ESCALA Power7

Managing PCI adapters for M6-700, M6-705, M7-700 or M7-705

ESCALA Power7

Managing PCI adapters for M6-700, M6-705, M7-700 or M7-705

The ESCALA Power7 publications concern the following models:

 - Bull Escala E5-700 (Power 750 / 8233-E8B)
 - Bull Escala M6-700 (Power 770 / 9117-MMB)
 - Bull Escala M6-705 (Power 770 / 9117-MMC)
 - Bull Escala M7-700 (Power 780 / 9179-MHB)
 - Bull Escala M7-705 (Power 780 / 9179-MHC)
 - Bull Escala E1-700 (Power 710 / 8231-E2B)
 - Bull Escala E1-705 (Power 710 / 8231-E1C)
 - Bull Escala E2-700 / E2-700T (Power 720 / 8202-E4B)
 - Bull Escala E2-705 / E2-705T (Power 720 / 8202-E4C)
 - Bull Escala E3-700 (Power 730 / 8231-E2B)
 - Bull Escala E3-705 (Power 730 / 8231-E2C)
 - Bull Escala E4-700 / E4-700T (Power 740 / 8205-E6B)
 - Bull Escala E4-705 (Power 740 / 8205-E6C)

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

Hardware

May 2012

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.

Laser safety information

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

Laser compliance

The 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 provided power cord. Do not use the 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.**
>
>   **(D005a)**

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)

CAUTION:
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°C (212°F)**
- **___ Repair or disassemble**

Exchange only with the approved part. Recycle or discard the battery as instructed by local regulations. (C003a)

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

The following comments apply to the 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 for the 17M/MB, 17M/MC, 79M/HB, or 79M/HC

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

Managing PCI adapters for the 17M/MB or 79M/HB

This section provides information 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 about 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 described in the Managing PCI adapters information.

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

For information on the removal and replacement procedures of the system backplane for your system, see the corresponding topic:
- System backplane for the 02E/4B, 02E/4C, 05F/6B, or 05E/6C.
- System backplane for the 31E/2B, 31E/1C, or 31E/2C.
- System backplane for the 33E/8B or 36E/8C.

See the following sections for SAS RAID enablement procedures:
- SAS RAID controllers for AIX®
- SAS RAID controllers for
- SAS RAID controllers for Linux

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.
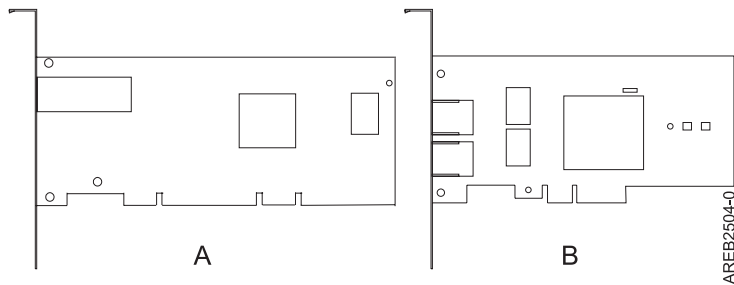
Figure 1. PCI-X adapter and PCIe 4x adapter

PCIe adapters and slots come in 4 different sizes: 1x, 4x, 8x, and 16x. Smaller size adapters do fit in larger slots, but larger size adapters do 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

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, before 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 (FC 2053, 2054, or 2055) that take up two adjacent adapter slots or two separate RAID adapters paired together, both physical slots must be assigned to the same logical partition. For example, if you install the FC 2053, 2054, or 2055 adapter in slot 2, then the adjacent slot 3 cannot be used to install another adapter even though the slot 3 is reported as empty. It is important to understand the wanted 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 increasing availability. This configuration is also referred to as Dual Storage IOA configuration. This type of connection 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 places 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 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.

Adapter information by feature for the 17M/MB, 17M/MC, 79M/HB, or 79M/HC

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

PCIe Cryptographic Coprocessor (FC 4807, FC 4808, and FC 4809; CCIN 4765)

Learn about the specifications for the PCIe Cryptographic Coprocessor.

The PCIe Cryptographic Coprocessor adapters (feature codes (FC) 4807, FC 4808, 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, FC 4808, 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, FC 4808, 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, FC 4808, 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 4807, FC 4808, and FC 4809 are the same adapter but the different FCs indicate if a blind-swap cassette is used and the type of the cassette.

- FC 4807 is not a blind-swap cassette
- FC 4808 is a generation-3 blind-swap cassette
- FC 4809 is a generation-4 blind-swap cassette

IBM PCIe Cryptographic adapter highlights:
- PCIe 4x standard height - half length
- Integrated Dual PPC processors
- ASIC (Accelerator engines)
- Supports the Common Cryptographic Architecture (CCA) application programming interfaces (APIs) and the Public-Key Cryptographic Standards (PKCS11) on the single firmware load.
- 3072, 4096 bit RSA CRT HW (including routing)
- SHA 256 required HW or firmware within secure module (including routing)
- Secure Key AES 128, 192, 256 bit keys
- Fast path – symmetric and asymmetric (secure and clear key)

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Supported operating systems

The following versions of the operating systems are supported:
- AIX
  - AIX 5.3 with the 5300-12 Technology Level, or later.
  - AIX 6.1 with the 6100-05 Technology Level, or later.
- Linux
  - No support.
-
  - 7.1, or later.
  - 6.1 with 6.1.1 machine code or later.

Specifications and requirements

FRU number:
> 45D7948

> RoHS compliant with server exemption

Placement information
> To view information about the PCI adapter placement rules, see the PCI adapter placement topic collection for your system.

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

Storage

> Shipping and storage temperature below -35°C ± 60°C (-31°F ± 140°F) 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 (-41.8°F to -31°F) to +90°C ± 2°C (190.4°F to 197.6°F), the card will be permanently disable.

Handling requirements

Each PCIe Cryptographic Coprocessor includes 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 batteries of the adapter. Data in the protected memory is lost when battery power is removed. .

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.

PCIe 2-port Async EIA-232 Adapter (FC 5289)

Learn about the specifications and operating system requirements for the feature code 5289 adapters.

Overview

The feature code (FC) 5289 and FC 5290 are both the same adapter. FC 5289 is a full-height adapter, and the FC 5290 is a low-profile 2U adapter. The marketing names of these two adapters are:
- FC 5289: PCIe 2-port Async EIA-232 Adapter
- FC 5290: PCIe LP 2-port Async EIA-232 Adapter (tailstock only)

The FC 5289 and FC 5290 are 2-port EIA-232 asynchronous serial communications PCI Express (PCIe) adapters that can be installed in the PCIe slots. The adapters are based on the PCIe 1.1 host bus interface. The parallel port function is not implemented on these adapters.

Each of the two Universal Asynchronous Receiver/Transmitter (UART) channels contain 128 byte receiver-transmitter, first-in first-out (FIFO), full modem-control signaling, and standard host interrupts. If either of the two UART interrupts are active, the host can be interrupted through a single PCI interrupt. The two-port adapter provides RJ45 Ethernet ports, which are connected by DB-9 connectors.

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Specifications

Item   Description

Adapter FRU number

74Y4084 (Designed to comply with RoHS requirement)

I/O bus architecture

PCIe 1.1

Slot requirement

For the slot priorities, see the PCI adapter placement topic collection for your system.

Cables

Cat 5 unshielded twisted-pair cables

Voltage

3.3 V

Form factor

Short

Maximum number

For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

This adapter is supported for the following versions of the operating systems:

- AIX:
  - operating system with the 7100-01 Technology Level, or later
  - AIX 6.1 with the 6100-07 Technology Level, or later Version 5.3 with the 5300-12 Technology Level and Service Pack 5
  - AIX 5.3 with the 5300-12 Technology Level, and Service Pack 5, or later
- Linux:
  - SUSE Linux Enterprise Server 11 SP1, or later
  - SUSE Linux Enterprise Server 10 SP4, or later
  - Red Hat Enterprise Linux Version 6.1, or later
  - Red Hat Enterprise Linux Version 5.7, or later
  - See the Linux Alert site for the support details.
-
  - is not supported.

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 auto-negotiates 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 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 (FC 2456) or a LC-SC 62.5 micron fiber converter cable (FC 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 x 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 x km bandwidth cable)
> * 1.0625 Gbps 2 – 300 m
> * 2.125 Gbps 2 – 150 m
> * 4.25 Gbps 2 – 70 m

Maximum number
> For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

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

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

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

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

Overview

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 at a maximum speed of 320 Megabytes per second (MBps). 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 support Ultra320 speeds.

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

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

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 the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Tools   None
Cables
>   Attachment cables are included with the attaching subsystem or device.

Operating system or partition requirements

This adapter is supported for the following versions of operating systems:
- AIX
  - AIX Version 7.1
  - AIX Version 6.1
  - AIX Version 5.3
- Linux
  - Red Hat Enterprise Linux
  - SUSE Linux Enterprise Server
  - See the Linux Alert site for the support details.
-
  - 7.1
  - 6.1

Required software or drivers

This adapter requires the following 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)

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. 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

The following figure shows the adapter:
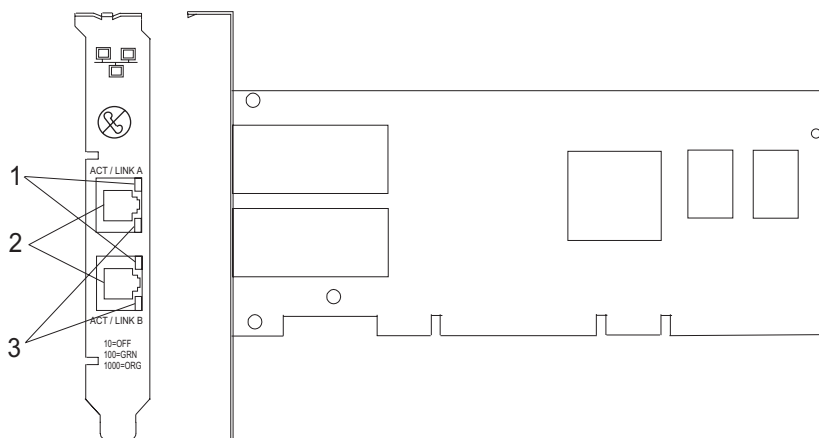
Figure 2. 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter

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

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

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 the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Adapter size

> PCI short form

Connector information

> RJ-45

Wrap plug

> RJ-45, part number 03N6070

Cables

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

Operating system or partition requirements

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

- AIX
  - AIX Version 7.1, or later
  - AIX Version 6.1, or later
  - AIX Version 5.3, or later
- Linux
  - Red Hat Enterprise Linux 5.6 for POWER®, or later
  - Novel SUSE Linux Enterprise 11 Service Pack 1, or later

-
  - 7.1, or later
  - 6.1, or later

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

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

Description and technical overview

The 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.

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.
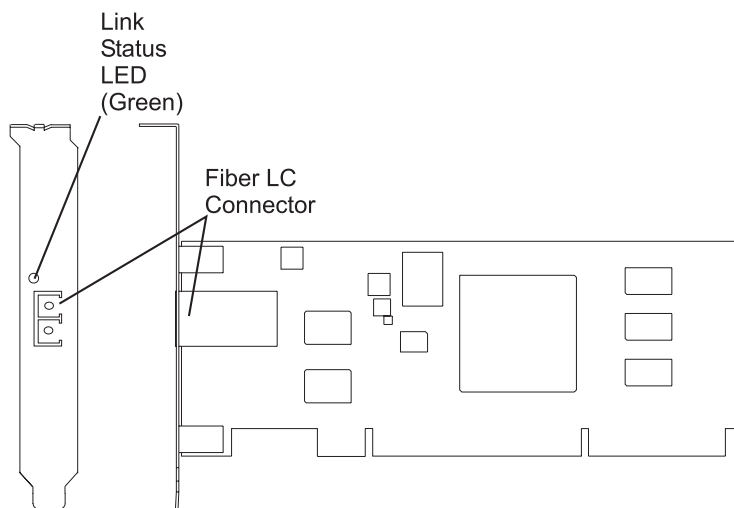
Figure 3. 1 Gigabit-SX iSCSI TOE PCI-X Adapter

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
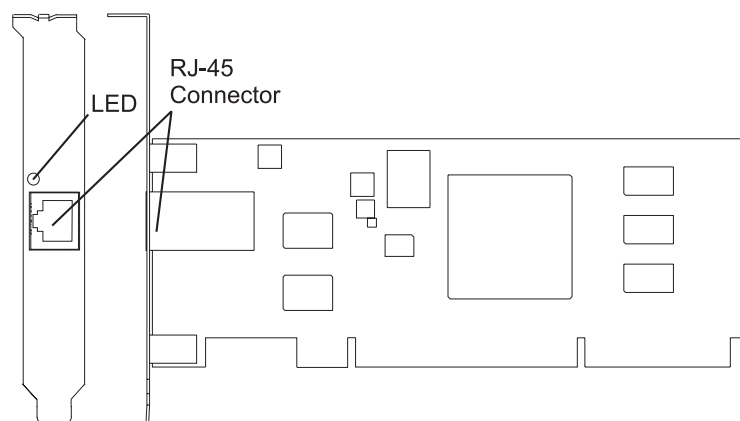
Figure 4. 1 Gigabit-TX iSCSI TOE PCI-X Adapter

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 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.

Checking prerequisites:

To install the adapter, you will need the following items.
- The adapter

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, see Installing the PCI adapters topic.
- Your operating system documentation.

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 1 Gigabit iSCSI TOE PCI-X Adapter" on page 17. When you install AIX, your adapter device driver is automatically installed.

Note: You must only 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 does not require that you install the device driver again. Go to "Installing the 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, see your system documentation for performing a NIM (Network Installation Management) installation.
4. At the command line, type the following System Management Interface Tool (SMIT) fast path:

   `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.
   - 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 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 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 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 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 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 1 Gigabit-TX iSCSI TOE PCI-X Adapter. Any subsequent installation of the 1 Gigabit-TX iSCSI TOE PCI-X Adapter will not require device driver installation again. Go to "Installing the 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.
   - 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 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 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 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 1 Gigabit iSCSI TOE PCI-X Adapter."

    - If no data displays on your screen, the 1 Gigabit-TX iSCSI TOE PCI-X Adapter device driver did not install correctly. Return to "Installing the device driver software for the 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 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, see Installing 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.

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.

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 1 Gigabit iSCSI TOE PCI-X Adapter to your Ethernet network.

Connecting the 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
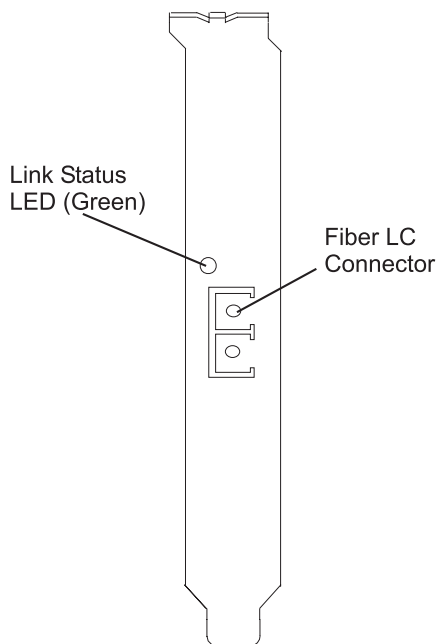
Figure 5. LED on the 1 Gigabit-SX iSCSI TOE PCI-X Adapter

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 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
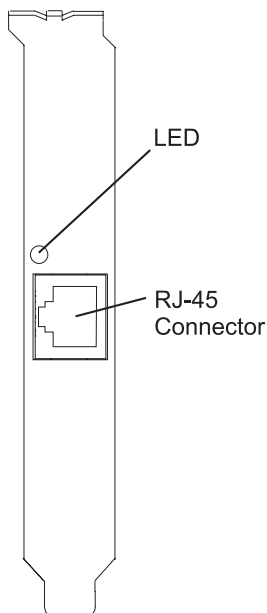
Figure 6. LED on the 1 Gigabit-TX iSCSI TOE PCI-X Adapter

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/targetshw*x* 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/targetshw*x* 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 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 25 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 25 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
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
TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT
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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
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
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

Table 4. Detail sense data descriptions (continued)

Data	Description
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

Table 6. Error number values (continued)

Error number	Error template	Description of error
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
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

Table 6. Error number values (continued)

Error number	Error template	Description of error
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.
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.

Table 6. Error number values (continued)

Error number	Error template	Description of error
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.
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 on page 29 shows the detail sense data layout.
- Table 8 on page 29 shows the detail sense data descriptions.
- Table 9 on page 30 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
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.
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

Table 8. Detail sense data descriptions (continued)

Data	Description
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
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.

Table 9. Error number values (continued)

Error Number	Error Template	Description of Error
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.
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

Table 9. Error number values (continued)

Error Number	Error Template	Description of Error
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
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.

Table 9. Error number values (continued)

Error Number	Error Template	Description of Error
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
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

Table 9. Error number values (continued)

Error Number	Error Template	Description of Error
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. \
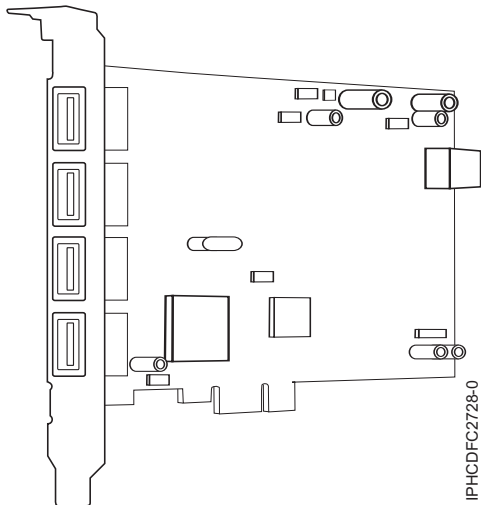
The following figure shows the adapter.

Figure 7. 4-Port USB PCIe Adapter

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

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 the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Connector

Standard USB single pin-type series "A" receptacle

Wrap plug

None

Cables

None

Operating system or partition requirements

This adapter is supported for the following versions of the operating systems:

- AIX
  - AIX Version 7.1
  - AIX Version 6.1
  - AIX 5L for POWER version 5.3
- Linux
  - Red Hat Enterprise Linux
  - SUSE Linux
-

– IBM is not supported.

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 the maximum adapters supported, see the PCI adapter placement topic collection for your system.

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: -15 degrees C (+5 degrees F) to +60 degrees C (+140 degrees F)
>> 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: +1 degree C (+38.8 degrees F) to +60 degrees C (+140 degrees F)
>> Pressure in storage: minimum 700 mbar, maximum 1039 mbar
>> Humidity in storage: 5% to 80% RH
>
> **Operation (ambient in system)**
>
>> Temperature while operating: +10 degrees C (+50 degrees F) to +40 degrees C (+104 degrees F)

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 battery-powered and protected memory of the adapter, 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 deletes 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, ensure that the adapter circuits do not come in contact with any conductive surface or tools. Doing so can render the adapter permanently inoperable.

Do not remove the batteries from the adapter. Data in the protected memory is lost when battery power is removed. For information about replacing the batteries, see "Replacing the batteries" on page 40.

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.

Required software or device 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.

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Operating system or partition requirements

The adapter is supported on the following versions of the operating system:
- AIX
  - 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

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 39 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.
   - 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, see Installing 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 components, including protected memory. Support software or application software can query the coprocessor to determine whether the batteries must 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 approved part. Recycle or discard the battery as instructed by local regulations. (C002a)

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 approved part. Recycle or discard the battery as instructed by local regulations. (C005a)
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 to 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 42. The connector is polarized to ensure a correct connection.

Attention: Any loss of power erases data stored in the protected memory of the card. 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 that the card is fully seated.

14. Replace the cover of the host computer.

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

J7

BT1

J9

J8

J10

Eth
net

R
S
2
3
2

BT2

Secure Crypto Module

Front Side

IPHAK503-0
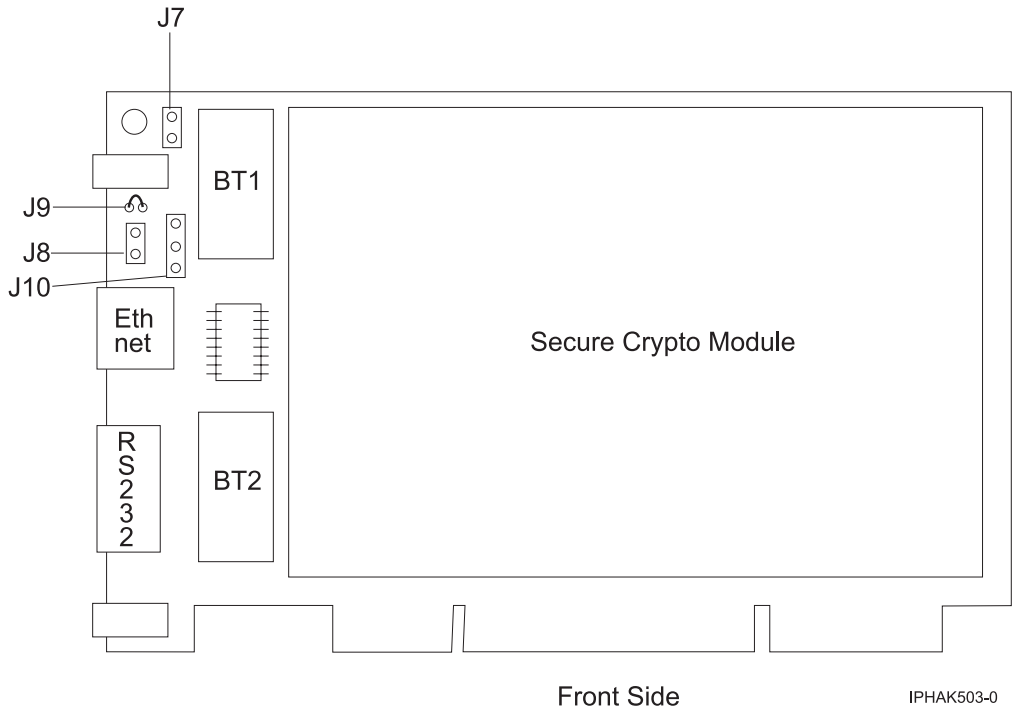
Figure 8. Front side of the adapter
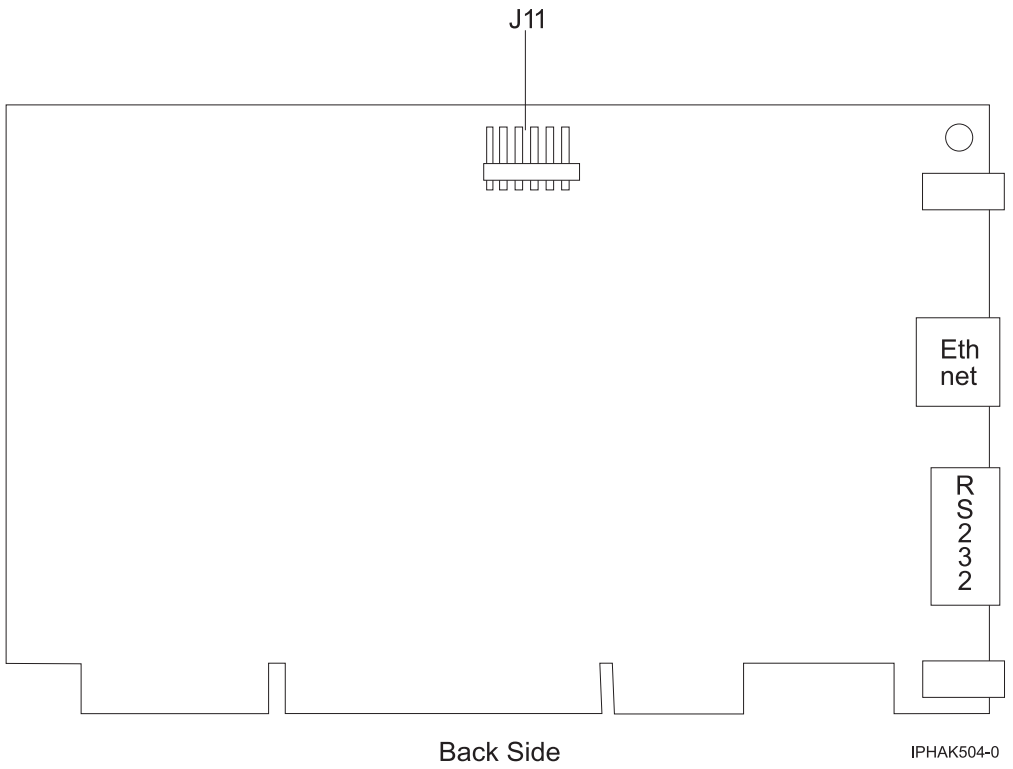
J11

Eth
net

R
S
2
3
2

Back Side

IPHAK504-0

Figure 9. Rear side of the adapter

PCIe Cryptographic Coprocessor (FC 4807, FC 4808, and FC 4809; CCIN 4765)

Learn about the specifications for the PCIe Cryptographic Coprocessor.

The PCIe Cryptographic Coprocessor adapters (feature codes (FC) 4807, FC 4808, 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, FC 4808, 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, FC 4808, 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, FC 4808, 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 4807, FC 4808, and FC 4809 are the same adapter but the different FCs indicate if a blind-swap cassette is used and the type of the cassette.

- FC 4807 is not a blind-swap cassette
- FC 4808 is a generation-3 blind-swap cassette
- FC 4809 is a generation-4 blind-swap cassette

IBM PCIe Cryptographic adapter highlights:

- PCIe 4x standard height - half length
- Integrated Dual PPC processors
- ASIC (Accelerator engines)
- Supports the Common Cryptographic Architecture (CCA) application programming interfaces (APIs) and the Public-Key Cryptographic Standards (PKCS11) on the single firmware load.
- 3072, 4096 bit RSA CRT HW (including routing)
- SHA 256 required HW or firmware within secure module (including routing)
- Secure Key AES 128, 192, 256 bit keys
- Fast path – symmetric and asymmetric (secure and clear key)

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Supported operating systems

The following versions of the operating systems are supported:

- AIX
  - AIX 5.3 with the 5300-12 Technology Level, or later.
  - AIX 6.1 with the 6100-05 Technology Level, or later.
- Linux
  - No support.
-
  - 7.1, or later.
  - 6.1 with 6.1.1 machine code or later.

Specifications and requirements

FRU number:
>
> 45D7948
>
> RoHS compliant with server exemption

Placement information
> To view information about the PCI adapter placement rules, see the PCI adapter placement topic collection for your system.

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

Storage

> Shipping and storage temperature below -35°C ± 60°C (-31°F ± 140°F) 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 (-41.8°F to -31°F) to +90°C ± 2°C (190.4°F to 197.6°F), the card will be permanently disable.

Handling requirements
> Each PCIe Cryptographic Coprocessor includes 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 batteries of the adapter. Data in the protected memory is lost when battery power is removed. .

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.

175 MB 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 feature provides enabling write cache and enabling or changing the embedded SAS adapter configuration into a dual IOA (HA RAID) configuration.
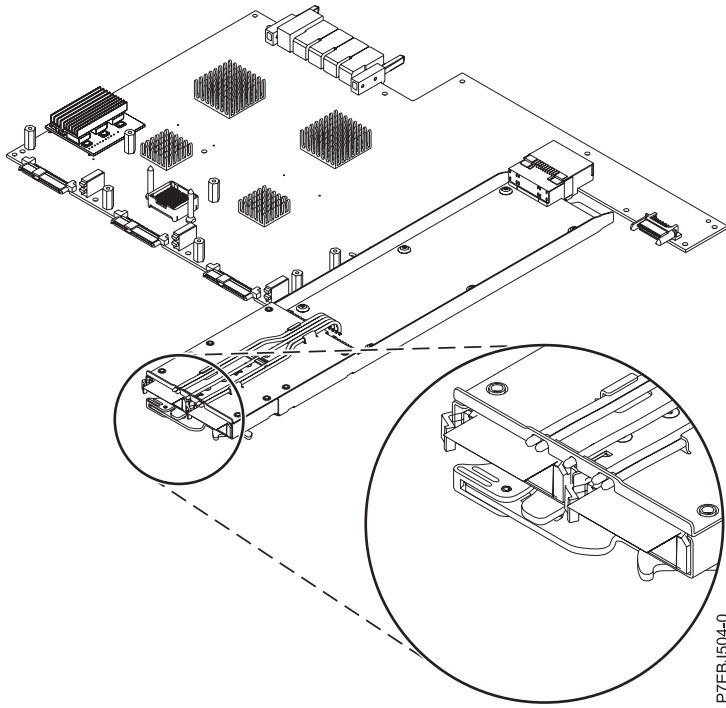
Figure 10. CCIN 57CF PCI Express x8 Planar 3 Gb SAS RAID Adapter with 175MB Cache RAID - Dual IOA Enablement Card

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 by 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.

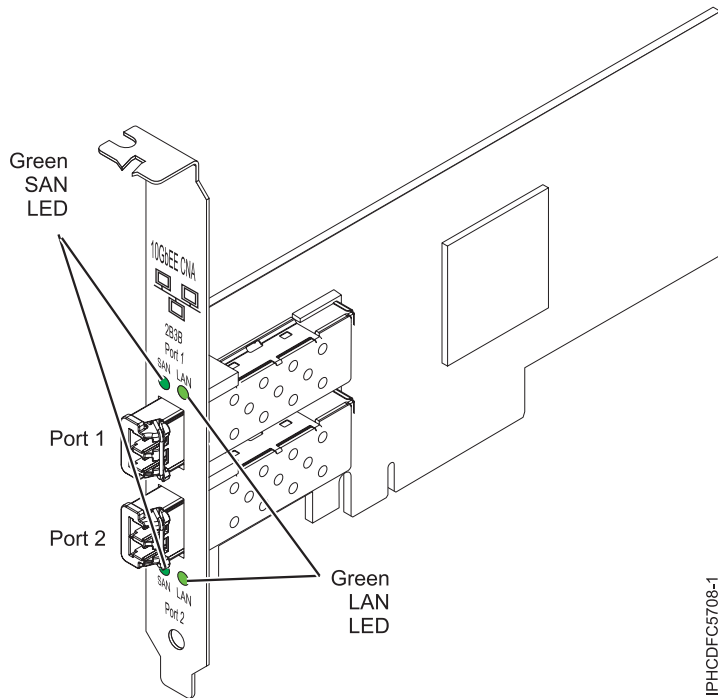The following figure shows the adapter LEDs and connectors.

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, Transmission/Receive (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

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

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 generation-1 and x4 generation-2

PCI Express (PCIe) Base and Card Electromechanical (CEM) 2.0

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 fiber optic cables with short-wave lasers that adhere to the following specifications:

- OM1
  - Multimode 62.5/125 micron fiber
  - 200 MHz x km bandwidth
  - Maximum cable distance 1 is 33 m (108 ft)
- OM2
  - Multimode 50/125 micron fiber
  - 500 MHz x km bandwidth
  - Maximum cable distance is 82 m (269 ft)
- OM3
  - Multimode 50/125 micron fiber
  - 2000 MHz x 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 operating systems:

- AIX
  - AIX Version 7.1 with Service Pack 3, or later
  - AIX Version 6.1 with the 6100-06 Technology Level, and Service Pack 5, or later
  - AIX Version 5.3 with the 5300-12 Technology Level and Service Pack 4, or later
- Linux
  - Red Hat Enterprise Linux 5.6 for POWER, or later
  - Novel SUSE Linux Enterprise Server Service Pack 4, or later
-
  - Support of this feature with requires VIOS 2.2 or later
  - 7.1, or later
- VIOS
  - VIOS support requires VIOS 2.2.0.12-FP24 SP02, 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 whether there are any prerequisites.

Replacing FCoE adapters by using hot swap

When hot swapping FCoE adapters, be aware that device-related software for the storage devices might have additional devices that must be removed. See specific storage device documentation for information about how to remove these additional devices. The 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 operating 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 PCI Express (PCIe), 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 meters. 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 central processing unit (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

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Adapter specifications

Item   Description
FRU number
    46Y3512[*]

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

Maximum number

For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Adapter size

PCIe short form

Connector information

- Four RJ-45 ports
- Two LED adapter status indicators per port, for link activity and speed

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 PCIe Adapter shows the location of the LEDs. Table 12 describes the different LED states and what those states indicate.
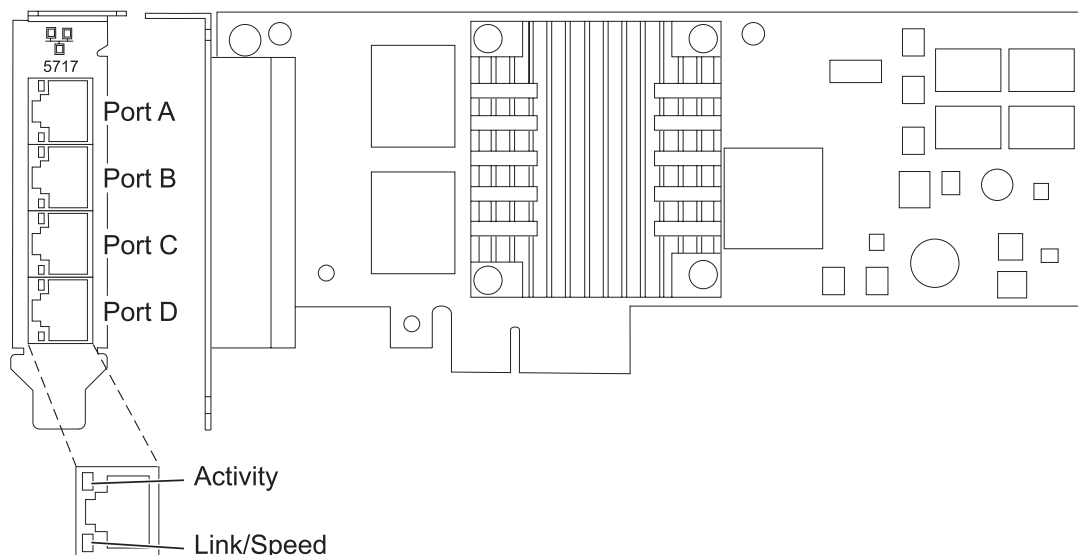
The following figure shows the adapter:

Figure 12. 4-Port 10/100/1000 Base-TX PCIe 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 for the following operating systems:

This adapter is supported for the following versions of the operating systems:
- AIX
  - AIX Version 7.1, or later
  - AIX Version 6.1, or later
  - AIX Version 5.3, or later
- Linux
  - Red Hat Enterprise Linux
  - SUSE Linux Enterprise Server
  - See the Linux Alert site for the support details.

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.

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" on page 52 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
- CAT5e (or later) UTP cables for 1000 Mbps network attachment
- CAT5 or CAT3 UTP cables for 100 Mbps or 10 Mbps network attachment

Restriction: The cables can be no longer than 100 meters (328.08 feet) (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."

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 notices and Handling static sensitive devices. 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.

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 (PCIe) 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.

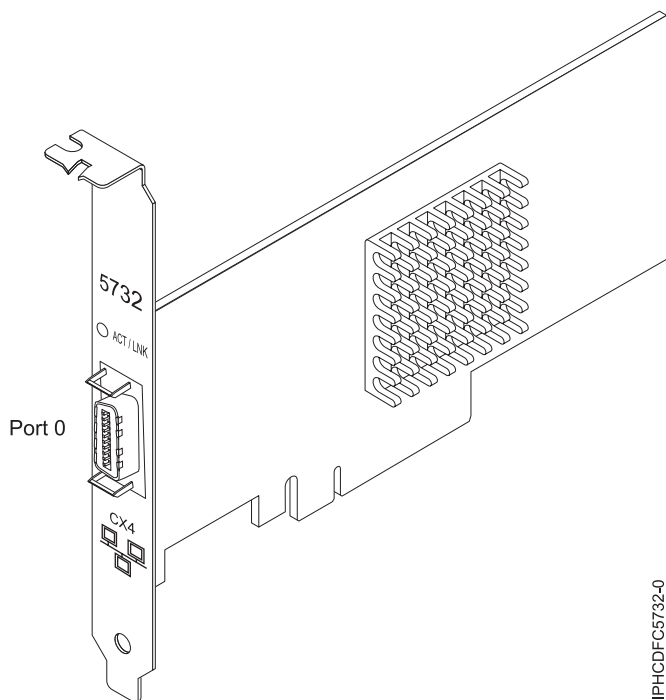The following figure shows the adapter.

Figure 13. 10 Gigabit Ethernet-CX4 PCI Express (PCIe) 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
	Flashing	Transmit activity
	Off	No link[*]
Board status (visible through ACT/LNK)	Red	Not Initialized[**]
	Off	Initialized
[*]The absence of a link can be the result of a defective cable, a defective connector, or a configuration mismatch.		
[**] The adapter has not been initialized by the OS. During such time: • If no cable is connected, the Green LED is ON. • If cable is connected and the LINK is sensed, the Green LED is OFF.		

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Specifications

Item   Description
FRU number
    46K7899 (designed to comply with RoHS requirement.)
I/O bus architecture
    PCIe-V1.1 x8
Busmaster
    Yes

Maximum number
> For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Adapter size
> PCIe x8, short form

Connector information
> 10G Ethernet CX4 cable

Cables
> Customers supply the cables. The CX4 adapter supports copper CX4 cables. Cables can be ordered through a cable supplier.

Attributes
> The adapter provide the following features:
> - PCIe 1.1 x8
> - MSI-X, MSI and support of traditional pin interrupts
> - 10GBASE-CX
> - 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

This adapter is supported for the following versions of operating systems:
- AIX
  - AIX Version 6.1 with the 6100-03 Technology Level, or later
  - AIX Version 5.3 with the 5300-10 Technology Level, or later
- Linux
  - 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 file sets:

devices.pciex.251430001410a303 (CX4 adapter)

devices.pciex.2514310025140100 (BladeCenter® hardware)

AIX Adapter-specific device attributes are contained in the following file sets:

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 55.

Installing the AIX device driver software

To install device driver software, follow the steps in "Installing the AIX device driver software" on page 128.

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.

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

Learn about the specifications and operating system requirements for the feature code (FC) 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.
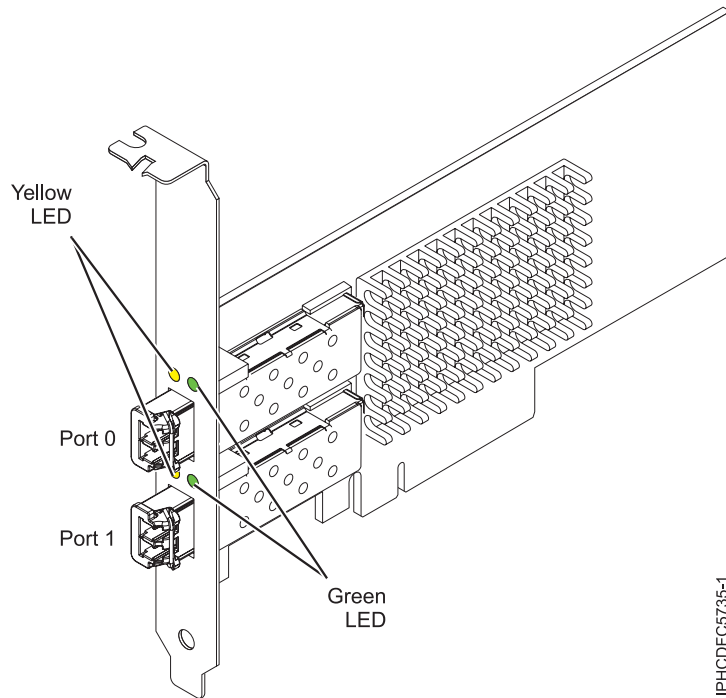
The following figure shows the adapter:

Figure 14. 5735 adapter

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

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 Card Electromechanical (CEM) 2.0
> x8 PCIe bus interface

Slot requirement

> One available PCIe x8 or x16 slot

Voltage

> 3.3 V

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 x km bandwidth
> - OM2: Multimode 50/125 micron fibre, 500 MHz x km bandwidth
> - OM1: Multimode 62.5/125 micron fibre, 200 MHz x 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 the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

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

- AIX
  - AIX Version 7.1, or later
  -
  - AIX Version 6.1, or later
  -
  -
  - AIX Version 5.3, or later
- Linux
  - Red Hat Enterprise Linux 6.1 for POWER, or later
  - SUSE Linux Enterprise Server 11, Service Pack 1, or later (with update package)
  - See the Linux Alert site for the support details.
-
  - 7.1, or later.
  - 6.1, or later.

Adapter LED

Green and yellow LEDs can be seen through openings in the adapter 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 flashes (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 flash	Off	Normal, link inactive or not started
On	2 fast flashes	2 Gbps link rate - normal, link active
On	3 fast flashes	4 Gbps link rate - normal, link active
On	4 fast flashes	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, Linuxor operating system diagnostics.
Off	On	POST failure (dead board)	Perform AIX, Linuxor operating system diagnostics.
Off	Slow blink	Wake-up failure monitor	Perform AIX, Linuxor operating system diagnostics.
Off	Fast blink	POST failure	Perform AIX, Linuxor operating system diagnostics.
Off	Flashing	POST processing in progress	None
On	Off	Failure while functioning	Perform AIX, Linuxor operating system diagnostics.
On	On	Failure while functioning	Perform AIX, Linuxor 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 adapter.

Overview

This PCI Express adapter has two feature codes associated:
- FC 5748: POWER GXT145 PCI Express Graphics Accelerator, is the full-height adapter.
- FC 5269: POWER GXT145 PCI Express Graphics Accelerator, is the low-profile adapter.

The POWER GXT145 PCI Express Graphics Accelerator 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. Figure 15 on page 60 shows the adapter and its connectors.
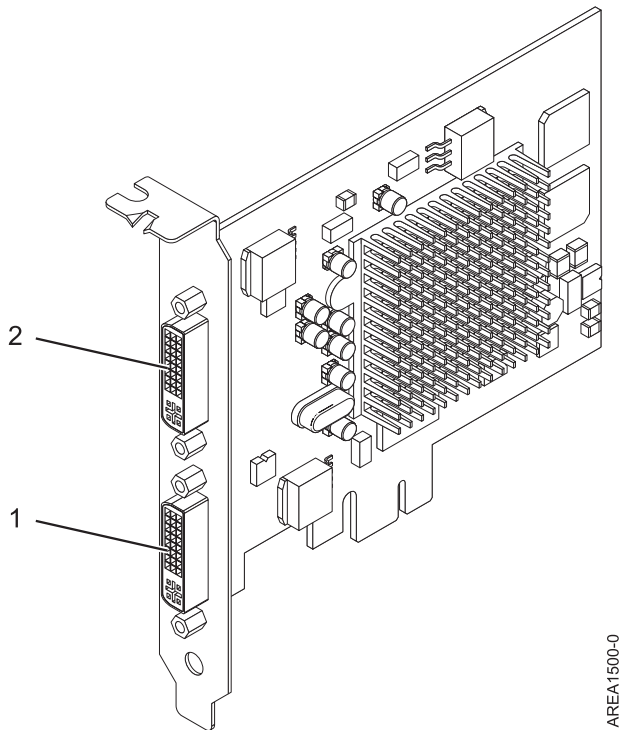
Figure 15. POWER GXT145 PCI Express Graphics Accelerator adapter

| **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. In the system or logical partition running 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. A second monitor supported on secondary connector at up to 1600 x 1200 analog or 1280 x 1024 digital.

– For systems or logical partitions running Linux, a second monitor is supported on the secondary connector at resolutions up to 1600 x 1200 analog or 1280 x 1024 digital.

– For systems or logical partitions running 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 is also displayed on the secondary monitor.

- Display power management: Video Electronics Standards Association (VESA), Display Power Management Signaling (DPMS)

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Operating system or partition requirements

The adapter is supported under the following operating systems:

This adapter is supported for the following versions of operating systems:

- AIX
  – AIX Version 7.1
  – AIX Version 6.1
  – AIX Version 5.3
- Linux
  – Red Hat Enterprise Linux
  – Novel SUSE Linux
  – See the Linux Alert site for the support details.

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 62 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 that 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 61 for instructions.

Attention: Before installing an adapter, review the precautions in Safety notices and Handling static sensitive devices. 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 PCI Express Graphics Accelerator 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 PCI Express Graphics Accelerator adapter 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 61.

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 PCI Express Graphics Accelerator adapter.

At the AIX command-line type `lsdev -Cs pci`. If the POWER GXT145 PCI Express Graphics Accelerator 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 that the adapter is DEFINED instead of AVAILABLE, shut down the system unit and check the POWER GXT145 PCI Express Graphics Accelerator adapter to ensure that it is installed

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

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

Learn about features, requirements, and specifications for the feature code (FC) 5767 adapter.

The 2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter is a full duplex, dual port, 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 that uses unshielded twisted pair (UTP) cable for distances of up to 100 meters (328.08 feet). 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 processor 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
      46K6601[*]

      [*]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 the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Adapter size

PCIe short form

Connector information

- Two RJ-45 ports
- Two LED adapter status indicators per port, for link activity and speed

Cabling

Customers supply their own cables. For best performance, use cables that meet CAT5e cabling standards, or later.

Adapter LED states

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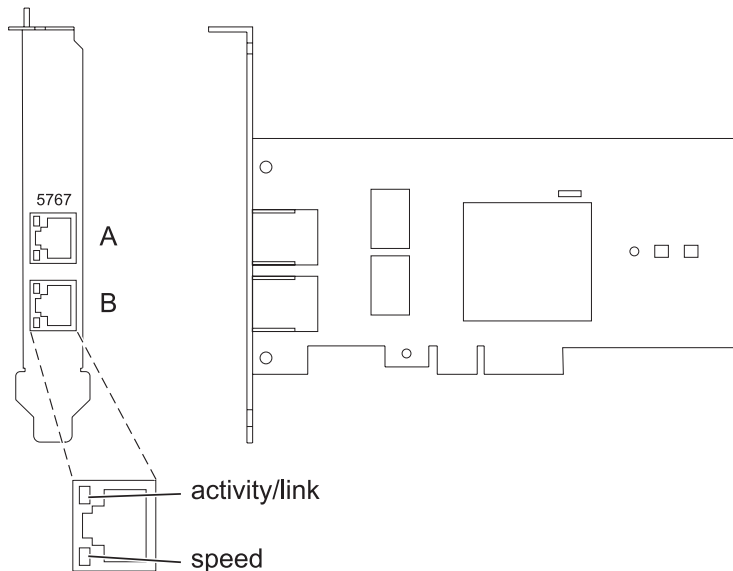

Figure 16. 2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter

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.
	Flashing	Data activity
Speed	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Operating system or partition requirements

The adapter is supported on the following versions of the operating systems:
- AIX
    - AIX Version 7.1, or later.
    - AIX Version 6.1, or later.
    - AIX Version 5.3, or later.
- Linux
    - Red Hat Enterprise Linux 5.6 for POWER, or later.
    - Novel SUSE Linux Enterprise Server 11, Service Pack 1, or later.
-
    - 7.1, or later.
    - 6.1, or later.

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 68 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 67 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 must not 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.
- CAT5e (or later) UTP cables for 1000 Mbps network attachment.
- CAT5 or CAT3 UTP cables for 100 Mbps or 10 Mbps network attachment.

Restriction: The cables can be no longer than 100 meters (328.08 feet) (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."

Gathering tools and documentation

To install the adapter, ensure that 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 is shown.

Fileset	Level	State	Description
Path: /usr/lib/objrepos devices.pciex.14104003.rte	5.*x*.0.0	COMMITTED	2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter

3. Confirm that the devices.pciex.14104003.rte filesets are installed. If no data is shown 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 must 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 notices and Handling static sensitive devices. 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 by 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.

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 processor 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 the maximum adapters supported, see the PCI adapter placement topic collection for your system.
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 on page 70 shows the location of the LEDs. Table 18 on page 70 describes the different LED states and what those states indicate. The following figure shows the adapter.
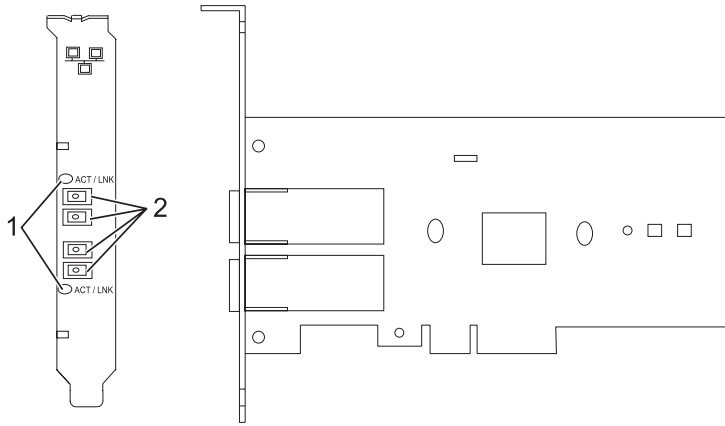
Figure 17. 2-Port Gigabit Ethernet-SX PCI Express Adapter

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

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Operating system or partition requirements

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

- AIX
  - AIX Version 7.1, or later.
  - AIX Version 6.1, or later.
  - AIX Version 5.3, or later.
- Linux
  - Red Hat Enterprise Linux 5.6 for POWER, or later.
  - Novel SUSE Linux Enterprise Server 11, Service Pack 1, or later.
-
  - 7.1, or later.
  - 6.1, or later.

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 71 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 must not 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 must 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 notices and Handling static sensitive devices. 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 by 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.

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

Learn about the features, operating system requirements, and installation procedures for the feature code (FC) 5769 adapter.

Overview

The 10 Gigabit Ethernet-SR PCIe 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.

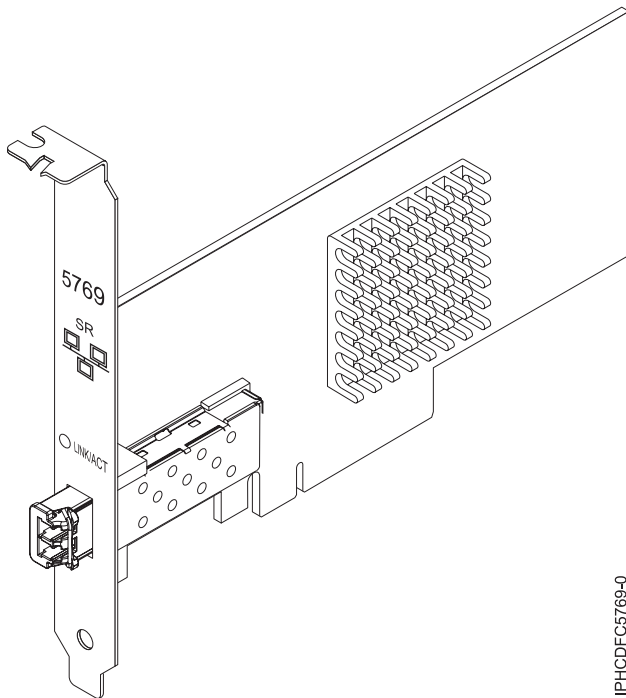The following figure shows the adapter LED and network connector. The following figure shows the adapter.

Figure 18. 10 Gigabit Ethernet-SR PCIe 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
	Flashing	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.		

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Specifications

Item   Description
FRU number
> 46K7897 (Designed to comply with RoHS requirement.)

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

Busmaster
> Yes

Maximum number
> For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

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 adapter provide the following features:
   - PCIe 1.1 x8
   - MSI-X, MSI and support of traditional pin interrupts
   - 10GBASE-SR short-reach optics (850 nm)
   - 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

This adapter is supported for the following versions of operating systems:
- AIX
  - AIX Version 6.1 with the 6100-03 Technology Level, or later
  - AIX Version 5.3 with the 5300-10 Technology Level, or later
- Linux
  - 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

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" on page 75.

Installing the AIX device driver software

To install device driver software, follow the steps in "Installing the AIX device driver software" on page 128.

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.
- 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.

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.
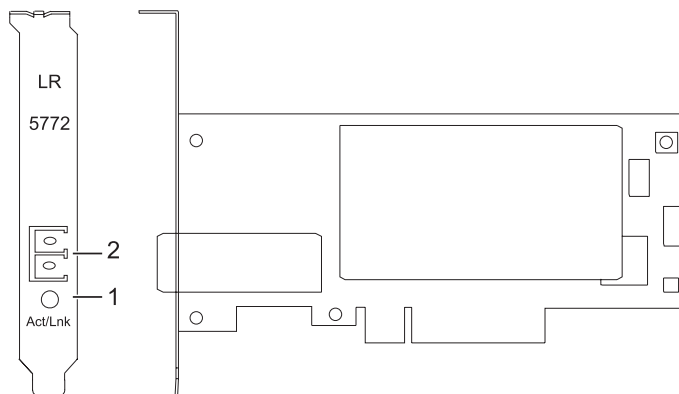
Figure 19. 10 Gigabit Ethernet-LR PCI Express Adapter

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 the maximum adapters supported, see the PCI adapter placement topic collection for your system.
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.

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Operating system or partition requirements

The adapter is supported on the following versions of the operating systems:
* AIX
  – AIX Version 7.1, or later
  – AIX Version 6.1, or later
  – AIX Version 5.3, or later
* Linux
  – Red Hat Enterprise Linux 5.6 for POWER, or later
  – Novel SUSE Linux Enterprise 11 Service Pack 1, or later
*
  – 7.1, or later
  – 6.1, 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 80 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 79 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."

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 78 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 80. 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, see Installing 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 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.

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.		

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 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 with Fibre Channel switches. If you are attaching a device or switch with an SC type fiber connector, you must use an LC-SC 50 micron fiber converter cable (FC 2456) or an LC-SC 62.5 micron fiber converter cable (FC 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 by 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

The following figure shows the adapter.
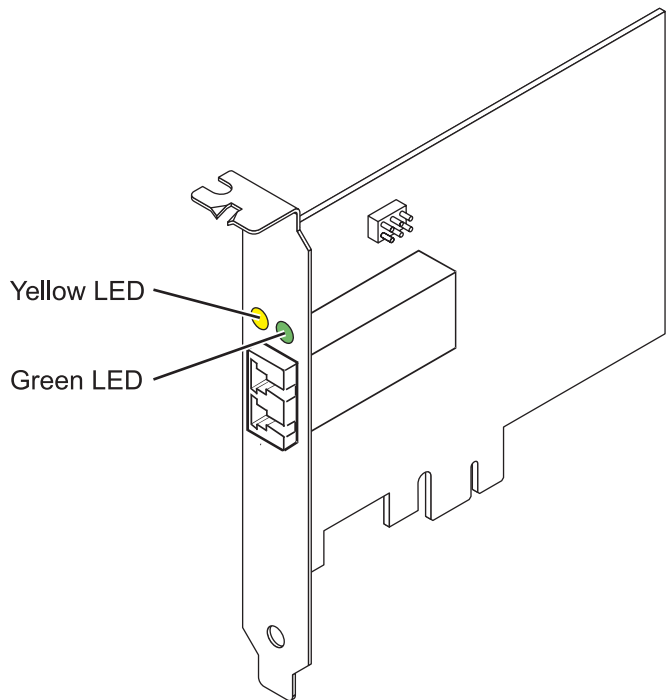
Figure 20. 5773 adapter

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 the maximum adapters supported, see the PCI adapter placement topic collection for your system.

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Operating system or partition requirements

The adapter is supported under the following versions of the operating systems:
- AIX
  - AIX 5L Version 5.3 with the 5300-06 Technology Level, or later
- Linux
  - Red Hat Enterprise Linux version 4 U5
  - 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 whether there are any prerequisites.

Adapter LED states

Green and yellow LEDs can be seen through openings in the mounting bracket of the adapter. 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 flashes (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 flash	1 Gbps link rate - normal, link active

Table 24. Normal LED states (continued)

Green LED	Yellow LED	State
On	2 fast flashes	2 Gbps link rate - normal, link active
On	3 fast flashes	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 flash	Wake-up failure monitor
Off	Fast flash	Failure in post
Off	Flashing	Post processing in progress
On	Off	Failure while functioning
On	On	Failure while functioning
Slow flash	Off	Normal, link down
Slow flash	On	Not defined
Slow flash	Slow flash	Offline for download
Slow flash	Fast flash	Restricted offline mode, waiting for restart
Slow flash	Flashing	Restricted offline mode, test active
Fast flash	Off	Debug monitor in restricted mode
Fast flash	On	Not defined
Fast flash	Slow flash	Debug monitor in test fixture mode
Fast flash	Fast flash	Debug monitor in remote debug mode
Fast flash	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 on page 85. Do not change the jumper settings for a standard installation.
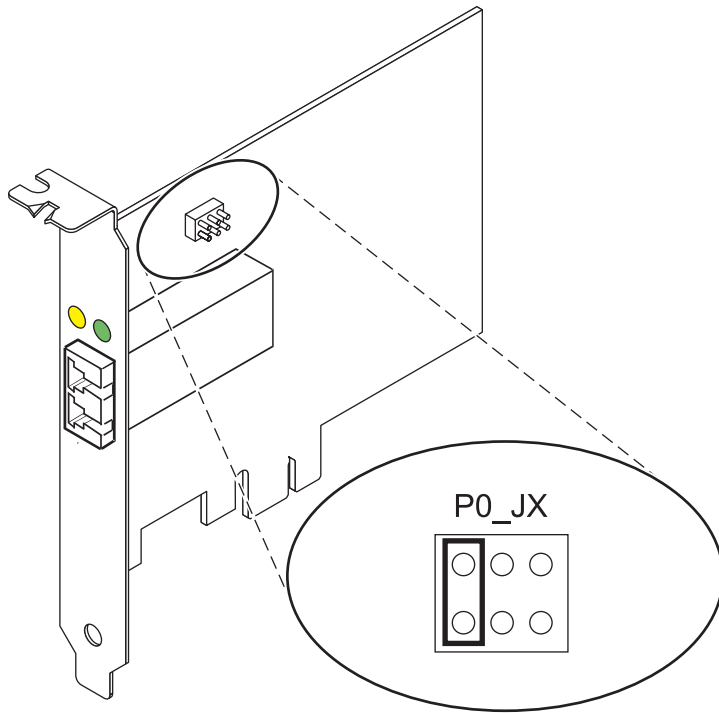
Figure 21. Device ID jumper

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, see *Replacing hot swap HBAs* in the *System Storage® DS4000 Storage Manager Version 9, Installation and Support Guide for AIX, HP-UX, Solaris, and Linux on Power Systems™ Servers*, order number GC26-7848.

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

Learn about the features, operating system requirements, and installation procedures for the 4 Port Async EIA-232 PCIe Adapter (FC 5785).

Overview

This PCI Express (PCIe) adapter has two feature codes associated:
- FC 5785: 4 Port Async EIA-232 PCIe adapter, is the full-height adapter.
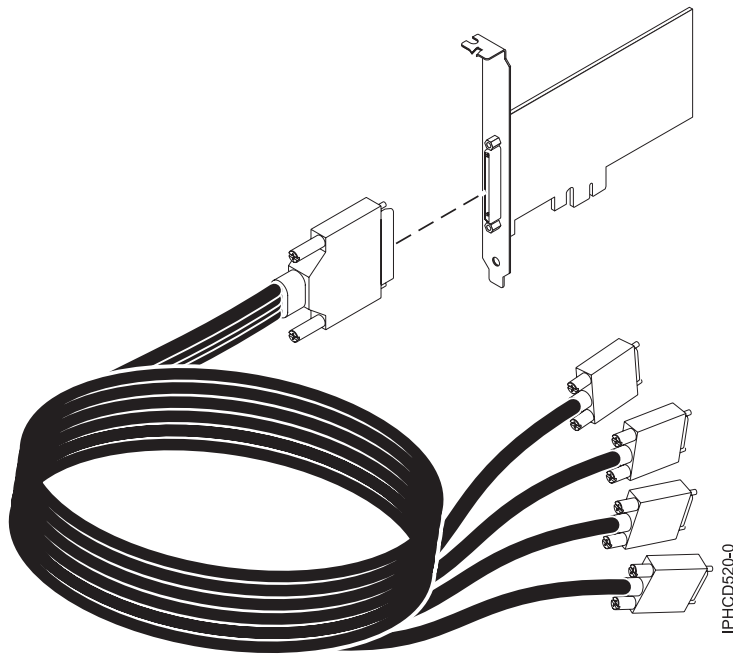- FC 5277: PCIe LP 4-Port Async EIA-232 adapter, is the low-profile adapter.

The 4 Port Async EIA-232 PCIe Adapter (FC 5785) 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.
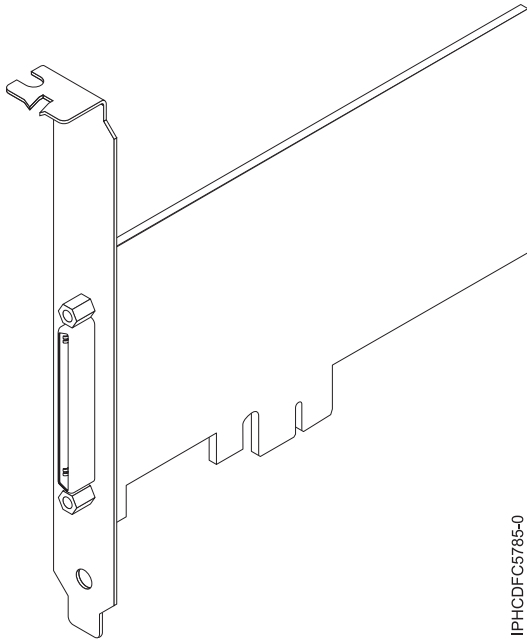
Figure 22. Adapter

Figure 23. 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 the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Adapter size

PCIe 1x, short form factor

Connectors

Adapter: 68-pin SCSI

Cable: 68-pin SCSI to DB 9-pin shell

Wrap plug

42R5143

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Operating system or partition requirements

The adapter is supported on the following operating systems:

- AIX:
  - operating system, or later
  - AIX 6.1, or later
  - AIX 5L Version 5.3 with the 5300-07 Technology Level, or later

  The AIX device package name is `devices.pci.1410a803.rte`.
- Linux:
  - SUSE Linux Enterprise Server 11, or later
  - Red Hat Enterprise Linux Version 5.3, or later
-
  - is not supported.

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 128.

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.

PCIe2 4-port 1GbE Adapter (FC 5899; CCIN 576F)

Learn about the specifications and operating system requirements for the feature code 5899 adapters.

Overview

There are two adapters with the same CCIN. The feature code (FC) 5260 and FC 5899 are the same adapter. FC 5260 is a low-profile adapter and the FC 5899 is a full-height adapter. The names of these two adapters are:

*   FC 5260: PCIe2 LP 4-port 1GbE Adapter
*   FC 5899: PCIe2 4-port 1GbE Adapter

The PCIe2 4-port 1GbE Adapter is a full-height, generation-2 PCIe adapter. This adapter provides four 1-Gb Ethernet ports that can be configured to run at 1000 megabits per second (Mbps) (or 1 gigabit per second (Gbps)), 100 Mbps, or 10 Mbps. Each of the Ethernet ports can be connected by using 4-pair, CAT-5, Unshielded Twisted Pair (UTP) cables up to 100 meters in length. The cables are attached to the copper RJ45 connectors. Each port is independent of one another and supports full-duplex or half-duplex. The half-duplex mode does not support a speed of 1000 Mbps. The adapter conforms to the IEEE 802.3ab 1000Base-T standard and supports jumbo frames when running at 1000 Mbps.

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Specifications

Item   Description
Adapter FRU number
      74Y4063 (Designed to comply with RoHS requirement)
Wrap plug
      10N7405
I/O bus architecture
      PCIe2.0, x4
Slot requirement
      One PCIe x4 slot.
Cables
      4-pair, Cat 5, Unshielded Twisted Pair (UTP) cables are connected to copper RJ45 connectors.
Voltage
      3.3-V
Form factor
      Short, full-height
Maximum number
      For the maximum adapters supported, see the PCI adapter placement topic collection for your system.
Attributes provided
      •   PCIe x4, generation-1 or generation-2
      •   4-Port machine access code (MAC)
      •   High performance IPV4/IPV6 checksum offload
      •   Large Send and Large Receive Support
      •   Multiple Queues

- VIOS

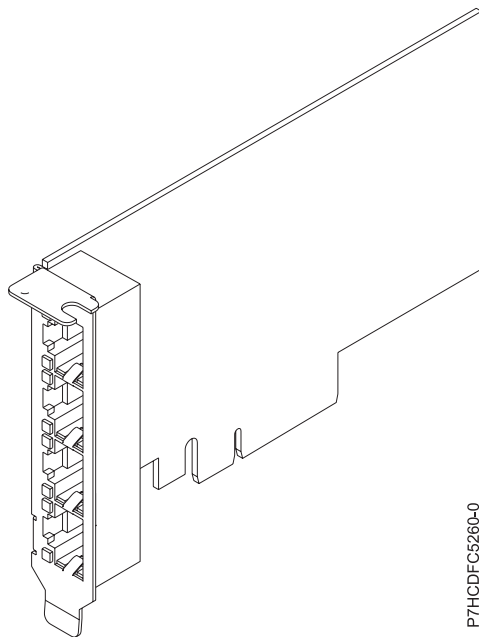The following figure shows the adapter.

Figure 24. Adapter

Operating system or partition requirements

This adapter is supported for the following versions of operating systems:

- AIX
  - AIX Version 7.1 with the 7100-01 Technology Level and Service Pack 4, or later.
  - AIX Version 7.1 with the 7100-00 Technology Level and Service Pack 6, or later.
  - AIX Version 6.1 with the 6100-07 Technology Level, and Service Pack 4, or later.
  - AIX Version 6.1 with the 6100-06 Technology Level, and Service Pack 8, or later.
  - AIX Version 5.3 with the 5300-12 Technology Level and Service Pack 6, or later.
- Linux
  - Red Hat Enterprise Linux 6.2 for POWER, or later.
  - Red Hat Enterprise Linux 5.8 for POWER, or later.
  - SUSE Linux Enterprise Server 11, Service Pack 2, or later (with update package).
  - See the Linux Alert site for the support details.
-
  - 7.1, or later.
  - 6.1 with 6.1.1 machine code 6.1.1, or later.
- VIOS
  - VIOS support requires VIOS 2.2.1.5, or later.

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

Learn about the specifications and operating system requirements for the feature code (FC) 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 by 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 the AIX and Linux operating systems. operating system provides mirroring and data spreading capability. FC 5901 does not support the RAID 5 and RAID 6 configurations. The adapter does not have write cache. (The write performance of RAID 5 and RAID 6 can be poor on adapters that do not provide write cache. Consider using an adapter which provides write cache when using RAID 5 or RAID 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. does not support feature 5901 in multi-initiator and high availability configurations.

Important: See the SAS RAID controllers for AIX, SAS RAID controllers for Linux, or SAS RAID controllers for topics for more information and important considerations for multi-initiator and high availability or dual storage IOA configurations

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).
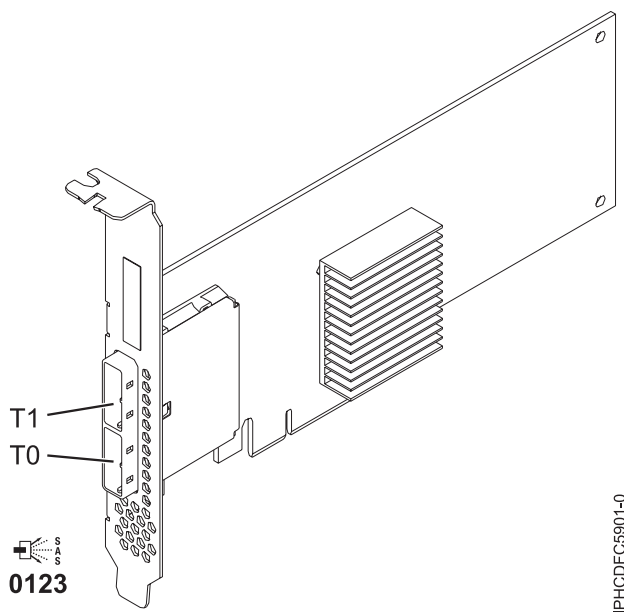

T1
T0

S
A
S

0123

IPHCDFC5901-0

Figure 25. 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
    3.3 V
Form factor
    Short, low-profile
Maximum number
    For the maximum adapters supported, see the PCI adapter placement topic collection for your system.
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 can 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

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Operating system or partition requirements

The adapter is supported on the following versions of the operating systems:
- AIX
  - AIX Version 7.1, or later.
  - AIX Version 6.1, or later.
  - AIX Version 5.3, or later.
- Linux
  - Red Hat Enterprise Linux 5.6 for POWER, or later.
  - Novel SUSE Linux Enterprise Server 11 Service Pack 1, or later.
-
  - 7.1, or later.
  - 6.1, 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 later) for RHEL4 kernels
- iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or later) for RHEL5 kernels
- iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or later) for SLES10 kernels

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 controllers for AIX, SAS RAID controllers for Linux, or SAS RAID controllers for topics for more information and important considerations for multi-initiator and high availability or dual storage IOA configurations

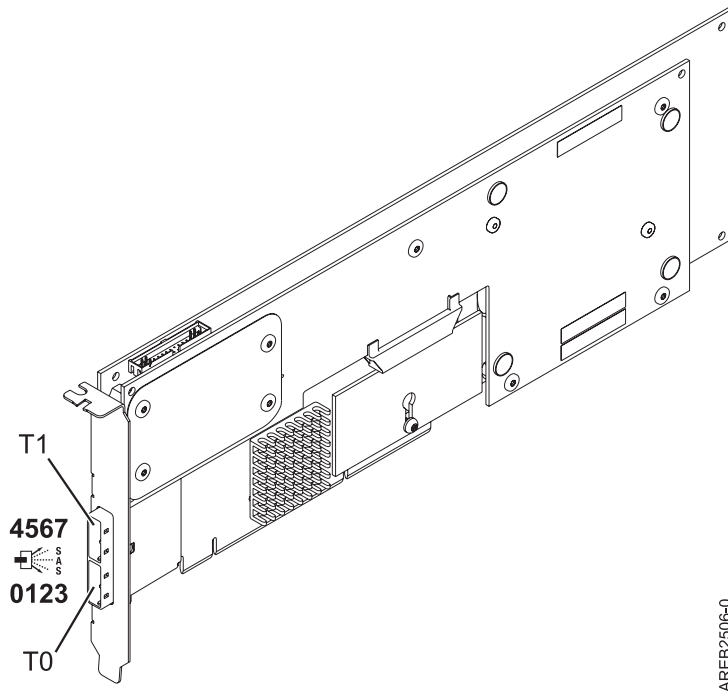The following figure shows the adapter.

Figure 26. 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
>74Y9340 (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 require 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
>For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Attributes provided
>- Eight physical links by way of two external x4 SAS ports provide 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 non-volatile fast write cache
>- RAID 0, 5, 6, 10
>- Concurrent firmware update
>- 440 - 500 Mhz PowerPC (PPC)

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Operating system or partition requirements

This adapter is supported for the following versions of the 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

PCIe Dual - x4 3 Gb SAS RAID Adapter (FC 5903 and FC 5805; CCIN 574E)

Learn about the specifications and operating system requirements for the 5903 / 5805 adapter.

Overview

The PCI Express (PCIe) Dual - x4 3 Gb 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 / 5805 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 / 5805 adapters provide mirrored write-cache data and mirrored RAID parity footprints between the adapters. If the 5903 / 5805 pairing is broken, then write cache is disabled.

Important: See the SAS RAID controllers for AIX, SAS RAID controllers for Linux, or SAS RAID controllers for topics for more information and important considerations for multi-initiator and high availability or dual storage IOA configurations

The 5903 / 5805 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 adequate 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 in case a SAS failure occur.

The 5903 / 5805 contains a LED (**(C)** in Figure 27 on page 95) that flashes if the cache data is present. The cache-data present LED flashes when there is possible data in the cache on the adapter. If the cache data present LED is flashing, do not replace the cache battery pack. If replaced when the LED is flashing, the cache data is lost. See Figure 27 on page 95 to locate the cache-data present LED on this adapter.

Attention: Do not attempt to replace the cache battery pack if the cache-data present LED on the card is flashing. The cache-data present LED indicates that there is possible data in the cache on the adapter. To prevent data loss, first make sure that the system has been shut down correctly. If the cache-data present LED is flashing, refer to one of the following topics before removing the cache battery pack.
- For Linux operating systems, see Displaying rechargeable battery information.
- For AIX operating systems, see Displaying rechargeable battery information.
- For operating systems, see Displaying rechargeable battery information.
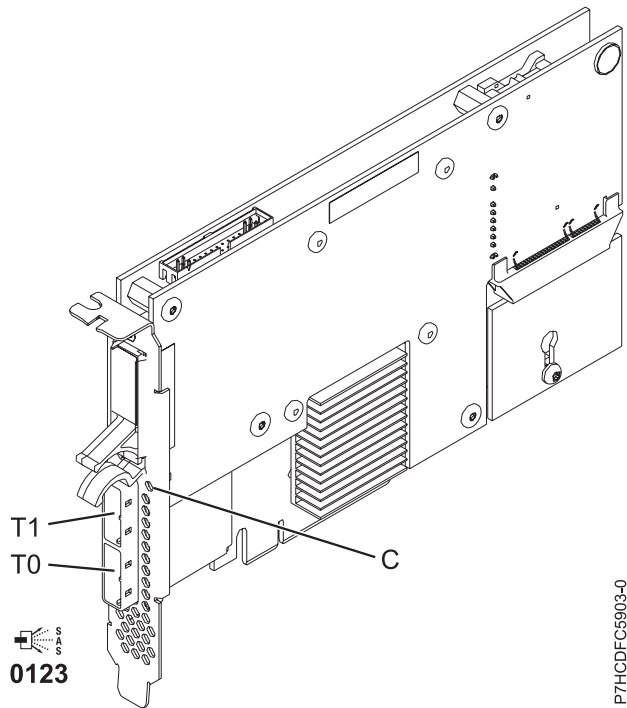
The following figure shows the adapter.

Figure 27. PCIe Dual - x4 3 Gb SAS RAID Adapter

Specifications

Item   Description

Adapter FRU number

      46K4735 (Designed to comply with RoHS requirement.)

Battery FRU number

      44V7597 (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 require 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

      3.3 V

Form factor

      Short

Maximum number

      For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

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 Gbps
- 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

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Operating system or partition requirements

This adapter is supported for the following versions of the 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 Version 5.3 with the 5300-09 Technology Level and Service Pack 2, or later
  - AIX 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
-
  - V5R4M5 and Resave F, or later
  - 6.1 and Resave F, or later
  - 6.1.1 and Resave A, or later, is required for Dual Storage IOA support.

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

Learn about the specifications and operating system requirements for the 5904 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 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 5908 indicates a gen-3 blind swap cassette. This feature is used in the 5790 and 5796.

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.

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.

This adapter supports the multi-initiator and high availability configurations. 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 (top) mini-SAS connector on each card set is used to directly connect the card sets by using a SAS AA cable. See Serial attached SCSI cable planning for more information.

Important: See the SAS RAID controllers for AIX, SAS RAID controllers for Linux, or SAS RAID controllers for topics for more information and important considerations for multi-initiator and high availability or dual storage IOA configurations

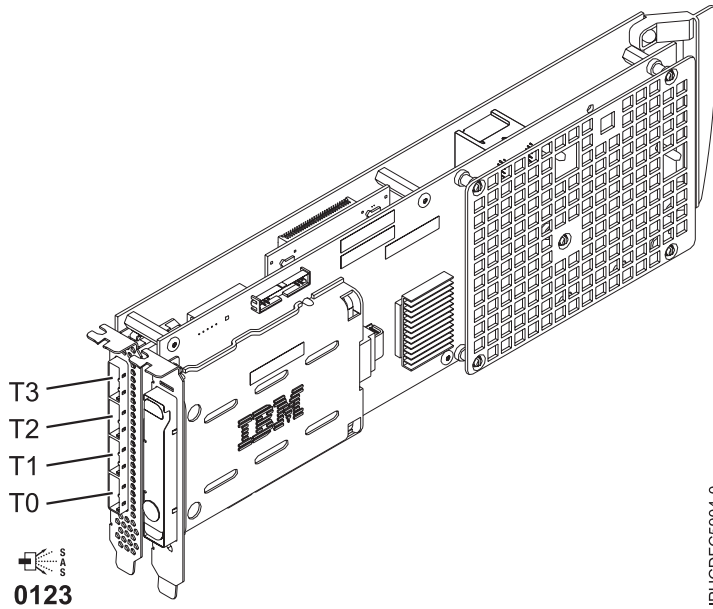The following figure shows the adapter.

Figure 28. PCI-X DDR 1.5 GB 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 (Adapter only) (Designed to comply with RoHS requirement.)

> 44V7627 (Adapter in a gen-2.5 blind swap cassette)

Battery FRU number

> 42R3965 or 74Y5665 (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

> 3.3 V

Form factor

> Long

Maximum number

> For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

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 AA 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
- Solid-state drives (SSDs) supported
- Removable media devices are not supported

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

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 Version 5.3 with the 5300-09 Technology Level and Service Pack 2, or later
  - AIX Version 5.3 with the 5300-10 Technology Level, or later
  - AIX 6.1 Service Pack 8, or later
  - AIX Version 6.1 with the 6100-01 Technology Level 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
-
  - V5R4M5 and Resave F, or later
  - 6.1 and Resave F, or later
  - 6.1.1 and Resave A, or later, is required for Dual Storage IOA support.

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

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 AIX or Linux, you must manually turn off the power and turn on the power to each slot separately.

Important:
- Both PCI slots must be powered off when installing or removing this adapter with the system power turned 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.

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 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 controllers for AIX, SAS RAID controllers for Linux, or SAS RAID controllers for topics for more information and important considerations for multi-initiator and high availability or dual storage IOA configurations
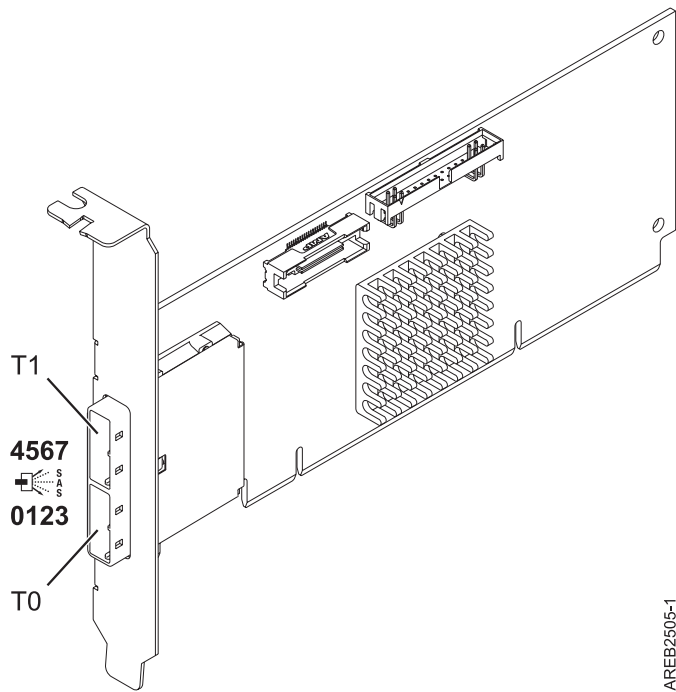
The following figure shows the adapter.

Figure 29. PCI-X DDR External Dual – x4 Port SAS Adapter

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Specifications

Item   Description
Adapter FRU number
    FC 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 the maximum adapters supported, see the PCI adapter placement topic collection for your
    system.
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

The adapter is supported on the following versions of the operating systems:
- AIX
  - AIX 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
- Linux
  - Red Hat Enterprise Linux Version 5, with update 1, or later
  - SUSE Linux Enterprise Server 10, with service pack 1, or later
-
  - V5R4m5, or later (5912 only)
  - 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)

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 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 controllers for AIX, SAS RAID controllers for Linux, or SAS RAID controllers for topics for more information and important considerations for multi-initiator and high availability or dual storage IOA configurations
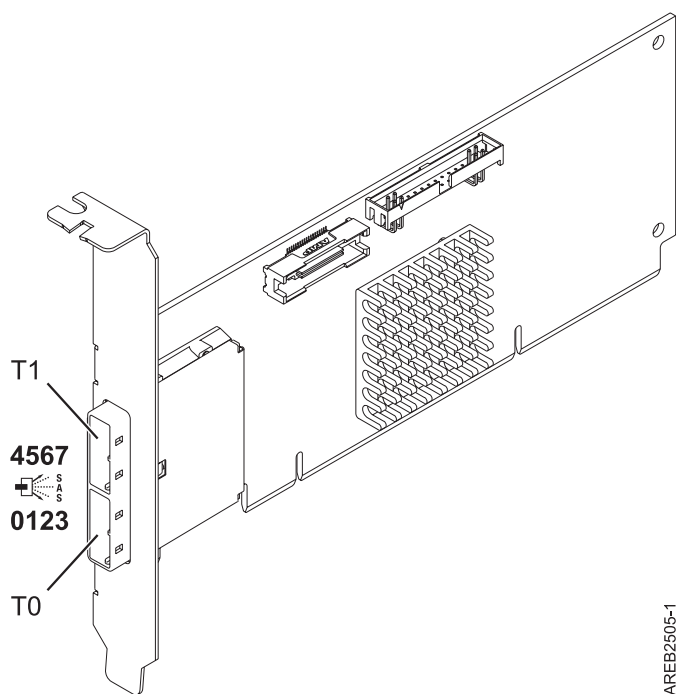
The following figure shows the adapter.

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 the maximum adapters supported, see the PCI adapter placement topic collection for your system.

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)

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Operating system or partition requirements

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

- AIX
  - AIX Version 7.1, or later.
  - AIX Version 6.1, or later.
  - AIX Version 5.3, or later.
- Linux
  - Red Hat Enterprise Linux 5.6 for POWER, or later.
  - Novel SUSE Linux Enterprise Server 11 Service Pack 1, or later.
-
  - 7.1, or later
  - 6.1, or later

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 driver: devices.pci.1410bd02 device driver package.

This adapter requires the following drivers:

- 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)

PCIe2 1.8 GB Cache RAID SAS Tri-port 6 Gb Adapter (FC 5913; CCIN 57B5)

Learn about the specifications and operating system requirements for the FC 5913 adapters.

Overview

The PCI Express (PCIe) generation-2, 1.8 GB Cache RAID SAS Tri-port 6 Gb Adapter is a large cache PCIe2 SAS adapter that provides high-performance capabilities and supports the attachment of serial-attached SCSI (SAS) disks and SAS solid-state drives through mini SAS HD (high density) connectors. The feature code (FC) 5913 has a 1.8 GB write-cache. The adapter must be installed in pairs and must be used in a high availability, multi-initiator RAID configuration with two adapters in dual-controller mode (Dual Storage IOA configuration). Two FC 5913 adapters provide additional performance and adapter redundancy with mirrored write-cache data and mirrored RAID parity footprints between the adapters. If the FC 5913 pairing is broken, then the write cache is disabled. Integrated flash memory with capacitors provides protection of the write cache in case of power failure, without the need for batteries as were used with previous large cache adapters.

To provide the highest bandwidth between two paired feature 5913 adapters for the mirroring of cache data and parity update footprints, a SAS Adapter-to-Adapter (AA) cable is required by default on the third adapter port until maximum device quantity attachment is required. When all three connectors are attaching SAS drives, the communication between the adapter pair is performed through the SAS fabric via the I/O drawer and cabling.

The FC 5913 is a single wide, full-height, short adapter.

Every FC 5913 requires another 6 Gbps SAS RAID adapter (FC 5913) on this server, or on another server, which pairs with the SAS RAID adapter and enables the onboard caches to function. See Figure 31 on page 107 that shows the FC 5913 adapter.

Systems running the AIX or Linux operating systems support either having both 5913 features in the same system or partition, or in two separate systems or partitions. Systems running the operating system do not support the pairing of adapters on different servers or different partitions, so both the 5913 features must be installed on the same system or partition.

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Specifications

Item   Description
Adapter FRU number
        00J0596 (Designed to comply with RoHS requirement)
I/O bus architecture
        PCIe2.0 x8
Slot requirement
        One PCIe x8 slot per adapter.

        Adapters are installed in pairs.

        For higher availability, place adapters in separate enclosures where supported.

Cables

Specific X , YO, AA, or AT SAS cables with HD connectors are used to attach to the expansion drawers.

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.

Voltage

3.3 V

Form factor

Short, full-height

Maximum number

For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Attributes provided

- Provides three mini-SAS high-density (HD) connectors for attaching the SAS drives located in the FC 5887 EXP24S, FC 5886 EXP12S, FC 5802, or FC 5803 12X PCIe I/O drawers. A maximum of three EXP24S, or six EXP12S, or a mix of each can be attached to the same FC 5913 pair.

   Note: If SSDs are installed in one of the FC 5886 EXP12S drawers, then a second FC 5886 is not allowed to be attached (or cascaded) to the first FC 5886 on that port.
- Supports a maximum of 72 hard disk drives or a maximum 24 SSDs (depending on the type of enclosures attached), or a combination of both with specific placement rules for each enclosure.
- If FC 5913 is controlling drives installed in FC 5802 or FC 5803, then the FC 5913 adapter pairs must be located in that FC 5802 or FC 5803 and the AA cable is required on the top mini-SAS HD port of the adapter pair. A FC 5887 EXP24S or FC 5886 EXP12S can be attached to the other port on the FC 5913 pair.
- An AA SAS cable with HD connectors attached to the FC 5913 pair provides a higher performance path for mirrored write-cache data and mirrored RAID parity footprints between the adapters and is required unless all three ports are being used to attach EXP24S or EXP12S I/O drawers.

   Note: Solid-state drives (SSDs) are not allowed on the top port (T2).
- Support of the SAS Serial SCSI Protocol (SSP) and Serial Management Protocol (SMP).
- Provides RAID 0, RAID 5, RAID 6, and RAID 10 with hot-spare capability. System level mirroring through the operating system is also supported. JBOD functionality (512 byte) is not supported except for the initial formatting to 528 bytes of new devices, as required.
- A single pair of FC 5913 adapters is not supported to attach to both halves of an FC 5887 EXP24S drawer configured in mode 2.
- Double looping of the I/O enclosure system connection is suggested to enhance performance when more than four adapters are installed in either FC 5803 or FC 5873.

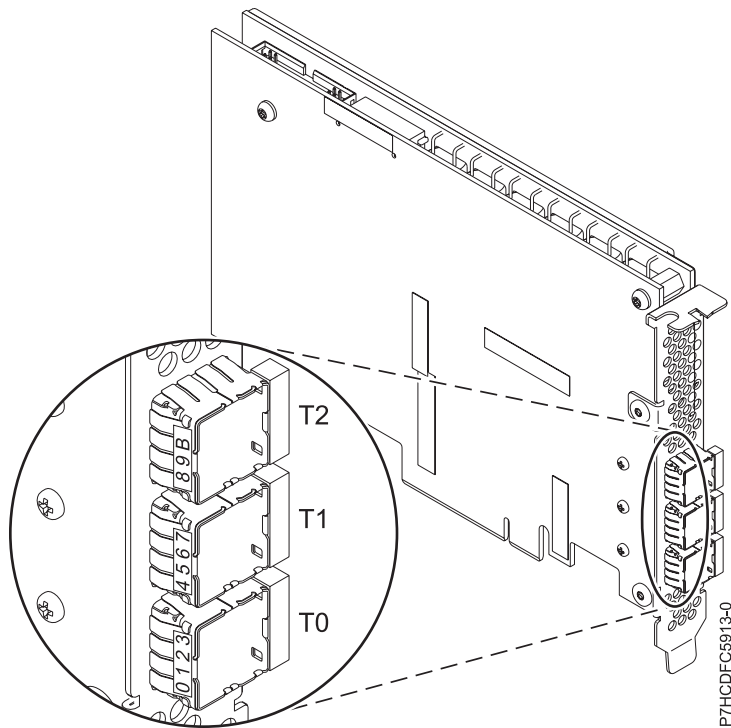The following figure shows the adapter.

Figure 31. 5913 Adapter

Operating system or partition requirements

This adapter is supported for the following versions of operating systems:

- AIX
  - AIX Version 7.1 with the 7100-01 Technology Level, or later
  - AIX Version 7.1 with Service Pack 3, or later
  - AIX Version 6.1 with the 6100-07 Technology Level, and Service Pack 5, or later
  - AIX Version 6.1 with the 6100-06 Technology Level, and Service Pack 5, or later
  - AIX Version 6.1 with the 6100-05 Technology Level, and Service Pack 6, or later
  - AIX Version 5.3 with the 5300-12 Technology Level and Service Pack 4, or later
- Linux
  - Red Hat Enterprise Linux 6.1 for POWER, or later
  - Red Hat Enterprise Linux 5.7 for POWER, or later
  - SUSE Linux Enterprise Server 11, Service Pack 1, or later (with update package)
  - SUSE Linux Enterprise Server 10, Service Pack 4, or later
  - See the Linux Alert site for the support details.
-
  - 7.1 Technology Refresh 3.
  - 6.1.1 with Resave E (RS611-E).
- VIOS
  - VIOS support requires VIOS 2.2.0.12-FP24 SP02, or later

Other important requirements for adapter installation

* If you are attaching a new or existing FC 5886 to an FC 5913 adapter, verify that the latest System Enclosure Services (SES) code is applied to the FC 5886 before attaching to the FC 5913 adapter, see the IBM Prerequisites website.

* If you are attaching a new or existing FC 5887 to an FC 5913 adapter, verify that the latest System Enclosure Services (SES) code is applied to the FC 5887 before attaching to the FC 5913 adapter, see the IBM Prerequisites website.

* If you are installing the FC 5913 in the 02E/4B, 02E/4C, 05F/6B, or 05E/6C system, turn off the acoustic mode by using advanced system management (ASM) options. For instructions, see Configuring the acoustic mode control.

* If you are migrating existing SAS disk enclosures and devices from existing previous SAS adapters, an automatic sector conversion takes place for use with the new FC 5913 adapters. For information about the migrating procedures, see Upgrading the adapter.

POWER6® restrictions

If you are installing the FC 5913 in a POWER6 server, the following restrictions apply:

* The FC 5913 adapter is not supported in the POWER6 system units and must be placed in the I/O expansion units attached to the server units.

* The FC 5913 adapter is not supported for controlling the boot or load source drives on POWER6 systems.

PCIe2 2x10GbE SFP+ Copper 2x1GbE UTP Adapter (FC 5279 and FC 5745)

Learn about the specifications and operating system requirements for the feature code 5279 and feature code 5745 adapters.

Overview

The feature code (FC) 5279 and FC 5745 are both the same adapter. FC 5745 is a full height adapter, and the FC 5279 is a low-profile 2U adapter. The marketing names of these two adapters are:

* FC 5745: PCIe2 2x10GbE SFP+ Copper 2x1GbE UTP Adapter
* FC 5279: PCIe2 LP 2x10GbE SFP+ Copper 2x1GbE UTP Adapter

The PCIe2 2x10GbE SFP+ Copper 2x1GbE adapter is a PCI Express generation-2, four-port Ethernet unified wire adapter with a PCI Express 2.0 host bus interface. The adapter is optimized for cloud computing, virtualization, storage, and other data center applications. The four-port adapter provides two 10 Gb Ethernet ports and two 1 Gb Ethernet ports. The two 10 Gb small form-factor pluggable (SFP+) copper transceiver ports are used for connectivity with other servers or switches in the network. Each SFP+ port provides Ethernet connectivity with a nominal data rate of 10 Gbps (gigabits per second), and uses SFP+ copper twinaxial cables up to 5 m (16.4 ft) in length. Each of the RJ45 ports provides Ethernet connectivity at a data rate of 1 Gbps and are connected with unshielded twisted-pair (UTP) Ethernet cables. The link aggregation and failover features of the adapter are ideal for critical network applications that require redundancy and high availability. Figure 32 on page 109shows the FC 5745 adapter.

Note: The SFP+ twinaxialial copper cables have connectors that are not the same as the AS/400® 5250 connector, the CX4 connector, or the 10 GBASE-T connector.
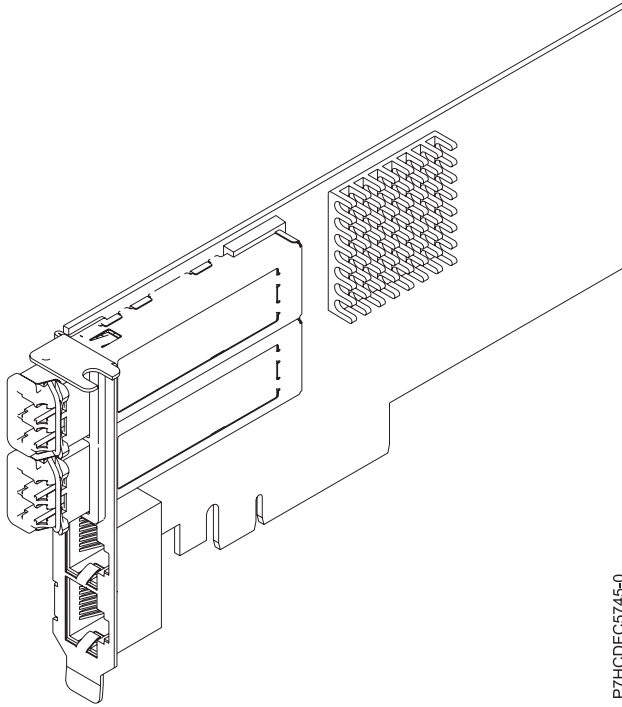
Figure 32. PCIe2 2x10GbE SFP+ Copper 2x1GbE UTP Adapter

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Specifications

Item   Description
Adapter FRU number
>   FC 5279: 74Y1986 (Designed to comply with RoHS requirement)
>
>   FC 5745: 74Y1997 (Designed to comply with RoHS requirement)

I/O bus architecture
>   PCIe2 x8

Slot requirement
>   For the slot priorities, see the PCI adapter placement topic collection for your system.

Cables
>   See "Cables" on page 110 for details

Voltage
>   3.3 V

Form factor
>   Short

Maximum number
>   For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

This adapter is supported for the following versions of the operating system:

- Linux:
    - SUSE Linux Enterprise Server
    - Red Hat Enterprise Linux

Cables

Feature codes 5279 and FC 5745 require the use of compatible SFP+, 10 Gbps, copper, twinaxial, active, Ethernet cables. See Figure 33 for a view of the cable top and cable bottom. These cables are compliant with industry standard specifications SFF-8431 Rev 4.1 and SFF-8472 Rev 10.4, and all applicable IBM requirements.

Note: These cables are EMC Class A compliant.
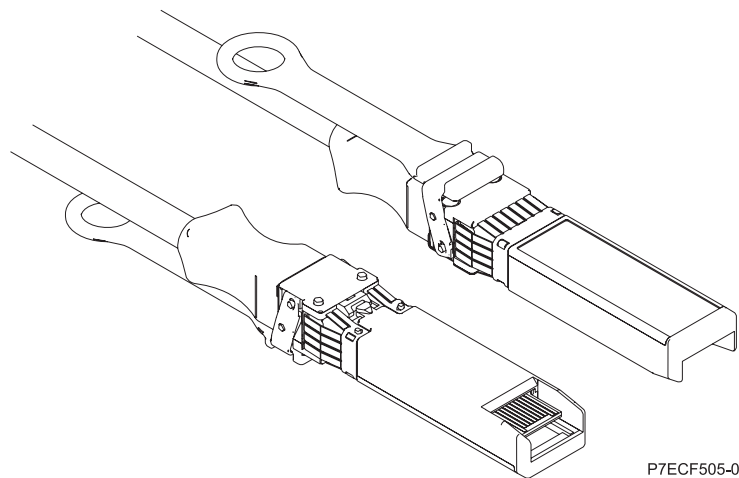
See Table 26 for details about the feature codes.

P7ECF505-0

Figure 33. Top and bottom view of the cable

Table 26. Feature code and part number for varying lengths of the cable

Cable length	1 m (3.28 ft)	3 m (9.84 ft)	5 m (16.4 ft)
Feature code	EN01	EN02	EN03
CCIN	EF01	EF02	EF03
Part number	46K6182	46K6183	46K6184

PCIe2 2x10GbE SR 2x1GbE UTP Adapter (FC 5280 and FC 5744)

Learn about the specifications and operating system requirements for the feature code 5280 and feature code 5744 adapter.

Overview

The FC 5280 and FC 5744 are both the same adapter. FC 5744 is a full-height adapter, and the FC 5280 is a low-profile 2U adapter. The names of these two adapters are:
- FC 5744: PCIe2 2x10GbE SR 2x1GbE UTP Adapter
- FC 5280: PCIe2 LP 2x10GbE SR 2x1GbE UTP Adapter

The PCIe2 2x10GbE SR 2x1GbE UTP adapter is a PCI Express generation-2, four-port Ethernet unified wire adapter with a PCI Express 2.0 host bus interface. The adapter is optimized for cloud computing, virtualization, storage, and other data center applications. The four port adapter provides two 10 Gb Ethernet ports and two 1 Gb Ethernet ports. The two 10 Gb small form-factor pluggable (SFP+) single root (SR) transceiver ports are used for connectivity with other servers or switches in the network. Each SFP+ (SR) port provides Ethernet connectivity with a nominal data rate of 10 Gbps (gigabits per second), and uses the SFP+ copper twinaxial cables up to 5 m (16.4 ft) in length. Each of the RJ45 ports provides

Ethernet connectivity at a data rate of 1 Gbps. The link aggregation and failover features of the adapter are ideal for critical network applications that require redundancy and high availability. Figure 34 shows the FC 5745 adapter.
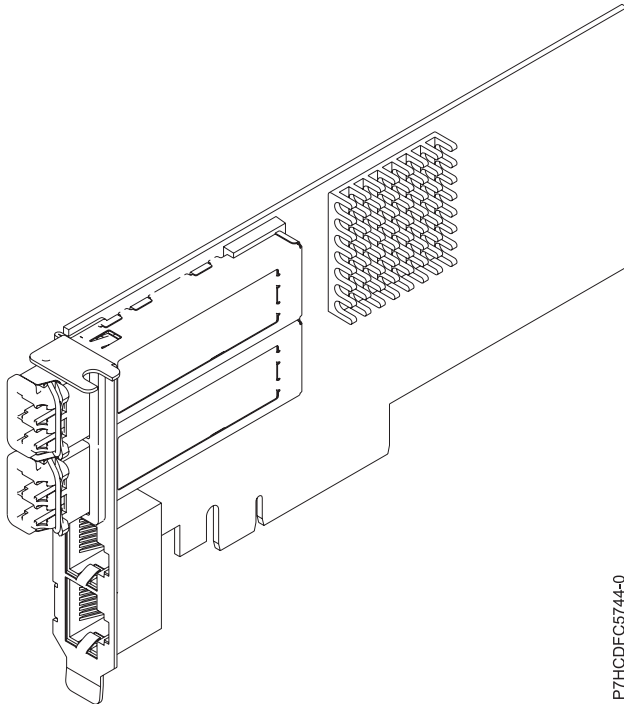
Figure 34. PCIe2 2x10GbE SR 2x1GbE UTP Adapter

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Specifications

Item   Description
Adapter FRU number

> FC 5280: 74Y1988 (Designed to comply with RoHS requirement)

> FC 5744: 74Y1987 (Designed to comply with RoHS requirement)

I/O bus architecture

> PCIe2 x8

Slot requirement

> For the slot priorities, see the PCI adapter placement topic collection for your system.

Cables

> No cables required.

Voltage

> 3.3 V

Form factor

> Short

Maximum number

> For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

This adapter is supported for the following versions of the operating system:
- Linux:
  – SUSE Linux Enterprise Server
  – Red Hat Enterprise Linux

PCIe2 FH 4-Port 8 Gb Fibre Channel Adapter (FC 5729)

Learn about the specifications and operating system requirements for the 5729 adapter.

Overview

The PCIe2 FH 4-Port 8 Gb Fibre Channel Adapter (FC 5729) is a high-performance adapter based on the Emulex LPe12004 PCIe Host Bus Adapter (HBA). FC 5729 is a generation-2 adapter and is supported on systems that support the generation-2 adapters. The adapter provides four Fibre Channel ports. Each Fibre Channel port provides single initiator capability over a fibre link. The ports have LC type connectors and use 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 about the status and link speed of the port.

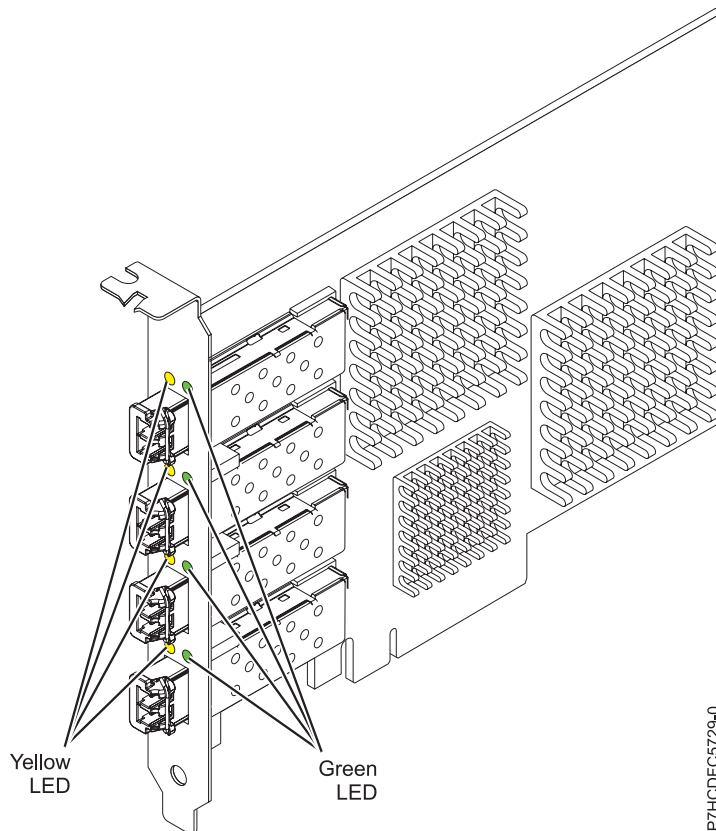The following figure shows the FC 5729 adapter.

Figure 35. FC 5729 adapter

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Adapter specifications

Item   Description

FRU number

74Y3467 (Designed to comply with RoHS requirement)

I/O bus architecture

PCI Express (PCIe) Base 2.0 and x8 PCIe bus interface

Slot requirement

One available PCIe x8 or x16 slot

Voltage

3.3 V

Form factor

Full-height, full-length adapter with standard-size bracket

FC compatibility

2, 4, and 8 gigabit FC devices

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 x km bandwidth
- OM2: Multimode 50/125 micron fibre, 500 MHz x km bandwidth
- OM1: Multimode 62.5/125 micron fibre, 200 MHz x km bandwidth

Because core sizes are different, only OM1 cables can be connected to other OM1 cables. For best results, do not connect OM2 cables to OM3 cables. However, if an OM2 cable is connected to an OM3 cable, the characteristics of the OM2 cable applies 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 27. 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 on the following versions of the operating systems:
- AIX
  - AIX Version 7.1D
  - AIX Version 6.1Q

Adapter LED

Green and yellow LEDs can be seen through openings in the mounting bracket of the adapter. Green indicates firmware operation and yellow signifies port activity. Table 28 on page 114 summarizes the link rate conditions. There is a one second pause when the LED is off between each group of fast flashes (2, 3, or 4). Observe the LED sequence for several seconds to be sure that you have correctly identified the state.

Table 28. Normal LED states

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

Power-on self test (POST) conditions and results are summarized in Table 29. These states can be used to identify abnormal states or problems. Follow the action to be taken for each condition.

Table 29. POST conditions and results

Green LED	Yellow LED	State	Action to be taken
Off	Off	Wake-up failure (dead board)	Perform the AIX or operating system diagnostics.
Off	On	POST failure (dead board)	Perform the AIX or operating system diagnostics.
Off	Slow flashing	Wake-up failure monitor	Perform the AIX or operating system diagnostics.
Off	Fast flashes	POST failure	Perform the AIX or operating system diagnostics.
Off	Flashing	POST processing in progress	None
On	Off	Failure while functioning	Perform the AIX or operating system diagnostics.
On	On	Failure while functioning	Perform the AIX or operating system diagnostics.
Slow flashes	Slow flashing	Offline for download	None
Slow flashes	Fast flashes	Restricted offline mode, waiting for restart	None
Slow flashes	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 adapter has a unique worldwide port name (WWPN). Check the zoning and LUN assignments to ensure that the new adapter functions as expected.

PCIe2 RAID SAS Adapter Dual-port 6Gb (FC ESA1; CCIN 57C4)

Learn about the specifications and operating system requirements for the feature code (FC) ESA1 adapters.

Overview

FC ESA1 and FC ESA2 are adapters with the same CCIN. FC ESA1 is a full-height adapter and the FC ESA2 is a low-profile adapter. The names of these two adapters are:

- FC ESA1: PCIe2 RAID SAS Adapter Dual-port 6Gb
- FC ESA2: PCIe2 RAID SAS Adapter Dual-port 6Gb LP

The PCI Express generation-2 (PCIe2), RAID SAS dual-port 6Gb Adapter provides high-performance solid-state drives (SSD) controller functions by using the PCIe2 technology. The adapter does not have

write cache and thus pairing with another PCIe2 RAID SAS Adapter Dual-port 6Gb (either FC ESA1 or FC ESA2) is optional. Pairing can provide controller redundancy and enhanced performance. There are no batteries in the adapter to maintain.

The PCIe2 RAID SAS Adapter Dual-port 6Gb supports SSD only. Hard disk drives (HDD) are not supported by this adapter. The 69 GB SSD features are not supported.

The adapter provides two mini-SAS high density (HD) connectors for the attachment of SSDs located in the FC 58/87 EXP24S, FC 58/02, or FC 58/03 12X PCIe I/O drawers. X , YO, or AT SAS cables with HD connectors are used to attach to these drawers. A maximum of 18, 26, or 24 SSD can be controlled depending on the I/O drawers being used. Only one drawer can be controlled. The FC 58/02 12X PCIe I/O drawer has a maximum of 18 SSDs. The FC 58/03 PCIe I/O Drawer has a maximum of 26 SSDs. The FC 58/87 EXP24S Drawer has a maximum of 24 SSDs. If the SSDs are located in FC 58/02 or FC 58/03, one or both of the controlling adapter pair must be located in that FC 58/02 or FC 58/03.

A single adapter or a pair of adapters provides RAID 0, RAID 5, RAID 6, and RAID 10 configurations for systems or partitions running the AIX or Linux operating system and VIOS. The PCIe2 RAID SAS Adapter Dual-port 6Gb does not support JBOD. The adapter provides RAID 5 and RAID 6 for systems or partitions running the operating system. provides both mirroring and data spreading. Systems or partitions running the AIX or Linux operating system and VIOS provide mirroring (logical volume manager (LVM)).

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Specifications

Item   Description
Adapter FRU number
    00E6727 (Designed to comply with RoHS requirement)
I/O bus architecture
    PCIe2.0 x8
Slot requirement
    One PCIe2, x8, slot per adapter.
Cables
    Specific X , YO, or AT SAS cables with HD connectors are used to attach to the expansion drawers.
Voltage
    3.3 V
Form factor
    Regular, full-height
Maximum number
    For the maximum adapters supported, see the PCI adapter placement topic collection for your system.
Attributes provided
    • High-performance SSD SAS adapter without write cache
    • Optional pairing (Multi-Initiator and High Availability or Dual Storage IOA)
    • Support of the SAS Serial SCSI Protocol (SSP) and Serial Management Protocol (SMP).

Operating system or partition requirements

This adapter is supported for the following versions of operating systems:
• AIX
    – AIX Version 7.1 with the 7100-01 Technology Level, and Service Pack 4, or later.
    – AIX Version 7.1 with the 7100-00 Technology Level, and Service Pack 6, or later.

- AIX Version 6.1 with the 6100-07 Technology Level, and Service Pack 4, or later.
- AIX Version 6.1 with the 6100-06 Technology Level, and Service Pack 8, or later.
- AIX Version 5.3 with the 5300-12 Technology Level, and Service Pack 6, or later.
- Linux
  - Red Hat Enterprise Linux 6.2 for POWER, or later
  - Red Hat Enterprise Linux 5.8 for POWER, or later
  - Novel SUSE Linux Enterprise Server 11, Service Pack 2, or later (with update package)
  - Novel SUSE Linux Enterprise Server 10, Service Pack 4, or later
  - See the Linux Alert site for the support details.
-
  - 6.1.0 with machine code 6.1.1, or later.
- VIOS
  - VIOS support requires VIOS 2.2.1.5, or later

PCIe2 LP 2-Port 10GbE RoCE SFP+ Adapter (FC EC27 and FC EC28)

Learn about the specifications and operating system requirements for the feature code (FC) EC27 and FC EC28 adapters.

Overview

The FC EC27 and FC EC28 are the same adapter. FC EC28 is a full-height adapter, and the FC EC27 is a low-profile adapter. The names of these two adapters are:

- FC EC27: PCIe2 LP 2-Port 10GbE RoCE SFP+ adapter
- FC EC28: PCIe2 2-Port 10GbE RoCE SFP+ adapter

The adapter is a PCIe generation-2 (PCIe2), dual port, 10-Gigabit Ethernet (GbE) adapter with a PCIe 2.0 host bus interface. The adapter delivers high-bandwidth and low-latency 10 GbE connectivity. The adapter is optimized for high-transaction databases, cloud computing, virtualization, storage, and other data center applications. The adapter improves network performance by increasing available bandwidth to the central processing unit (CPU) and providing enhanced performance. The two 10 Gb small form-factor pluggable (SFP+) transceiver ports are used for connectivity with other servers or switches in the network. Each SFP+ port provides Ethernet connectivity with a nominal data rate of 10 gigabits per second (Gbps), and uses the SFP+ copper twinaxial cables up to 5 m (16.4 ft) in length. The link aggregation and failover features of the adapter are ideal for critical network applications that require redundancy and high availability.

See the topics for the placement rules relevant for your system, if the adapter is supported on that system.

Specifications

Item   Description

Adapter FRU number
　　　FC EC27: 74Y1988 (Designed to comply with RoHS requirement)

　　　FC EC28 74Y1987 (Designed to comply with RoHS requirement)

I/O bus architecture
　　　PCIe2 x8

Slot requirement
　　　For the slot priorities, see the PCI adapter placement topic collection for your system.

Cables
　　　See "Cables" on page 117 for details

Voltage

    3.3 V

Form factor

    Short

Maximum number

    For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

This adapter is supported for the following versions of the operating system:

- AIX:
  - AIX Version 7.1 with the 7100-01 Technology Level and Service Pack 3, or later
  - AIX Version 6.1 with the 6100-07 Technology Level and Service Pack 3, or later
- Linux: Not supported.
- : Not supported.

Cables

Feature codes EC27 and EC28 require the use of compatible SFP+, 10 Gbps, copper, twinaxial, active, Ethernet cables. See Figure 36 for a view of the cable top and cable bottom. These cables are compliant with industry standard specifications SFF-8431 Rev 4.1 and SFF-8472 Rev 10.4, and all applicable IBM requirements.

Note: These cables are EMC Class A compliant.

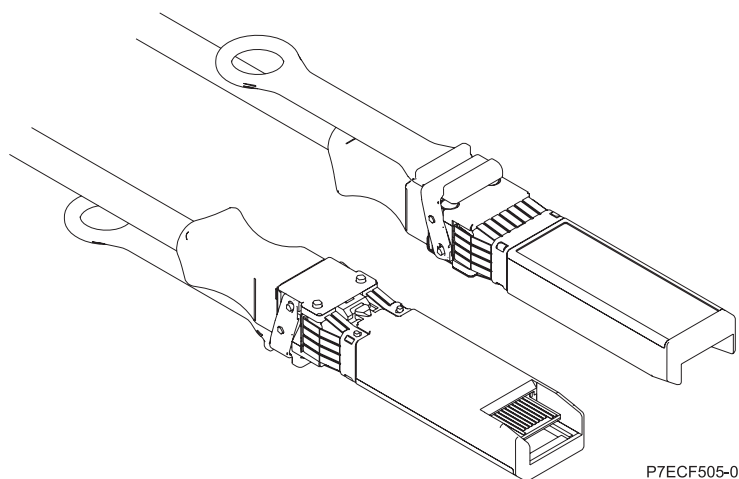See Table 30 for details about the feature codes.

P7ECF505-0

Figure 36. Top and bottom view of the cable

Table 30. Feature code and part number for varying lengths of the cable

Cable length	1 m (3.28 ft)	3 m (9.84 ft)	5 m (16.4 ft)
Feature code	EN01	EN02	EN03
CCIN	EF01	EF02	EF03
Part number	46K6182	46K6183	46K6184

Maintaining the rechargeable battery on the 57B7, 57CF, 574E, and 572F/575C SAS adapters

Learn about the rechargeable battery maintenance tasks that include displaying rechargeable battery information, forcing a rechargeable battery error, and replacing the rechargeable cache battery pack.

About this task

Attention: Use these procedures only if directed from an isolation procedure or a maintenance analysis procedure (MAP).

The following topics provide information about maintaining the rechargeable battery on the SAS adapters for the systems or logical partition running on the different operating systems.

For information about maintaining the rechargeable battery for systems running on the AIX operating system, see Maintaining the rechargeable battery on the 57B7, 57CF, 574E, and 572F/575C SAS adapters.

For information about maintaining the rechargeable battery for systems running on the Linux operating system, see Rechargeable battery maintenance.

For information about maintaining the rechargeable battery for systems running on the operating system, see Rechargeable battery maintenance.

Replacing SCSI RAID disk-controller cache battery packs

Learn how to remove or replace the cache battery from its controller.

Replacing this feature is a customer task. You can perform this task yourself, or contact an authorized service provider to perform the task for you. You might be charged a fee by the authorized service provider for this service.

To complete the procedures for the adapters, you might also need to use removal and replacement procedures for PCI adapters.

Replacing the cache battery pack on the 571B adapter

Learn how to replace the cache battery pack on the controller.

About this task

The following procedure describes how to replace a cache battery pack on the PCI-X DDR Dual Channel Ultra320 SCSI RAID adapter, CCIN 571B. The following feature codes apply to the 571B adapter.

Feature	CCIN	Description
0658 1913 5737 5776	571B	PCI-X DDR Dual Channel Ultra320 SCSI RAID adapter

Replacing this feature is a customer task. You can perform this task yourself, or contact an authorized service provider to perform the task for you. You might be charged a fee by the authorized service provider for this service.

Important: Removing the cache battery with the system or partition already in a powered-off state might result in the loss of customer data. If the system has been powered off *prior* to the battery service action, you *must* IPL to DST and continue this procedure *before* replacing the battery.

For information about replacing the cache battery pack on an AIX system or partition, see the *PCI-X SCSI RAID Controller Reference Guide for AIX*.

For information about replacing the cache battery pack on a Linux system or partition, see the *PCI-X SCSI RAID Controller Reference Guide for Linux*.

Replacing the cache battery pack on the 571F and 575B adapters

You might need to replace the cache battery pack. Use the procedure in this section to perform this task.

About this task

This procedure describes how to replace the cache battery pack on the PCI-X DDR double wide quad channel Ultra 320 SCSI RAID adapter with auxiliary write cache, CCIN 571F (controller) and 575B (cache). The following feature codes apply to this double-wide adapter.

Feature	CCIN	Description
0650 0651 5739 5746 5778 5781 5782	571F 575B	PCI-X DDR double wide quad channel Ultra 320 SCSI RAID adapter with auxiliary write cache

Note: The cache battery for both the 571F adapter and the 575B adapter is contained in the single battery FRU that is physically located on the 575B auxiliary write cache adapter. The functions of forcing the battery pack into an error state and starting IOA cache on either adapter in the card set will result in the same functions automatically being performed on the other adapter in the card set.

Replacing this feature is a customer task. You can perform this task yourself, or contact an authorized service provider to perform the task for you. You might be charged a fee by the authorized service provider for this service.

Important: Removing the cache battery with the system or partition already in a powered-off state might result in the loss of customer data. If the system has been powered off *prior* to the battery service action, you *must* IPL to DST and continue this procedure *before* replacing the battery.

For information about replacing the cache battery pack on an AIX system or partition, see the *PCI-X SCSI RAID Controller Reference Guide for AIX*.

For information about replacing the cache battery pack on a Linux system or partition, see the *PCI-X SCSI RAID Controller Reference Guide for Linux*.

Replacing the cache battery pack on the 571E, 574F, 2780, or 5708 adapters

Learn how to replace the cache battery pack.

About this task

This procedure describes how to replace the cache battery pack on the adapters listed in the following table

Feature	CCIN	Description
5582 5583	571E 574F	PCI-X DDR Quad Channel Ultra 320 SCSI RAID adapter with an auxiliary-write cache IOA
0627 2780	2780	PCI-X Ultra4 RAID disk-controller
0641 5590	2780 574F	PCI-X Ultra4 RAID disk-controller with an auxiliary-write cache IOA
5580	2780 5708	PCI-X Ultra4 RAID disk-controller auxiliary-write cache IOA
0649 5738 5777	571E	PCI-X DDR Quad Channel Ultra 320 SCSI RAID adapter

Replacing this feature is a customer task. You can perform this task yourself, or contact an authorized service provider to perform the task for you. You might be charged a fee by the authorized service provider for this service.

Important: Removing the cache battery with the system or partition already in a powered-off state might result in the loss of customer data. If the system has been powered off *prior* to the battery service action, you *must* IPL to DST and continue this procedure *before* replacing the battery.

For information about replacing the cache battery pack on an AIX system or partition, see the *PCI-X SCSI RAID Controller Reference Guide for AIX*.

For information about replacing the cache battery pack on a Linux system or partition, see the *PCI-X SCSI RAID Controller Reference Guide 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.
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.

Before you begin

Attention: Before continuing with this procedure, determine that it is safe to replace the cache battery pack. See Displaying rechargeable battery information. It is safe to replace the cache battery pack when **Yes** is displayed next to **Battery pack can be safely replaced**.

About this task

Complete the following steps to replace a nonconcurrent maintainable battery pack.

Procedure

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.
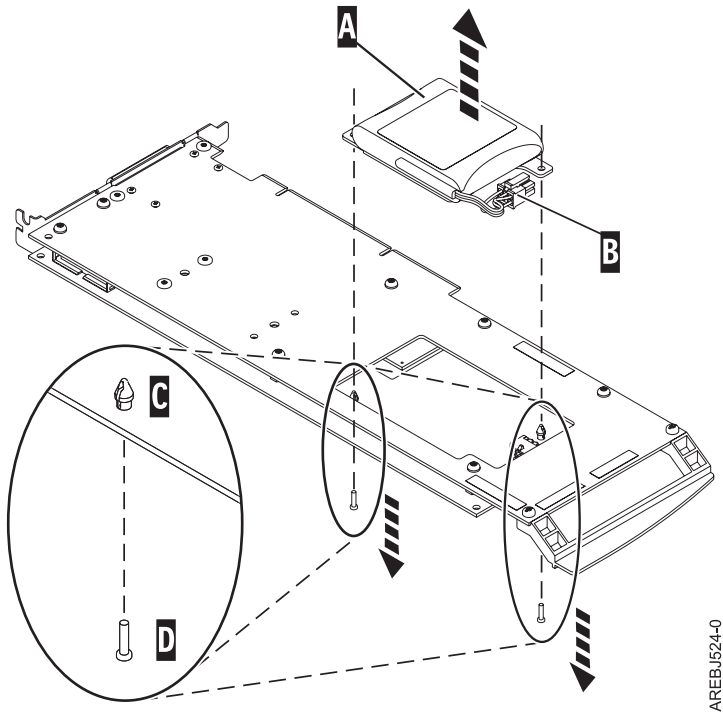
Figure 37. Removing the cache battery

(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 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.

Before you begin

Attention: Before continuing with this procedure, determine that it is safe to replace the cache battery pack. See "Maintaining the rechargeable battery on the 57B7, 57CF, 574E, and 572F/575C SAS adapters" on page 118. 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 for the LED details and its location.

About this task

Complete the following steps to replace a 572F/575C concurrent maintainable battery pack.

Procedure

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)**.
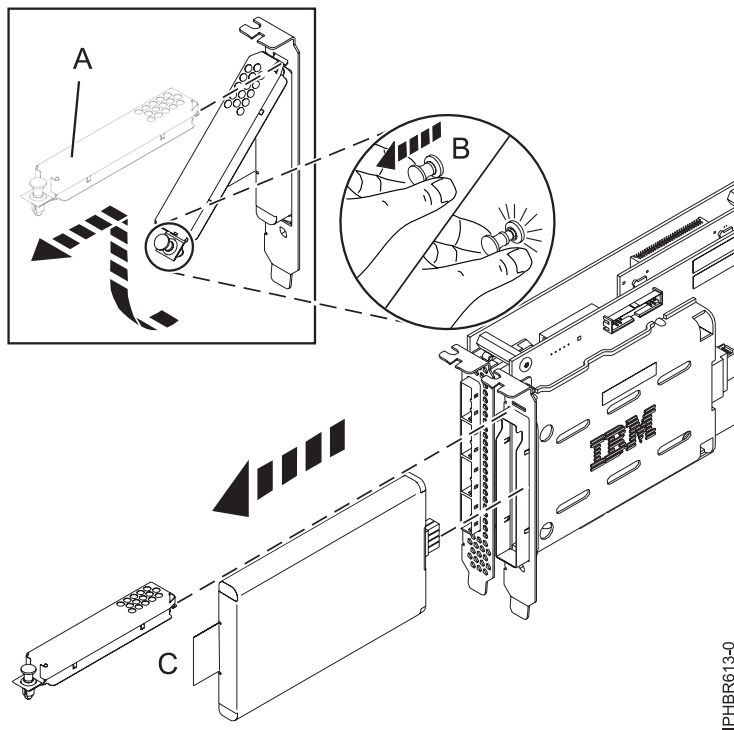
Figure 38. Replacing the 572F/575C cache battery

   (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`.

Replacing a 57B7 concurrent maintainable battery pack

Use this procedure to replace the concurrent maintainable battery pack on adapter type CCIN 57B7.

Before you begin

Attention: Before continuing with this procedure, determine that it is safe to replace the cache battery pack, see "Maintaining the rechargeable battery on the 57B7, 57CF, 574E, and 572F/575C SAS adapters" on page 118. 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.
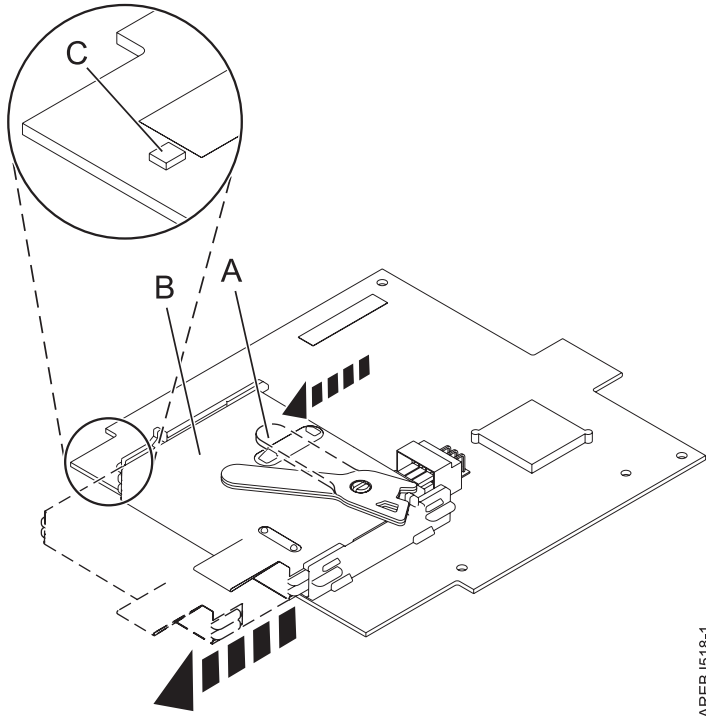
About this task

Complete the following steps to replace a 57B7 concurrent maintainable battery pack.

Procedure

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.

(A) Cache battery lever
(B) Cache battery pack
(C) Cache present LED
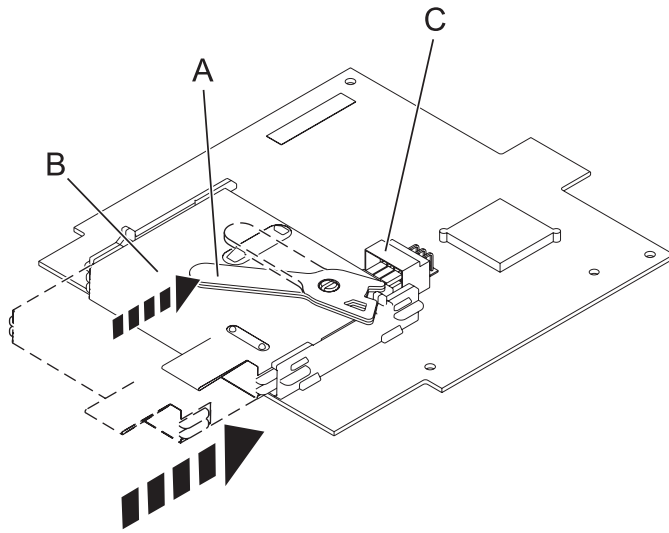
Figure 39. Removing the 57B7 cache battery

2. Move the cache battery lever **(A)** away from the connector to disengage the battery from the connector.

   Note: Hold the RAID auxiliary cache card with one hand to ensure it stays in the connector while using the other hand to move the lever and remove the battery from the card.

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).

AREBJ519-0

Figure 40. 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. Navigate to the **SAS Disk Array Manager** by using the steps in Using the Disk Array Manager.
   b. Select **Diagnostics** and **Recovery** Options.
   c. Select **Controller Rechargeable Battery Maintenance**.
   d. Select **Start Adapter Cache**.
   e. Select the controller with the battery you just replaced.
   f. Press **Enter**.

Replacing a 57CF cache battery pack

Learn how to replace the 57CF cache battery pack.

About this task

To replace the 57CF cache battery pack, see Removing and replacing the 17M/MB, 17M/MC, 79M/HB, or 79M/HC 175 MB cache RAID - dual IOA enablement card cache battery pack.

Replacing a 574E concurrent maintainable battery pack

Use this procedure to replace the concurrent maintainable battery pack on adapter type CCIN 574E.

Before you begin

Attention: Before continuing with this procedure, determine that it is safe to replace the cache battery pack. See "Maintaining the rechargeable battery on the 57B7, 57CF, 574E, and 572F/575C SAS adapters" on page 118. 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.

About this task

Complete the following steps to replace a 574E concurrent maintainable battery pack.

Procedure

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.
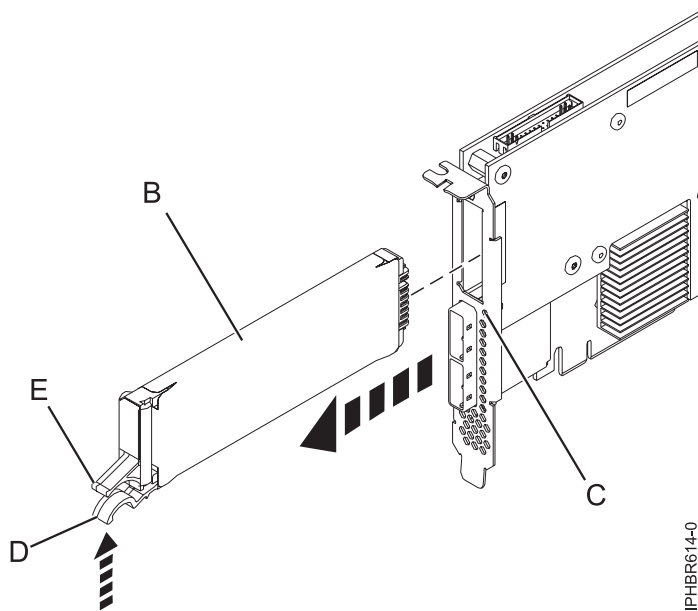

Figure 41. Replacing the 574E cache battery

> **(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`.

Displaying rechargeable battery information

Learn about the procedure to display information about the rechargeable battery in the RAID controller for your operating system.

About this task

The following topics provide the procedures to display rechargeable battery information in the SAS RAID adapters for the system or logical partition running on the different operating systems.

For information about displaying the rechargeable battery information for the system running on the AIX operating system, see Displaying rechargeable battery information.

For information about displaying the rechargeable battery information for the system running on the Linux operating system, see Displaying rechargeable battery information.

For information about displaying the rechargeable battery information for the system running on the operating system, see Displaying rechargeable battery information.

Installing the AIX device driver software

Learn how to install the AIX device driver software for a PCI adapter.

Before you begin

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.

About this task

If you are installing only the device driver for a PCI adapter, perform these steps:

Procedure

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.

About this task

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

Procedure

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.

Results

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.*xxxxxxxxxx*	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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European Community contact:
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Technical Regulations, Department M456
IBM-Allee 1, 71139 Ehningen, Germany
Tele: +49 7032 15-2937
email: tjahn@de.ibm.com

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Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
IBM Deutschland GmbH
Technical Regulations, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 7032 15-2937
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- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
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