type CCIN 572B.

Attention: Before continuing with this procedure, determine that it is safe to replace the cache battery pack. See "Displaying rechargeable battery information" on page 116. It is safe to replace the cache battery pack when **Yes** is displayed next to **Battery pack can be safely replaced**.

Complete the following steps to replace a nonconcurrent maintainable battery pack.

1. Remove the controller from the system. See your system documentation for instructions.
2. Place the controller on a surface that is electrostatic-discharge protected.
3. Unplug the battery connector **(B)** from its connector on the adapter, squeezing the retaining latch while gently pulling on the plug. The plug connects to the board in only one way, so it cannot be inserted incorrectly during the replacement procedure.

   Note: Ensure that the cache battery pack is disconnected for at least 60 seconds before connecting the new battery. This duration is the minimum amount of time needed for the adapter to recognize that the battery has been replaced.
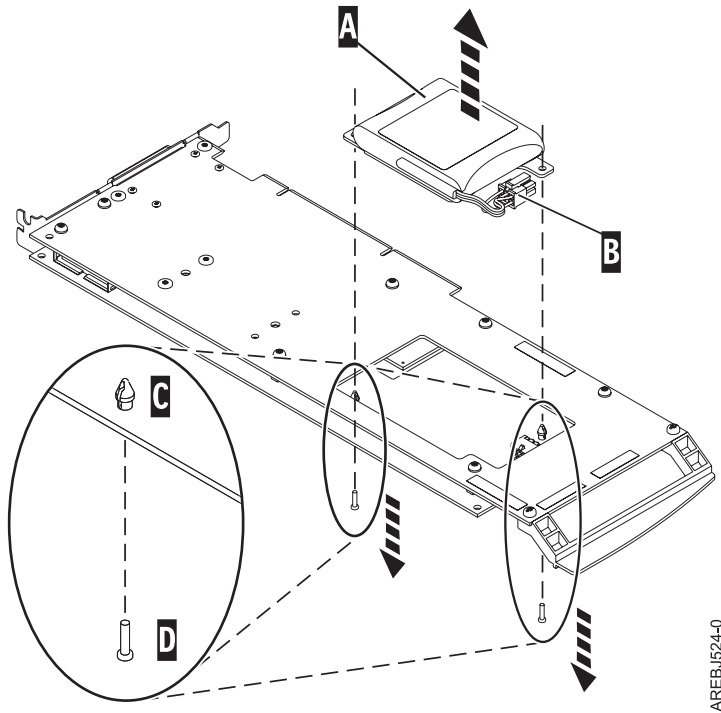
AREBJ524-0

Figure 36. Removing the cache battery

> **(A)** Cache battery pack
>
> **(B)** Battery connector
>
> **(C)** Plastic rivet
>
> **(D)** Plastic pin

4. Locate the two plastic rivets **(C)** that hold the cache battery pack in place. From the back of the adapter, remove the two pins **(D)** that are inserted inside of the rivets.

5. Release the rivets **(C)** that secure the battery assembly to the adapter. Press the rivets through the back of the adapter and remove the battery pack **(A)** from the adapter. If the rivets **(C)** cannot be pressed through the back of the adapter, follow these steps to press out the rivets with a ballpoint pen:

   a. Locate a retractable ballpoint pen.

      Note: A medium-sized retractable ballpoint pen is preferred, or an equivalent item with a small opening can be used. The small opening must be large enough so that the pen (or equivalent) can go around the tip of the rivet, but small enough that it does not slide over the rivet and contact the battery assembly bracket.

   b. Slide the card off the edge of the work area enough so rivet **(C)** can be pressed out of the back of the adapter.

   c. Hold the pen with the ballpoint retracted, place the pen on top of rivet **(C)**, and gently press straight down until rivet **(C)** presses out.

   d. Repeat steps 5b on page 111 and 5c on page 111 for the other rivet **(C)**.

   e. Remove the cache battery pack **(A)** from the adapter.

   f. Turn the adapter over and press the rivets **(C)** back into the adapter.

6. Install the new battery pack. **(A)** onto the press rivets **(C)** of the adapter.

7. Reinsert the pins **(D)** into the rivets from the back of the adapter.

8. Connect the cache battery pack connector **(B)** to the adapter. The plug connects to the adapter in only one way, so it cannot be inserted incorrectly.

9. Reinstall the adapter.

Replacing a 57CF cache battery pack

Use this procedure to replace the 57CF cache battery pack.

To replace the 57CF cache battery pack, see Removing and replacing the 9117-MMB or 9179-MHB 175 MB cache RAID - dual IOA enablement card cache battery pack.
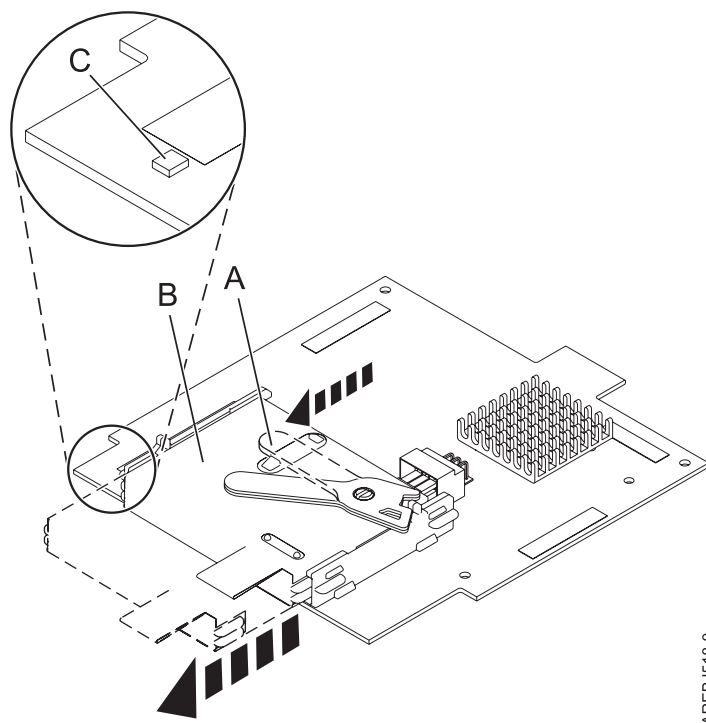
Replacing a 57B7 concurrent maintainable battery pack

Use this procedure to replace the concurrent maintainable battery pack on adapter type CCIN 57B7.

Attention: Before continuing with this procedure, determine that it is safe to replace the cache battery pack. See "Displaying rechargeable battery information" on page 116. It is safe to replace the cache battery pack when **Yes** is displayed next to **Battery pack can be safely replaced**. If the cache data present LED is flashing, do not replace the cache battery pack or data will be lost. See the feature comparison tables for PCIe and PCI-X cards and the following figures to determine whether your adapter has a cache data present LED and its location.

Complete the following steps to replace a 57B7 concurrent maintainable battery pack.

1. Using the following illustration to locate the battery components, verify that the cache data present LED **(C)** is not flashing. If it is flashing, do not continue; return to "Forcing a rechargeable battery error" on page 117.

(A) Cache battery lever
(B) Cache battery pack
(C) Cache present LED

Figure 37. Removing the 57B7 cache battery

2. Move the cache battery lever **(A)** away from the connector to disengage the battery from the connector.

3. Continue to slide the cache battery pack out of the mounting guides and remove it from the controller.

   Note: Ensure that the cache battery pack is disconnected for at least 60 seconds before connecting the new battery. This duration is the minimum amount of time needed for the card to recognize that the battery has been replaced.

4. Using the following illustration to locate the battery components, move the lever to the unlatched position (away from the connector).
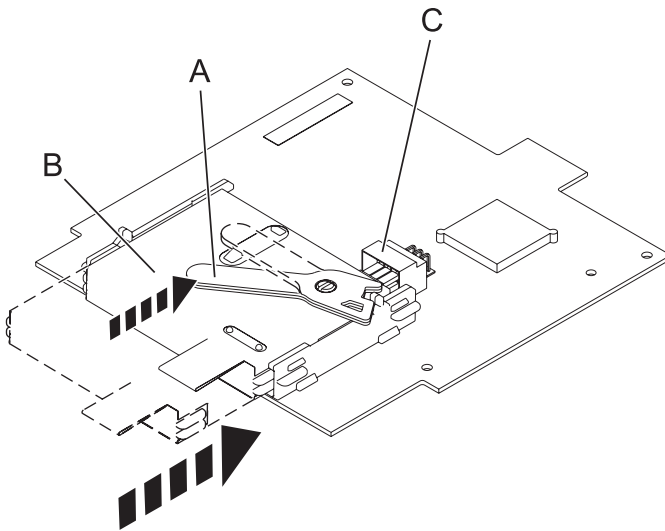
Figure 38. Replacing the 57B7 cache battery

       (A) Cache battery lever

       (B) Cache battery pack

       (C) Cache battery connector

5. Slide the new cache battery pack into the mounting guides on the controller until it is seated in the battery connector.

6. After the battery is seated in the connector, move the lever to the latched position to fully seat the battery into the connector.

7. Restart the adapter's write cache by doing the following:

   a. Return to the **Work with Resources containing Cache Battery Packs display** and select the **Start IOA cache**. Press Enter.

   b. Ensure that you get the message `Cache was started`.

Replacing a 574E concurrent maintainable battery pack

Use this procedure to replace the concurrent maintainable battery pack on adapter type CCIN 574E.

Attention: Before continuing with this procedure, determine that it is safe to replace the cache battery pack. See "Displaying rechargeable battery information" on page 116. It is safe to replace the cache battery pack when **Yes** is displayed next to **Battery pack can be safely replaced**. If the cache data present LED is flashing, do not replace the cache battery pack or data will be lost. See the feature comparison tables for PCIe and PCI-X cards and the following figures to determine whether your adapter has a cache data present LED and its location.

Complete the following steps to replace a 574E concurrent maintainable battery pack.

1. Using the following illustration to locate the battery components, verify that the cache data present LED **(C)** is not flashing. If it is flashing, do not continue; return to Forcing a rechargeable battery error.
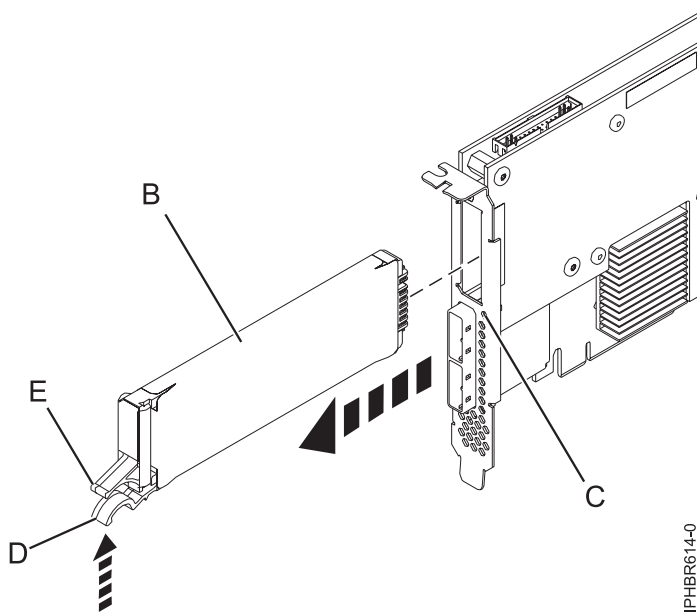

Figure 39. Replacing the 574E cache battery

       (B) Cache battery pack

       (C) Cache data present LED

       (D) Cache battery tab

       (E) Cache battery tab

2. Squeeze tab **(D)** against tab **(E)** to disengage the battery retaining tab, pull out the cache battery pack **(B)**, and remove it from the controller.

   Important: Use caution when squeezing tabs because the plastic parts can be fragile.

   Note: Ensure that the cache battery pack is disconnected for at least 60 seconds before connecting the new battery. This duration is the minimum amount of time needed for the card to recognize that the battery has been replaced.

3. Install the new cache battery pack by reversing this procedure. Ensure that the replacement cache battery back is fully seated.

4. Restart the adapter's write cache by doing the following:

   a. Return to the **Work with Resources containing Cache Battery Packs display** and select the **Start IOA cache**. Press Enter.

b. Ensure that you get the message `Cache was started`.

Replacing a 572F/575C card set concurrent maintainable battery pack

Use this procedure to replace the concurrent maintainable battery pack on adapter type CCIN 572F/575C card set.

Attention: Before continuing with this procedure, determine that it is safe to replace the cache battery pack. See "Displaying rechargeable battery information" on page 116. It is safe to replace the cache battery pack when **Yes** is displayed next to **Battery pack can be safely replaced**. If the cache data present LED is flashing, do not replace the cache battery pack or data will be lost. See the feature comparison tables for PCIe and PCI-X cards present LED and its location.

Complete the following steps to replace a 572F/575C concurrent maintainable battery pack.

1. Using the following illustration to locate the battery components, locate the metal cover **(A)** that holds the battery pack. Pull out on the push-rivet **(B)** to release the metal cover **(A)**.

Figure 40. Replacing the 572F/575C cache battery

> **(A)** Metal cover
> **(B)** Push-rivet
> **(C)** Tab

2. Remove the battery unit by pulling on tab **(C)**.

   Note: Ensure that the cache battery pack is disconnected for at least 60 seconds before connecting the new battery. This duration is the minimum amount of time needed for the card to recognize that the battery has been replaced.

3. Install the new cache battery pack by reversing this procedure. Ensure that the replacement cache battery pack is fully seated.

4. Restart the adapter's write cache by doing the following:

a. Return to the **Work with Resources containing Cache Battery Packs display** and select the **Start IOA cache**. Press Enter.
b. Ensure that you get the message `Cache was started`.

Installing the AIX device driver software

Learn how to install the AIX device driver software for a PCI adapter.

If you are installing the AIX operating system at this time, install the adapter before you install the operating system. When you install AIX, the adapter device driver is automatically installed and the following procedure does not apply to your situation.

If you are installing only the device driver for a PCI adapter, perform these steps:
1. Log in to the system unit as root user.
2. Insert the media containing the device driver software (for example, the CD) into the media device. If your system does not have a CD-ROM drive, refer to your system documentation for performing a Network Installation Management (NIM) installation.
3. Type the following System Management Interface Tool (SMIT) fast path command: `smit devinst`.
4. Press Enter. The Install Additional Device Software window highlights the `INPUT device / directory for software` option.
5. Type the name of the input device that you are using, or press F4 to select the input device from a list.
6. Press Enter. The Install Additional Device Software window highlights the `SOFTWARE to install` option.
7. Press F4 to select List.
8. Type / to display the Find window.
9. Type the device package name, and press Enter. The system finds and highlights this device driver software.
10. Press F7 to select the highlighted device driver software, and press Enter. The INSTALL ADDITIONAL DEVICE SOFTWARE window is displayed. The entry fields are automatically updated.
11. Press Enter to accept the information. The ARE YOU SURE window is displayed.
12. Press Enter to accept the information. The COMMAND STATUS window is displayed.
    - The message `RUNNING` is highlighted to indicate that the installation and configuration command is in progress.
    - When `RUNNING` changes to `OK`, scroll to the bottom of the page and locate the installation summary.
    - After a successful installation, `SUCCESS` displayed in the Result column of the installation summary at the bottom of the page.
13. Remove the installation media from the drive.
14. Press F10 to exit SMIT.

Verifying the AIX device driver software

Learn how to verify the AIX device driver is installed for a PCI adapter.

To verify that the AIX device driver for an adapter is installed, do the following steps:
1. If necessary, log in as root user.
2. At the command line, type `lslpp -l devices.`*xxxxxxxxxx* where *xxxxxxxxxx* is the device package name.
3. Press Enter.

If the adapter device driver is installed, the following is an example of the data that is displayed on the window.

File set	Level	State	Description
Path: /usr/lib/objrepos devices.*xxxxxxxxx*	5.3.8.0	COMMITTED	*Adapter name* software

Verify that the file sets are installed at the AIX version level you are running. Level 5.3.8.0 is an example. If no data is displayed on your screen, the adapter device driver was not installed correctly. Try reinstalling the driver.

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Avis de conformité à la réglementation d'Industrie Canada

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European Community contact:
IBM Technical Regulations
Pascalstr. 100, Stuttgart, Germany 70569
Tele: 0049 (0)711 785 1176
Fax: 0049 (0)711 785 1283
E-mail: tjahn@de.ibm.com

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IBM Taiwan Contact Information:

台灣IBM 產品服務聯絡方式：
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台北市松仁路7號3樓
電話：0800-016-888

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Verantwortlich für die Konformitätserklärung nach des EMVG ist die IBM Deutschland GmbH, 70548 Stuttgart.

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