Power Systems

Managing PCI adapters for the 8412-EAD, 9117-MMB, 9117-MMC, 9117-MMD, 9179-MHB, 9179-MHC, or 9179-MHD

IBM

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Managing PCI adapters for the 8412-EAD, 9117-MMB, 9117-MMC, 9117-MMD, 9179-MHB, 9179-MHC, or 9179-MHD

IBM

This edition applies to IBM Power Systems servers that contain the POWER7 processor and to all associated models.

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, safety information documentation is included in the publications package (such as in printed documentation, on DVD, or as part of the product) shipped with the product. The documentation 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 documentation. You should also refer to the safety information documentation any time you do not clearly understand any safety information in the U.S. English publications.

Replacement or additional copies of safety information documentation can be obtained by calling the IBM Hotline at 1-800-300-8751.

German safety information

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

Laser safety information

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

Laser compliance

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

DANGER

When working on or around the system, observe the following precautions:
 	
Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
• **Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.**
• **Do not open or service any power supply assembly.**
• **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
• **The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.**
• **Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.**
• **Connect any equipment that will be attached to this product to properly wired outlets.**
• **When possible, use one hand only to connect or disconnect signal cables.**
• **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
• **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
• **Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.**
 	
  To Disconnect:
  1. Turn off everything (unless instructed otherwise).
  2. Remove the power cords from the outlets.
  3. Remove the signal cables from the connectors.
  4. Remove all cables from the devices.
 	
  To Connect:
  1. Turn off everything (unless instructed otherwise).
  2. Attach all cables to the devices.
  3. Attach the signal cables to the connectors.
  4. Attach the power cords to the outlets.
  5. Turn on the devices.
 	
  (D005)

DANGER

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

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

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

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

(R001)

CAUTION:

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

- **Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions:**
  - **Remove all devices in the 32U position and above.**
  - **Ensure that the heaviest devices are installed in the bottom of the rack cabinet.**
  - **Ensure that there are no empty U-levels between devices installed in the rack cabinet below the 32U level.**
- **If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.**
- **Inspect the route that you plan to take to eliminate potential hazards.**
- **Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.**
- **Verify that all door openings are at least 760 x 230 mm (30 x 80 in.).**
- **Ensure that all devices, shelves, drawers, doors, and cables are secure.**
- **Ensure that the four leveling pads are raised to their highest position.**
- **Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.**
- **Do not use a ramp inclined at more than 10 degrees.**
- **When the rack cabinet is in the new location, complete the following steps:**
  - **Lower the four leveling pads.**
  - **Install stabilizer brackets on the rack cabinet.**
  - **If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.**
- **If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.**

(R002)

(L001)

(L002)

(L003)
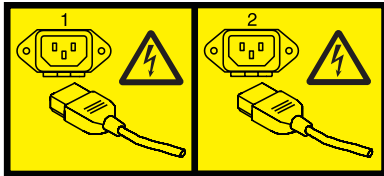
or

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

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

(C026)

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

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

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

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 IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

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

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

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

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

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

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

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

Managing PCI adapters for the 8412-EAD, 9117-MMB, 9117-MMC, 9117-MMD, 9179-MHB, 9179-MHC, or 9179-MHD

Learn about using and managing the peripheral component interconnect (PCI), PCI-X, and PCI Express (PCIe) adapters that are supported for the IBM Power® ESE (8412-EAD), the IBM Power 770 (9117-MMB, 9117-MMC, or 9117-MMD), and the IBM Power 780 (9179-MHB, 9179-MHC, or 9179-MHD) systems. You can learn about the specifications and instructions for specific adapters.

The following features are electromagnetic compatibility (EMC) Class B features. See the Class B Notices in the Hardware Notices section.

Table 1. Electromagnetic compatibility (EMC) Class B features

Feature	Description
1912, 5736	PCI-X DDR 2.0 Dual Channel Ultra320 SCSI Adapter
1983, 5706	Port 10/100/1000 Base-TX Ethernet PCI-X Adapter
1986, 5713	1 Gb iSCSI TOE PCI-X Adapter
2728	4-port USB PCIe Adapter
4764	PCI-X Cryptographic Coprocessor
4807	PCIe Cryptographic Coprocessor
5717	4-port 10/100/1000 Base-TX PCI Express Adapter
5732	10 Gb Ethernet-CX4 PCI Express Adapter
5748	POWER® GXT145 PCI Express Graphics Accelerator
5767	2-port 10/100/1000 Base-TX Ethernet PCI Express Adapter
5768	2-port Gb Ethernet-SX PCI Express Adapter
5769	10 Gb Ethernet-SR PCI Express Adapter
5772	10 Gb Ethernet-LR PCI Express Adapter
5785	4 Port Async EIA-232 PCIe Adapter
EC2G and EL39	PCIe LP 2-Port 10 GbE SFN6122F Adapter
EC2H and EL3A	PCIe LP 2-Port 10 GbE SFN5162F Adapter
EC2J	PCIe 2-Port 10 GbE SFN6122F Adapter
EC2K	PCIe 2-Port 10 GbE SFN5162F Adapter

Related information:

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

Managing PCI adapters for the 8412-EAD, 9117-MMB, 9117-MMC, 9117-MMD, 9179-MHB, 9179-MHC, or 9179-MHD

Learn how to use and manage 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.

See the following sections for SAS RAID enablement procedures:

- SAS RAID controllers for AIX®
- SAS RAID controllers for IBM i
- SAS RAID controllers for Linux

Related reference:

➡ Parts information

PCI Express

Learn about PCI Express (PCIe) adapters and slots.

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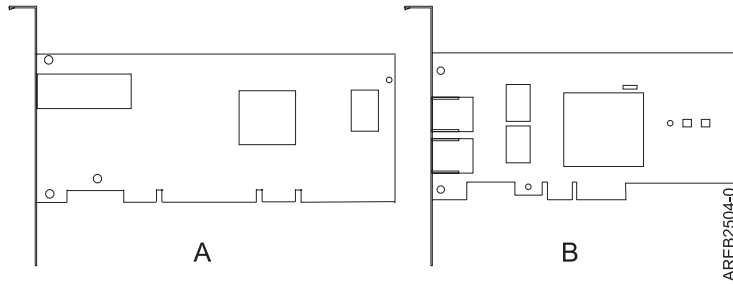
Figure 1. PCI-X adapter and PCIe 4x adapter

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

Table 2. PCIe slot compatibility

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

To learn more about the PCIe standard, see the IBM Redbooks® technote: Introduction to PCI Express.

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 damage. Learn about taking 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 IBMPowerHA® SystemMirror®. The IBMPowerHA SystemMirror software provides a commercial computing environment that ensures that mission-critical applications can recover quickly from hardware and software failures. The support for this configuration is operating system dependent.

HA single system configuration

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

Auxiliary write cache adapter

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

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

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

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

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

Related tasks:

Serial-attached SCSI cable planning
Learn about how to install the SAS cables to the hard disk drives, solid-state drives or CD-ROMs.

Related information:

➟ Logical partioning
Information about logical partioning.

➟ Changing partition profile properties
Information about changing partition profile properties using the HMC.

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

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

SAS RAID controllers for IBM i
Information about usage and maintenance information for the SAS RAID Controller for the IBM i.

SAS RAID controllers for Linux
Information about the useage and maintenance information for the SAS RAID Controller for Linux.

PCI adapter information by feature type for the 8412-EAD, 9117-MMB, 9117-MMC, 9117-MMD, 9179-MHB, 9179-MHC, or 9179-MHD

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).

Related information:

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

8-Port asynchronous EIA-232E/RS-422A PCI Adapter (FC 2943; CCIN 3-B)

Learn about the specifications for the 8-Port asynchronous EIA-232E/RS-422A PCI Adapter.

The 8-Port asynchronous EIA-232E/RS-422A PCI adapter is a multi-channel intelligent serial communications feature that supports speeds of up to 230 Kbps for each asynchronous port and is run by a 32-bit, 20 MHz, IDT 3041 processor.
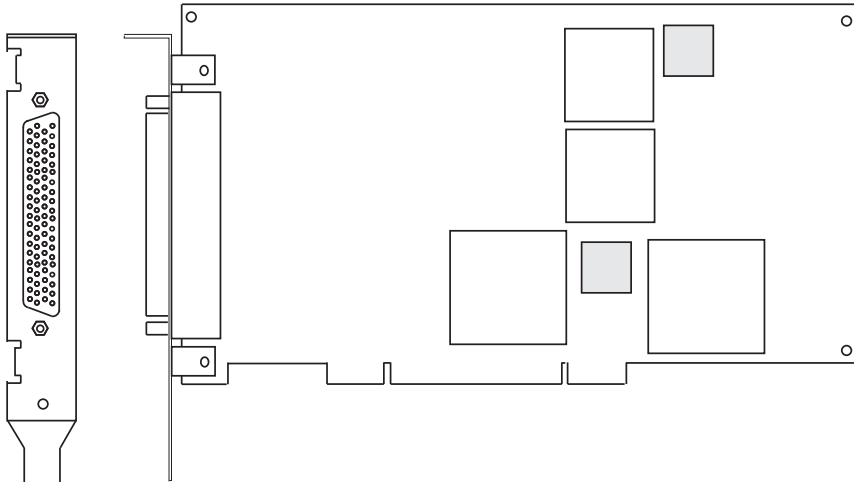
Figure 2. Feature 2943
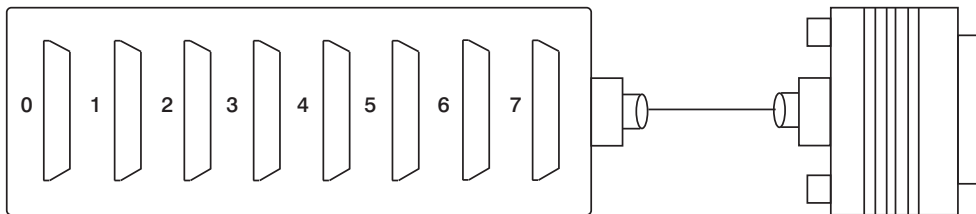
Figure 3. Feature 2943 connector

8-Port asynchronous EIA-232E/RS-422A PCI Adapter specifications

Item   Description
FRU number
> 93H6541 (Not designed to comply with RoHS requirement.)

I/O bus
> PCI

Bit rate
> 50 - 230,000 (set by the program)

Bits for each character
> 5, 6, 7, 8 (set by the program)

Busmaster
> No

Maximum number
> 8

Connector
> 78-pin D-shell female

Wrap plug
> EIA-232 25-pin, part number 6298964. This wrap plug tests all of the adapter functions for both EIA-232 and RS-422.

Cable   8-Port DB-25 connector box, part number 11H5967 included with adapter

Modem cable
> EIA-232 modem cable, part number 6323741, feature code 2936, length 3 meters or 10 feet
>
> RS-422 modem cable, customer supplied (must meet RS-422 requirements)

Terminal/printer cable
> EIA-232 terminal/printer cable, part number 12H1204, feature code 2934, length 3 meters or 10 feet

RS-422 terminal/printer cable, part number 30F8966, feature code 2945, length 20 meters or 66 feet

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

8-Port EIA-232E/RS-422A Adapter 78-position and 25-position connectors

The 8-Port asynchronous EIA-232E/RS-422A PCI adapter is shipped with a connector box that provides eight 25 pin D-shell standard connectors.

Figure 4. 25 pin D-shell standard connectors
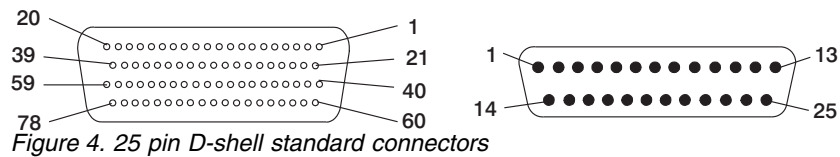
Mnemonic EIA-232E/ RS-422A	I/O	Port 0	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	25-Position Connector
TxD/TxDb	O	30	50	11	10	40	02	63	64	02
RxD/RxDb	I	55	17	37	56	28	08	46	27	03
RTS/TxDa	O	51	31	12	14	21	41	62	60	04
CTS/RxDa	I	16	53	59	57	25	04	09	45	05
DCD/DCD	I	35	33	39	18	43	23	48	06	08
DTR/DTR	O	49	32	13	52	22	03	61	01	20
DSR/DSR	I	54	34	58	38	05	42	29	26	06
RI/NA*	I	36	15	20	19	44	24	47	07	22
SGND**	--	--	--	--	--	--	--	--	--	07
FGND										01, Cable Shield
Notes: 1. * = RTS is wrapped internally to CTS and RI for each port in RS-422 2. ** = Pins 65 through 78 are ground										

Related tasks:

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement
"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe 2-port Async EIA-232 Adapter (FC 5289; CCIN 57D4)
Learn about the specifications and operating system requirements for the feature code (FC) 5289 adapters.

Overview

FC 5289 and 5290 are both the same adapter. FC 5289 is a full-height adapter, and the FC 5290 is a low-profile adapter. The 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.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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:
  – AIX 7.1 with the 7100-01 Technology Level, or later
  – AIX 6.1 with the 6100-07 Technology Level, or later
  – 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.

Related tasks:

Installing PCI adapters

Related reference:

➥ IBM Prerequisite Web page

➥ Parts information

➥ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

2-Port Asynchronous EIA-232 PCI Adapter (FC 5723; CCIN 5723)

Learn about the specifications for the 2-Port Asynchronous EIA-232 PCI Adapter.

Overview

The feature code (FC) 5723 is a 2-port EIA-232 asynchronous serial communications PCI adapter that can be installed in the PCI slots. The adapter is based on the PCI Local Bus Specification Revision 2.2 compliant. The adapter is installed in a single slot and is less than a half-size PCI adapter card.

This adapter provides connection for two asynchronous EIA-232 devices. Ports are programmable to support asynchronous protocols over an EIA-232 interface at line speeds up to 128 Kbps. The two port adapter provides RJ45 Ethernet ports connected using DB-9 connectors.

This adapter has the following features:
- Exar Dual Async Controller, XR17D152
- EIA-232 compatible
- Supports Xon/Xoff offload
- Supports RTS/CTS or DTR/DSR off-load
- Bus width: 32 bit data and address
- Bus speed: 33 MHz
- Universal signaling
- FCC Class-B
- Power consumption: 1.3 watts (nominal), 2.465 watts (maximum)
- Hardware or software flow control
- Custom baud rates
- 16C850 UART equivalent

The following figure shows the adapter:
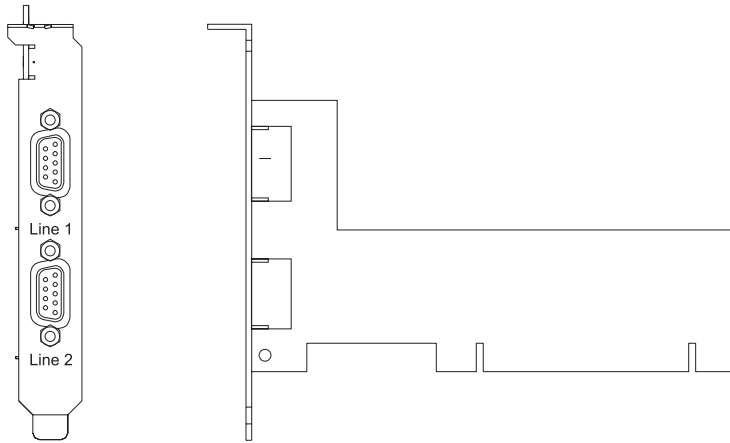
Figure 5. 2-Port Asynchronous EIA-232 PCI Adapter

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Specifications

Item   Description
Adapter FRU number
　　　80P4353 (Designed to comply with RoHS requirement)
I/O bus architecture
　　　PCI 2.2
Slot requirement
　　　For the slot priorities, see the PCI adapter placement topic collection for your system.
Cables
　　　Cat 5 unshielded twisted pair cables
Voltage
　　　5 V or 3.3 V
Form factor
　　　Short
Maximum number
　　　For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

For details about slot priorities and placement rules, 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 5.3, or later.
  - AIX 5L™ Version 5.2 with the 5200-04 Technology Level, or later.
- Linux
  - Red Hat Enterprise Linux version 4.
  - SUSE Linux Enterprise Server 9 SP1.

Note: If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

4-port Async EIA-232 PCIe Adapter (FC 5785; CCIN 57D2)

Learn about the features, operating system requirements, and installation procedures for the feature code (FC) 5785 adapters.

Overview

The FC 5785 is the is full-height adapter similar to FC 5277 (PCIe LP 4-port Async EIA-232 adapter), which is the low-profile adapter.

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

The following figures show the adapter and cable.
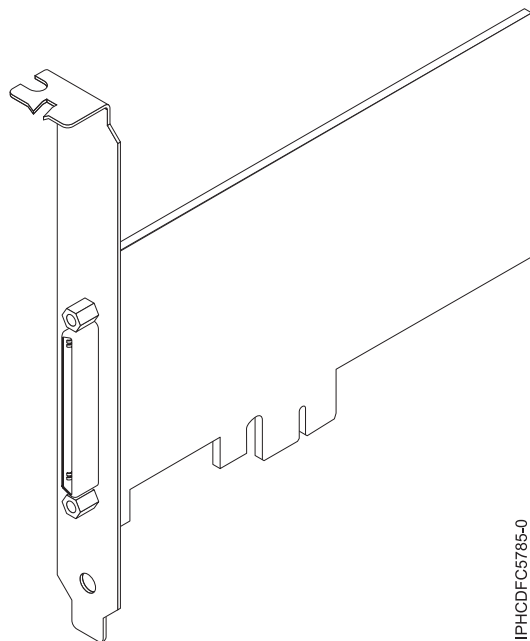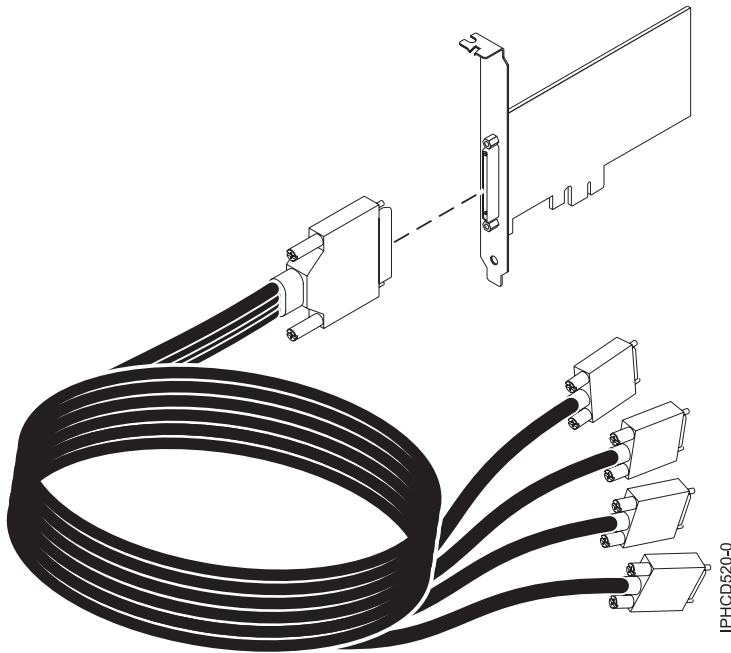
Figure 6. Adapter

Figure 7. 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

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

The adapter is supported on the following operating systems:

- AIX:
  - AIX 7.1, 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

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 276.

Installing the adapter

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

Verifying the adapter installation

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

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

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

Related tasks:

 Installing PCI adapters

Related reference:

 IBM Prerequisite Web page

 Parts information

 PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

2 Gigabit Fibre Channel PCI and PCI-X Adapters (FC 6228, 6239; CCIN 4-W, 5704)

Learn about the specifications and operating system requirements for the 2 Gigabit Fibre Channel PCI and PCI-X adapters.

The 2 Gigabit Fibre Channel PCI and PCI-X Adapters are 64-bit address/data, short form factor PCI and PCI-X adapters 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 2 Gigabit Fibre Channel PCI and PCI-X Adapters will auto-negotiate for the highest data rate (either 1 Gbps or 2 Gbps) of which the device or switch is capable. Distances of up to 500 meters running at 1 Gbps data rate and up to 300 meters running at 2 Gbps data rate are supported between the adapter and an attaching device or switch. When used with IBM Fibre Channel storage switches supporting long-wave optics, distances of up to 10 kilometers are capable of running at either 1 Gps or 2 Gps data rates.

PCI adapter (FC 6228)

The 2 Gigabit Fibre Channel Adapter for 64-bit PCI Bus 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 connector, use of an LC-SC fibre channel conversion cable (#2456) is required.

PCI-X adapter (FC 6239)

The 2 Gigabit 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 connector, use of an LC-SC 50 micron fiber converter cable (#2456) or a LC-SC 62.5 micron fiber converter cable (#2459) is required.

Adapter specifications

Table 3. Feature codes (FC), custom card identification numbers (CCIN) and field replaceable unit (FRU) part numbers

FC	CCIN	FRU
6228	4-W	80P4384*
6239	5704	80P6415*
*Not designed to comply with RoHS requirement.		

Item   Description
Wrap plug FRU number
   11P3847
I/O bus architecture
   PCI 32 and 64-bit data and 33/66 MHz clock frequency

   PCI-X 64-bit data and 66/100/133 MHz clock frequency
Slot requirement
   One available 3.3 volt PCI or PCI-X slot
FC compatibility
   1, 2, 4 Gigabit
Cables
   Multimode 50/125 micron fiber with LC connectors:

   1.0625Gb/sec: 2m – 500m

   2.125Gb/sec: 2m – 300m

   Multimode 62.5/125 micron fiber with LC connectors:
   1.0625Gb/sec: 2m – 300m
   2.125Gb/sec: 2m – 150m
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 5200-04 Technology Level

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

Red Hat Enterprise Linux version 3 U3

SUSE Linux Enterprise Server 9

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Related tasks:

➥ Installing PCI adapters

Related reference:

➥ IBM Prerequisite Web page

➥ Parts information

➥ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

2 Gigabit Fibre Channel PCI-X Adapter (FC 1977, 5716; CCIN 197E, 280B)

Learn about the specifications and operating system requirements for the 2 Gigabit Fibre Channel PCI-X Adapter.

The 2 Gigabit Fibre Channel PCI-X 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 2 Gigabit Fibre Channel PCI-X Adapter auto-negotiates for the highest data rate (either 1 Gbps or 2 Gbps) of which the device or switch is capable. Distances of up to 500 meters running at 1 Gbps data rate and up to 300 meters running at 2 Gbps data rate are supported between the adapter and an attaching device or switch. When used with IBM Fibre Channel storage switches supporting long-wave optics (distances of up to 10 kilometers) are capable of running at either 1 Gbps or 2 Gbps data rates.

The 2 Gigabit Fibre Channel PCI-X Adapter can be used to attach devices either directly, or with Fibre Channel switches. If attaching a device or switch with an SC type fiber connector, use of an LC-SC 50 micron fiber converter cable (FC 2456) or an LC-SC 62.5 micron fiber converter cable (FC 2459) is required.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Adapter specifications

Table 4. Feature codes (FC), custom card identification numbers (CCIN) and field replaceable unit (FRU) part numbers

FC	CCIN	FRU
1977	197E	03N7067[*] or 0H14096[**]
5716	280B	03N7069[*] or 03N6441[**]

Table 4. Feature codes (FC), custom card identification numbers (CCIN) and field replaceable unit (FRU) part numbers (continued)

FC	CCIN	FRU
* Designed to comply with RoHS requirement. ** Not designed to comply with the RoHS requirement.		

Item   Description
Wrap plug FRU number
      12R9314
I/O bus architecture
      PCI 32 and 64 bit data and 33/66 MHz clock frequency

      PCI-X 64 bit data and 66/100/133 MHz clock frequency
Slot requirement
      One available 3.3 volt PCI or PCI-X slot (5 volt tolerant)
FC compatibility
      1, 2, 4 gigabit
Cables
      Multimode 50/125 micron fiber with LC connectors:

      1.0625 Gbps: 2 – 500 m

      2.125 Gbps: 2 – 300 m

      Multimode 62.5/125 micron fiber with LC connectors:

      1.0625 Gbps: 2 – 300 m

      2.125 Gbps: 2 – 150 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 5200-04 Technology Level

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

      Red Hat Enterprise Linux version 3 U3

      SUSE Linux Enterprise Server 9

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

➦ Installing PCI adapters

Related reference:

➦ IBM Prerequisite Web page

➦ Parts information

➦ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

Learn about the specifications and operating system requirements for the feature code (FC) 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.
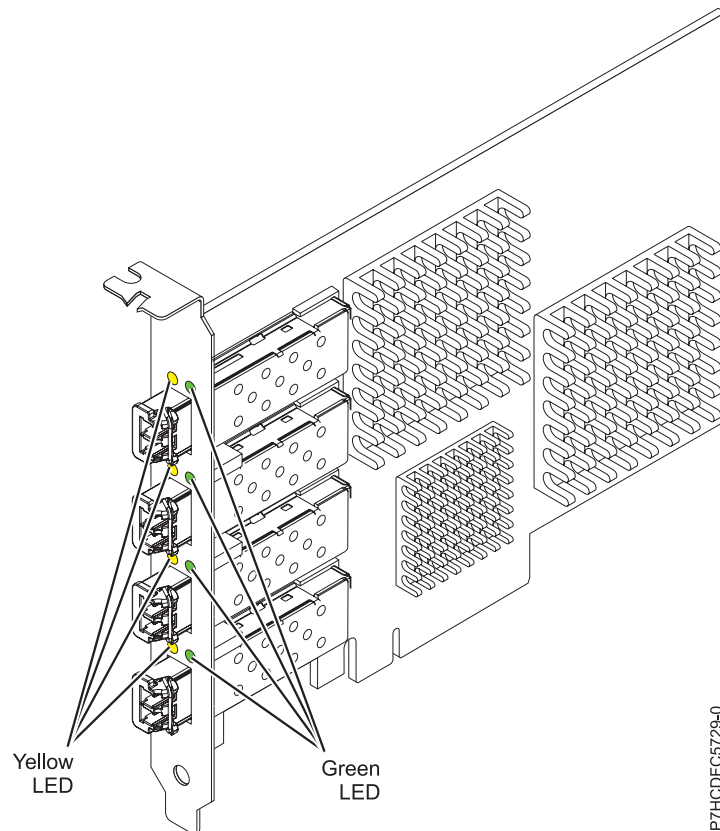
Figure 8. FC 5729 adapter

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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 5. 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

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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

* AIX
  - AIX 7.1
  - AIX 6.1

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 6 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 6. 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 7. These states can be used to identify abnormal states or problems. Follow the action to be taken for each condition.

Table 7. POST conditions and results

Green LED	Yellow LED	State	Action to be taken
Off	Off	Wake-up failure (dead board)	Perform the AIX or IBM i operating system diagnostics.
Off	On	POST failure (dead board)	Perform the AIX or IBM i operating system diagnostics.
Off	Slow flashing	Wake-up failure monitor	Perform the AIX or IBM i operating system diagnostics.
Off	Fast flashes	POST failure	Perform the AIX or IBM i operating system diagnostics.
Off	Flashing	POST processing in progress	None
On	Off	Failure while functioning	Perform the AIX or IBM i operating system diagnostics.
On	On	Failure while functioning	Perform the AIX or IBM i 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.

Related tasks:

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

Learn about the specifications and operating system requirements for the 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 9. 5735 adapter

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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 8. 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

If you are installing a new feature, ensure that you have the software that is required to support the new
feature and that you determine whether there are any prerequisites for this feature and attaching devices.
To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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)
    - For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/
      lopdiags/info/LinuxAlerts.htm)
- IBM i
    - IBM i 7.1, or later.
    - IBM i 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 9 on page 22 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 9. 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 10. These states can be used to identify abnormal states or problems. Follow the action to be taken for each condition.

Table 10. POST conditions and results

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

Replacing Fibre Channel adapters using hot swap

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

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

Related tasks:

➦ Installing PCI adapters

Related reference:

➦ IBM Prerequisite Web page

➦ Parts information

➦ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

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

The 4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR Adapter is a 64-bit address/data, short form factor Peripheral Component Interconnect-X (PCI-X) adapter with an little connector (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 gigabit per second (Gbps), 2 Gbps or 4 Gbps of which the device or switch is capable. Between the adapter and an attaching device or switch, the distances supported are up to: 500 meters running at 1 Gbps data rate, 300 meters running at 2 Gbps data rate, and 150 meters running at 4 Gbps data rate. When used with IBM Fibre Channel storage switches supporting long-wave optics (distances of up to 10 kilometers) are capable running at either 1 Gbps, 2 Gbps, or 4 Gbps data rates.

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

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Adapter specifications

Item   Description
Adapter FRU number
    32N1294[*]

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

    50/125 micron fiber (500 MHz 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.
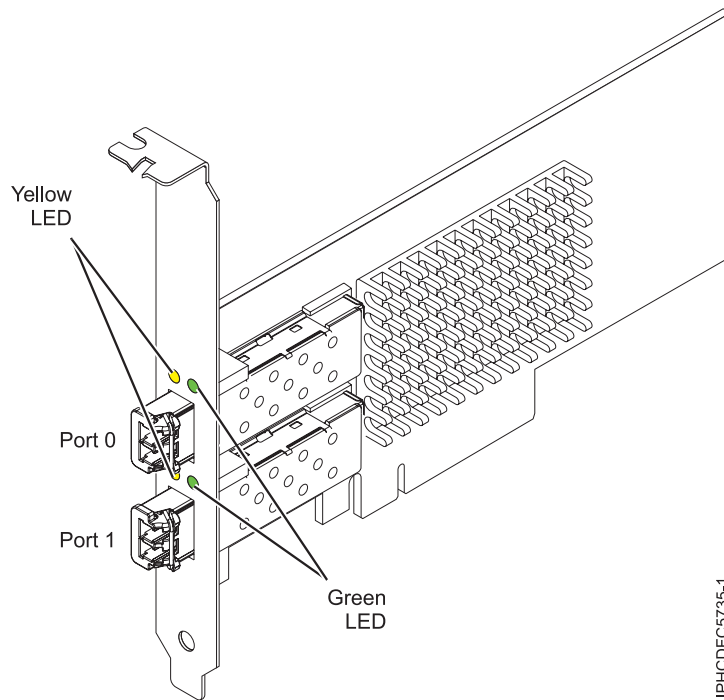
For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

The adapter is supported on the following versions of the operating system:
- IBM i 7.1, or later
- IBM i 6.1, or later
- IBM i 7.1, or later
- IBM i 6.1, or later

Related tasks:

➦ Installing PCI adapters

Related reference:

➦ IBM Prerequisite Web page

➦ Parts information

➦ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

4 Gb Single-Port Fibre Channel PCI-X 2.0 DDR Adapter (FC 1905, 5758; CCIN 1910, 280D, 280E)

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

The 4 Gb Single-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 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 4 Gigabit Single-Port Fibre Channel PCI-X 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. Distances of up to 500 meters running at 1 Gbps data rate, up to 300 meters running at 2 Gbps data rate, and 4 Gbps data rate up to 150 meters are supported between the adapter and an attaching device or switch. When used with IBM Fibre Channel storage switches supporting long-wave optics (distances of up to 10 km) are capable running at either 1 Gbps, 2 Gbps, or 4 Gbps data rates.

The 4 Gb Single-Port Fibre Channel PCI-X Adapter can be used to attach devices either directly, or with Fibre Channel switches. If attaching a device or switch with an SC type fiber connector, use of an LC-SC 50 micron fiber converter cable (FC 2456) or an LC-SC 62.5 micron fiber converter cable (FC 2459) is required.

Note: For CCIN 280D and CCIN 280E, see Table 11 on page 25 for information about the supported feature codes (FC) and part numbers.

Table 11. Supported FCs and part numbers for CCIN 280D and CCIN 280E

CCIN	Description	Feature code	FRU part number	Wrap plug part number
280D	Tape controllers	1905, 5758, and 5761	046K6838	012R9314
280E	Disk controllers	5760	No corresponding feature part number is supported in the POWER7® systems	

Adapter specifications

Item   Description
Adapter FRU number
>   046K6838 (Designed to comply with RoHS requirement.)

Wrap plug FRU number
>   012R9314

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, or later

>   AIX 5L Version 5.3 with the 5300-04 Technology Level, or later

>   Red Hat Enterprise Linux version 4 U2, or later

>   SUSE Linux Enterprise Server 9 SP3, or later

Note: If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Related tasks:

➥ Installing PCI adapters

Related reference:

➥ IBM Prerequisite Web page

➡️ Parts information

➡️ PCI adapter placement

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

4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR Adapter (FC 5759; CCIN 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 little connector (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 gigabit per second (Gbps), 2 Gbps or 4 Gbps of which the device or switch is capable. Between the adapter and an attaching device or switch, the distances supported are up to: 500 meters running at 1 Gbps data rate, 300 meters running at 2 Gbps data rate, and 150 meters running at 4 Gbps data rate. When used with IBM Fibre Channel storage switches supporting long-wave optics (distances of up to 10 kilometers) are capable running at either 1 Gbps, 2 Gbps, or 4 Gbps data rates.

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

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Adapter specifications

Item   Description
Adapter FRU number
> 000E0808
Wrap plug FRU number
> 012R9314
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

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

- AIX
  - AIX 7.1, or later
  - AIX 6.1, or later
  - AIX 5.3, or later
- Linux
  - Red Hat Enterprise Linux
  - SUSE Linux Enterprise Server

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

➦ Installing PCI adapters

Related reference:

➦ IBM Prerequisite Web page

➦ Parts information

➦ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

4 Gb Single-Port Fibre Channel PCI-X 2.0 DDR Adapter (FC 5760, 5761; CCIN 280D, 280E)

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

The 4 Gigabit Single-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 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 4 Gigabit Single-Port Fibre Channel PCI-X 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. Distances of up to 500 meters running at 1 Gbps data rate, up to 300 meters running at 2 Gbps data rate, and 4 Gbps data rate up to 150 meters are supported between the adapter and an attaching device or switch. When used with IBM Fibre Channel storage switches supporting long-wave optics (distances of up to 10 kilometers) are capable running at either 1 Gbps, 2 Gbps, or 4 Gbps data rates.

The 4 Gigabit Single-Port Fibre Channel PCI-X Adapter can be used to attach devices either directly, or with Fibre Channel switches. If attaching a device or switch with an SC type fiber connector, use of an LC-SC 50 micron fiber converter cable (FC 2456) or an LC-SC 62.5 micron fiber converter cable (FC 2459) is required.

Note: For CCIN 280D and CCIN 280E, see Table 12 for information about the supported feature codes (FC) and part numbers.

Table 12. Supported FCs and part numbers for CCIN 280D and CCIN 280E

CCIN	Description	Feature code	FRU part number	Wrap plug part number
280D	Tape controllers	1905, 5758, and 5761	046K6838	012R9314
280E	Disk controllers	5760	No corresponding feature part number is supported in the POWER7 systems	

Adapter specifications

Item   Description

Adapter FRU number

FC 5760 - No corresponding feature part number is supported in the POWER7 systems

FC 5761 - 046K6838 (Designed to comply with RoHS requirement.)

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, or later

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

Red Hat Enterprise Linux version 4 U2, or later

SUSE Linux Enterprise Server 9 SP3, or later

Note: If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Related tasks:

Installing PCI adapters

Related reference:

↪ IBM Prerequisite Web page

↪ Parts information

↪ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

Learn about the specifications and operating system requirements for the feature code (FC) 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 of. Distances between the adapter and an attaching device or switch can reach up to 500 meters running at 1 Gbps data rate, up to 300 meters running at 2 Gbps data rate, and up to 150 meters running at 4 Gbps data rate. When used with IBM Fibre Channel storage switches that support longwave 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 Card Electromechanical (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 shortwave optical 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 shortwave 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 10. 5773 adapter

Adapter specifications

Item   Description
FRU number
　　10N7249[*]

　　[*]Designed to comply with RoHS requirement.
Wrap plug FRU number
　　12R9314 (for Fibre LC connector)

　　Note: The wrap plug is included with the card, and can also be bought from IBM.
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
　　3.3 V
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.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

The adapter is supported under the following versions of the operating systems:
- AIX
  - AIX 5.3, or later
- Linux
  - Red Hat Enterprise Linux version 4
  - Red Hat Enterprise Linux version 5
  - SUSE Linux Enterprise Server 9, Service Pack 4, or later
  - SUSE Linux Enterprise Server 10, Service Pack 1, or later

Note: If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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 13 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 13. Normal LED states

Green LED	Yellow LED	State
On	1 fast flash	1 Gbps link rate - normal, link active
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 14. These states can be used to identify abnormal states or problems.

Table 14. POST conditions and results

Green LED	Yellow LED	State
Off	Off	Wake-up failure (dead board)

Table 14. POST conditions and results (continued)

Green LED	Yellow LED	State
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 11 on page 33. Do not change the jumper settings for a standard installation.
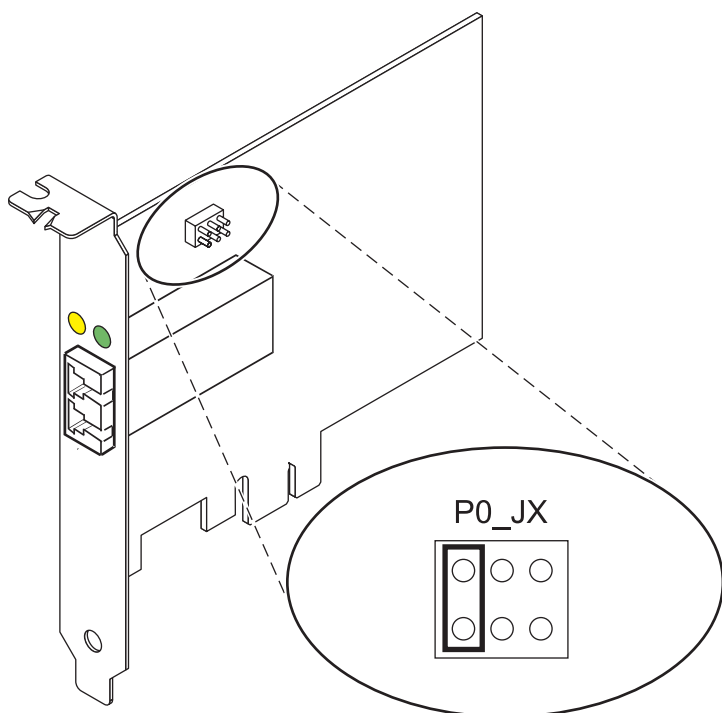
Figure 11. Device ID jumper

Replacing hot swap HBAs

Fiber Channel host bus adapters (HBAs) connected to a fiber array storage technology (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 *IBM 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.

Related tasks:

↪ Installing PCI adapters

Related reference:

↪ IBM Prerequisite Web page

↪ Parts information

↪ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

4 Gigabit PCI Express Dual Port Fibre Channel Adapter (FC 5774; CCIN 5774)

Learn about the specifications and operating system requirements for the feature code (FC) 5774 adapter.

Overview

The 4 Gigabit PCI Express Dual Port Fibre Channel Adapter is a 64 bit, short form factor x4, PCIe adapter with an LC-type external fiber connector that provides single initiator capability over an optical fiber link or loop. The adapter automatically negotiates the highest data rate between the adapter and an attaching device at 1 Gbps, 2 Gbps, or 4 Gbps of which the device or switch is capable. Distances between the adapter and an attaching device or switch can reach up to 500 meters running at 1 Gbps data rate, up to

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

The adapter can be used to attach devices either directly, or 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 Card Electromechanical (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 shortwave optical 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 shortwave 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.

Yellow LED

Green LED

Figure 12. 5774 adapter

Specifications

Item   Description
Adapter FRU number
    10N7255[*]

    [*] Designed to comply with RoHS requirement
Wrap plug FRU number
    11P3847
I/O bus architecture
    PCIe Base and CEM 1.0a
    x4 PCIe bus interface
Slot requirement
    One available PCIe x4, x8, or x16 slot
Voltage
    3.3 V
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.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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

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 15 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 15. Normal LED states

Green LED	Yellow LED	State
On	1 fast flash	1 Gbps link rate - normal, link active
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 16. These states can be used to identify abnormal states or problems.

Table 16. 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

Table 16. POST conditions and results (continued)

Green LED	Yellow LED	State
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 two device ID jumpers labeled P0_JX. and P1_JX is to set the jumpers on pins 1 and 2 as shown in Figure 13. Do not change the jumper settings for a standard installation.
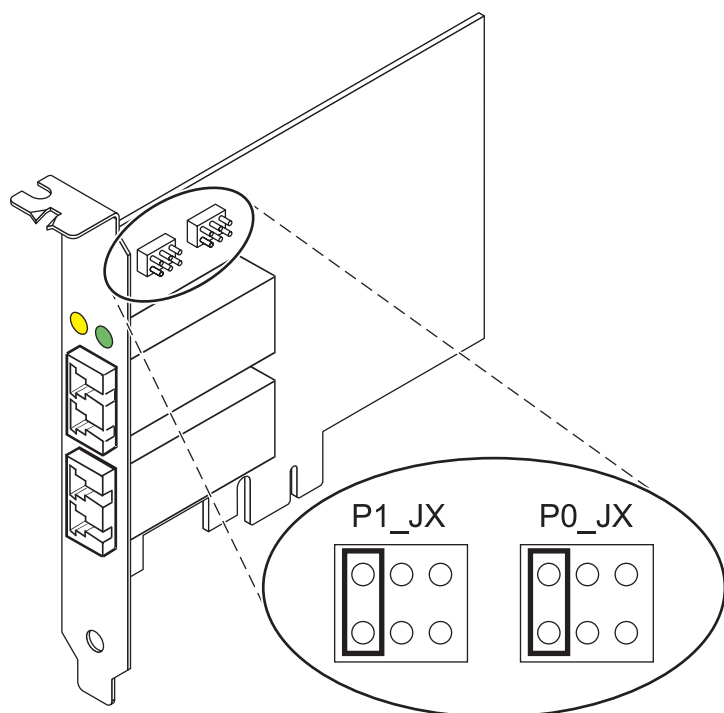
Figure 13. Device ID jumper

Replacing hot swap HBAs

Fiber Channel host bus adapters (HBAs) connected to a fiber array storage technology (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 *IBM 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.

Related tasks:

→ Installing PCI adapters

Related reference:

→ IBM Prerequisite Web page

→ Parts information

→ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe2 16 Gb 2-port Fibre Channel Adapter (FC EN0A; CCIN 577F)

Learn about the specifications and operating system requirements for the feature code (FC) EN0A adapter.

Overview

The PCIe2 16 Gb 2-port Fibre Channel Adapter is an x8, generation 2, PCIe adapter. This adapter has a little connector-type (LC) external fiber connector that provides single initiator capability over an optical fiber link. The adapter automatically negotiates the highest data rate between the adapter and an attaching device at a link speed of 16 Gbps, 8 Gbps, or 4 Gbps. The adapter supports a maximum link speed of 16 Gbps at both ports. Distances between the adapter and an attaching device or switch can reach up to 380 m running at a 4 Gbps data rate, up to 150 m running at an 8 Gbps data rate, and up to 100 m running at a 16 Gbps data rate. When used with IBM Fibre Channel storage switches supporting long-wave optics, the adapter can reach distances of up to 10 km running at 4 Gbps, 8 Gbps, or 16 Gbps data rates.

Important: The PCIe2 16 Gb 2-port Fibre Channel Adapter (FC EN0A) is not supported on the 8202-E4B.

The adapter has the following features:
- This adapter has parts and construction compliant with the European Union Directive of Restriction of Hazardous Substances (RoHS)
- The adapter is compliant with the PCIe base and Card Electromechanical (CEM) 2.0 specifications with the following characteristics:
  - Provides an x8 lane link interface at 14.025 Gbps, 8.5 Gbps, or 4.25 Gbps (automatic negotiation with system)
  - Provides support for one Virtual Channel (VC0) and one Traffic Class (TC0)
  - Provides configuration and I/O memory read and write, completion, and messaging capabilities
  - Provides support for 64-bit addressing
  - Provides error correction code (ECC) and error protection functions
  - Provides link cyclic redundancy check (CRC) on all PCIe packets and message information
  - Provides a large payload size of 2048 bytes for read and write functions
  - Provides a large read request size of 4096 bytes
- The adapter is compatible with 4, 8, and 16 Gb Fibre Channel interface with the following characteristics:
  - Provides for automatic negotiation between 4 Gb, 8 Gb, or 16 Gb link attachments
  - Provides support for the following Fibre Channel topologies: point-to-point (16Gb only) and fabric
  - Provides support for Fibre Channel class 3
  - Provides a maximum Fibre Channel throughput that is achieved by using full duplex hardware support
- The adapter provides an end-to-end data path parity and CRC protection, including internal data path random-access memory (RAM)

- Provides architectural support for multiple upper layer protocols
- Provides comprehensive virtualization capabilities with support for N_Port ID Virtualization (NPIV) and virtual fabric (VF)
- Provides support for message signaled interrupts extended (MSI-X)
- Provides support for 255 VFs and 1024 MSi-X
- Provides an internal, high-speed static random-access memory (SRAM) memory
- Provides ECC protection of local memory that includes single-bit correction and double-bit protection
- Provides an embedded shortwave optical connection with diagnostics capability
- Provides support for an on-board context management by firmware:
  - Up to 8192 FC port logins
  - I/O multiplexing down to the Fibre Channel frame level
- Provides data buffers capable of supporting 64+ buffer-to-buffer (BB) credits per port for shortwave applications
- Provides link management and recovery that is handled by firmware
- Provides on-board diagnostic capability accessible by an optional connection
- Provides a performance up to 16 Gbps full duplex

The following figure shows the adapter.
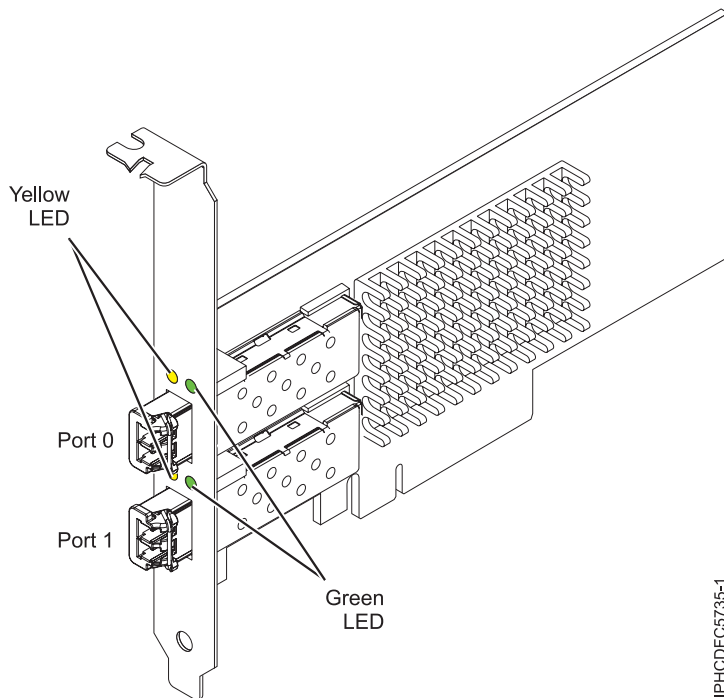
Figure 14. EN0A adapter

Specifications

Item   Description
Adapter FRU number
    74Y2221 (Designed to comply with RoHS requirement)
Wrap plug FRU number
    12R9314
I/O bus architecture
    PCIe base and CEM 2.0, x8 PCIe bus interface

Slot requirement

> One available PCIe x8 or x16 slot

Voltage

> 3.3 V, 12 V

Form factor

> Short, MD2

FC compatibility

> 4, 8, 16 Gb

Cables

> Cables are the responsibility of the customer. Use multimode fiber optic cables with shortwave lasers that adhere to the following specifications:
> - OM3: Multimode 50/125 micron fiber, 2000 MHz x km bandwidth
> - OM2: Multimode 50/125 micron fiber, 500 MHz x km bandwidth
> - OM1: Multimode 62.5/125 micron fiber, 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 must 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 different cable types at the different link speeds.

Table 17. Supported distances for cables

Header	Cable type and distance		
Rate	OM1	OM2	OM3
4.25 Gbps	0.5 - 70 m (1.64 - 229.65 ft)	0.5 - 150 m (1.64 - 492.12 ft)	0.5 - 380 m (1.64 - 1246.71 ft)
8.5 Gbps	0.5 - 21 m (1.64 - 68.89 ft)	0.5 - 50 m (1.64 - 164.04 ft)	0.5 - 150 m (1.64 - 492.12 ft)
14.025 Gbps	0.5 - 15 m (1.64 - 49.21 ft)	0.5 - 35 m (1.64 - 114.82 ft)	0.5 - 100 m (1.64 - 328.08 ft)

Maximum number

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

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

The adapter is supported on the following versions of the operating systems:
- AIX
  - AIX 7.1, or later
  - AIX 6.1, or later
- Linux
  - Red Hat Enterprise Linux
  - SUSE Linux Enterprise Server
  - For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.htm)
- IBM i
  - IBM i 7.1, or later
  - IBM i 6.1, or later

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 18 summarizes normal LED states. A 1 Hz pause occurs when the LED is off between each group of fast flashes (2, 3 or 4). Observe the LED sequence for several seconds to ensure that you correctly identify the state.

Table 18. Normal LED states

Green LED	Yellow LED	State
On	2 fast flashes	4 Gbps link rate: normal, link active
On	3 fast flashes	8 Gbps link rate: normal, link active
On	4 fast flashes	16 Gbps link rate: normal, link active

Power-on-self-test (POST) conditions and results are summarized in Table 19. These states can be used to identify abnormal states or problems.

Table 19. POST conditions and results

Green LED	Yellow LED	State
Off	Off	Wake-up failure of the adapter board
Off	On	POST failure of the adapter board
Off	Slow flash	Wake-up failure monitor
Off	Fast flash	Failure in post
Off	Flashing	Postprocessing 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

PCI IOP (FC 2844, CCIN 2844)

Learn about the specifications and operating system requirements for the feature code (FC) 2844.

FC 2844 is a PCI I/O processor that drives PCI IOA adapters in the system unit and in HSL attached PCI or PCI-X I/O expansion units. A 2844 can drive a maximum of four IOAs, subject to configuration restrictions.

Fru number
    39J1719*

39J3242**

* Designed to comply with RoHS requirement.

** Not designed to comply with the RoHS requirement.

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

POWER GXT135P graphics PCI Adapter (FC 1980, FC 2849)

Learn about specifications for the POWER GXT135P graphics PCI Adapter.

The POWER GXT135P graphics PCI Adapter is a high-performance PCI graphics adapter that accelerates and enhances your system unit video. This adapter has no hardware switches to set. Mode selection is made through the software. Connection to the video monitor is made through a high-density 15-pin D-shell connector or a 28-pin DVI connector.
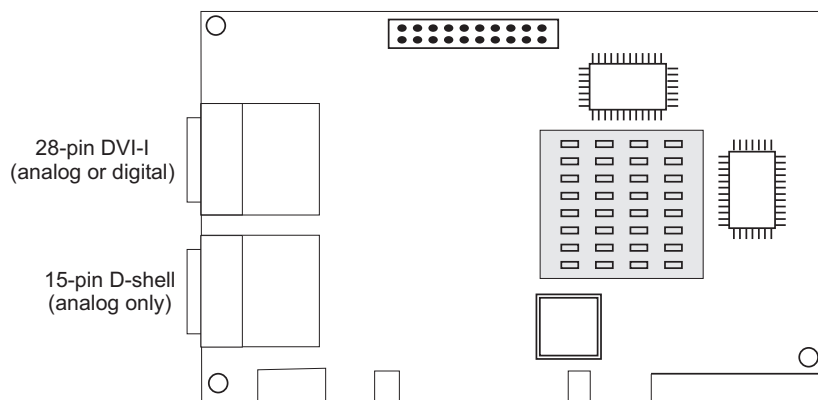
Figure 15. Feature 2849

Adapter specifications

Item   Description
FRU number
        03N5853* or 00P5758**

        * Designed to comply with RoHS requirement.
        ** Not designed to comply with the RoHS requirement.
Bus architecture
        PCI
Bus width
        32-bit
Memory
        16 MB SDRAM
Number of colors supported
        8-bit or 24-bit
Analog screen resolutions
        640x480 at 60 Hz vertical refresh

        1024x768 at 60 - 85 Hz vertical refresh

        1280x1024 at 60 - 85 Hz vertical refresh

        1600x1200 at 75 - 85 Hz vertical refresh

2048x1536 at 60 - 75 Hz vertical refresh

Digital screen resolutions

640x480 at 60 Hz vertical refresh

1024x768 at 60 Hz vertical refresh

1280x1024 at 60 Hz vertical refresh

1600x1200 at 30 Hz vertical refresh

Display power management

Supports VESA and DPMS

Connectors

15-pin D-shell connector

28-pin DVI-I connector

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

POWER GXT145 PCI Express Graphics Accelerator (FC 5748; CCIN 5748)

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

Overview

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 16 on page 44 shows the adapter and its connectors.
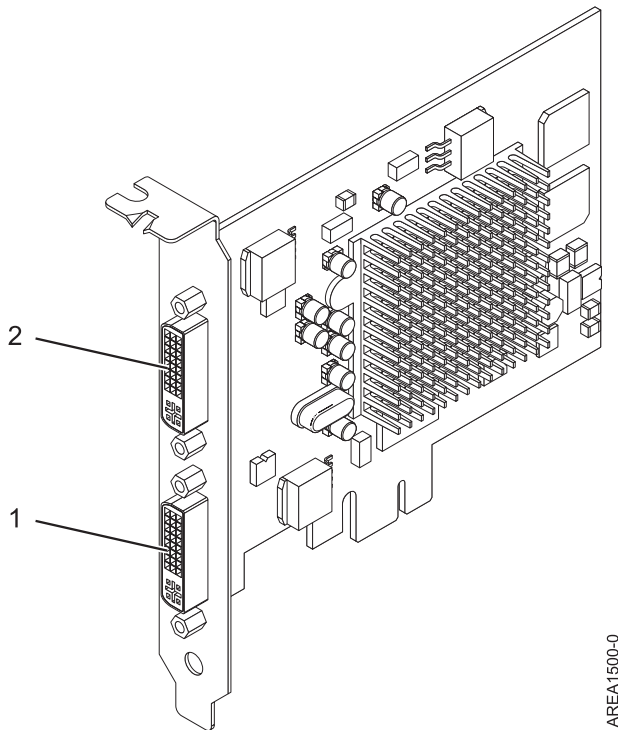
Figure 16. POWER GXT145 PCI Express Graphics Accelerator adapter

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)

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

The adapter is supported under the following operating systems:

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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.

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 46 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 45 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 45.

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.

Related tasks:

➥ Installing PCI adapters

Related reference:

➥ IBM Prerequisite Web page

➥ Parts information

➥ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe3 RAID SAS quad-port 6 Gb Adapter (FC EJ0J; CCIN 57B4)

Learn about the specifications and operating system requirements for the feature code (FC) EJ0J adapter.

Overview

The PCIe3 RAID SAS quad-port 6 Gb Adapter is a PCI Express (PCIe), generation 3, RAID SAS adapter that has a low-profile, short-form factor, but packaged for full height installation. The adapter is used in high-performance and high-density, serial attached SCSI (SAS) applications. It supports the attachment of SAS disk and SAS tape by using four mini SAS high-density (HD) x4 connectors that allow the physical links to be used in various narrow and wide-port configurations. SAS tape attachment is only supported in a single adapter configuration and cannot be mixed with SAS disk on the same adapter. The adapter does not have write cache. Figure 17 on page 49 shows the PCIe3 RAID SAS quad-port 6 Gb Adapter.

The adapter is a 64 bit, 3.3 V, bootable SAS adapter that provides RAID 0, 5, 6, and 10 capability, and system level mirroring via the operating system. The adapter provides both single and dual RAID controller configurations. Dual controller configurations (dual storage IOA) must run RAID. JBOD (512 byte) functionality is supported only in a single controller configuration based on the operating system. Best performance is achieved when multiple RAID sets are configured and optimized under a pair of adapters in a high availability, multi-initiator RAID configuration (dual storage IOA) which allows for an Active-Active mode of operation.

The adapter support a maximum of 98 attached disk devices that depends on the drive enclosure attached. A maximum of 48 devices can be solid-state devices (SSDs). Externally attached devices are designed to run at a maximum data rate of 6 Gbps for SAS disk devices and 3 Gbps for SAS tape devices. This adapter supports RAID and non-RAID DASD, and SAS tape devices. Specific device attachment support rules apply. This adapter supports the multi-initiator and high availability (dual storage IOA) configurations in AIX, IBM i, and Linux partitions.. This adapter enables configuring the SAS drives as dedicated hot-spares with equal or higher capacity.

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

Figure 17 on page 49 shows the adapter. The connector plug **(A)** is installed in an empty port and prevents damage to that port whenever a cable for the adjacent port connectors is plugged-in or removed.
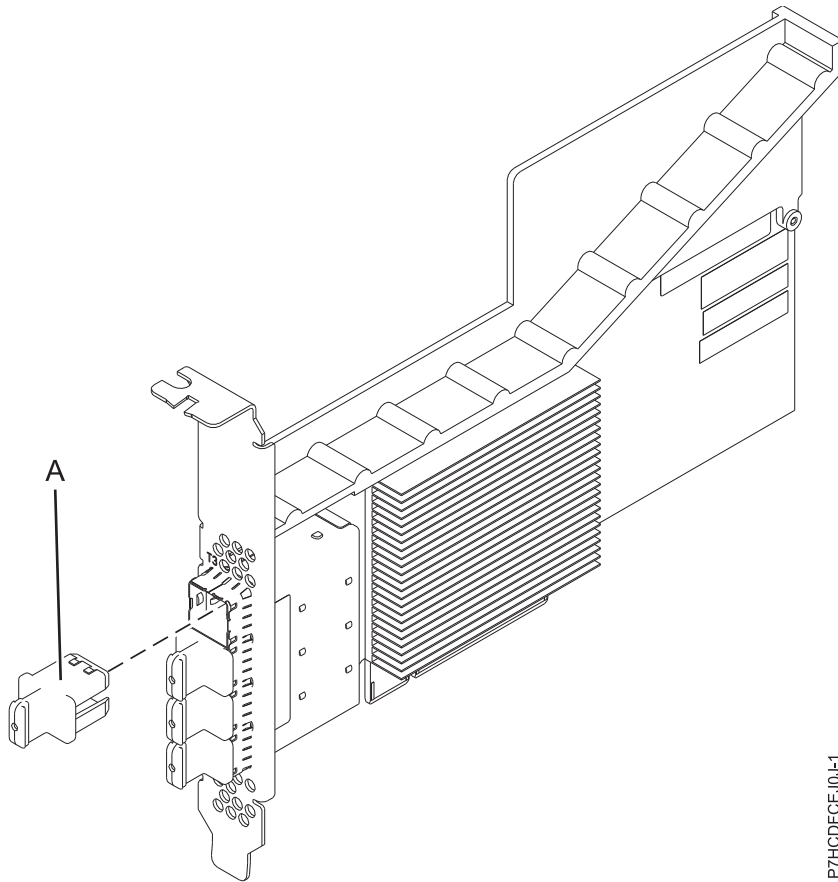
Figure 17. PCIe3 RAID SAS adapter

Specifications

Item   Description

Adapter FRU number

    00E7167 (Designed to comply with RoHS requirement)

Connector plug part number

    00FW784 (The connector plug is installed in an empty port and prevents damage to that port
    whenever a cable for the adjacent port connectors is plugged-in or removed.)

I/O bus architecture

    PCIe 3.0 but compatible to PCIe 2.0 or PCIe 1.0 slots.

Slot requirement

    One available PCIe x8 slot per adapter.

Cables

    Specific X, YO, AA, or AT SAS cable features with new narrow HD connectors are used to attach
    to the other adapter or disk expansion drawers.

    SAS device attachment requires specific cables that are provided with the subsystem or device
    features that are being attached. Special cabling is required for multi-initiator and high
    availability configurations. Specific AE1 or YE1 SAS cable features are required for SAS Tape
    attachment. See Serial attached SCSI cable planning.

Voltage

    3.3 V

Form factor

    Short, low-profile but packaged for full-height installations.

Maximum number

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

Attributes

- Four external mini SAS HD 4x connectors provide attachment of SAS device enclosures
- SAS Serial SCSI Protocol (SSP) and Serial Management Protocol (SMP)
- RAID 0, 5, 6, or 10 with hot-spare capability. System level mirroring through the operating system is also supported. JBOD functionality (512 byte) is supported in a single controller configuration only.
- Concurrent firmware update
- Removable media device (SAS Tape) are supported in a single controller configuration only and cannot be combined with disk devices attached to the same adapter. Removable media is not supported in multi-initiator and high availability (dual storage IOA) configurations
- Support for multi-initiator and high availability or single controller configurations

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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.
- Linux
  - Red Hat Enterprise Linux 6.4, or later.
  - SUSE Linux Enterprise Server 11 Service Pack 3, or later.
  - The latest version of iprutils can be downloaded from IBM Service and Productivity Tools website (http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html).
- IBM i
  - IBM i 7.1 (with TR7), or later.
  - IBM i 6.1 (with 6.1.1-M Machine Code), or later.
- Supported on Firmware level 7.8, or later.

This adapter requires the following drivers:
- AIX: devices.pci.14104A0 device driver package

PCIe3 12 GB Cache RAID SAS quad-port 6 Gb Adapter (FC EJ0L; CCIN 57CE)

Learn about the specifications and operating system requirements for the feature code (FC) EJ0L adapters.

Overview

The PCI Express (PCIe) generation 3, 12 GB Cache RAID SAS quad-port 6 Gb Adapter is a large cache PCIe3 SAS adapter that provides high-performance capabilities and supports the attachment of serial-attached SCSI (SAS) disks and SAS solid-state drives (SSDs) through four mini SAS high-density (HD) connectors. The feature code (FC) EJ0L has up to a 12 GB write-cache via compression. The adapter is a 64 bit, 3.3 V, bootable SAS adapter that supports RAID levels 0, 5, 6, and 10 as well as system level mirroring via the operating system. 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 EJ0L adapters provide additional performance and adapter redundancy with

mirrored write-cache data and mirrored RAID parity footprints between the adapters. If the FC EJ0L 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 some previous large cache adapters.

Figure 18 shows the PCIe3 12 GB Cache RAID SAS quad-port 6 Gb adapter. The connector plug **(A)** is installed in an empty port and prevents damage to that port whenever a cable for the adjacent port connectors is plugged-in or removed.
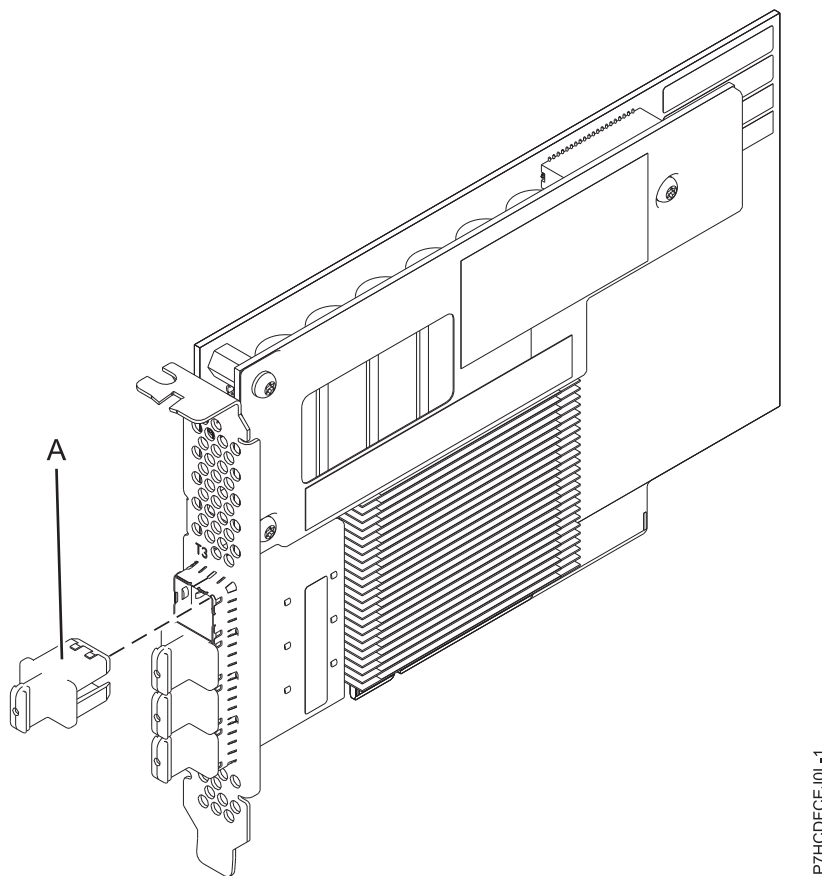
Figure 18. PCIe3 12 GB Cache RAID SAS 6 Gb Adapter

To provide the highest bandwidth between two paired feature EJ0L adapters for the mirroring of cache data and parity update footprints, two SAS Adapter-to-Adapter (AA) cables are required by default on the third and fourth adapter ports until maximum device quantity attachment is required. When all 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 EJ0L is a single wide, full-height, short adapter. Figure 18 shows the FC EJ0L adapter. Every FC EJ0L requires another FC EJ0L on this server, or on another server, which pairs with the SAS RAID adapter and enables cache functionality and the other multi-initiator high availability (dual storage IOA) functions.

Systems running the AIX or Linux operating systems support either having both EJ0L features in the same system or partition, or in two separate systems or partitions. Systems running the IBM i operating system do not support the pairing of adapters on different servers or different partitions, so both the EJ0L features must be installed on the same system or partition.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Specifications

Item   Description

Adapter FRU number

  00FX840 (Designed to comply with RoHS requirement)

Connector plug part number

  00FW784 (The connector plug is installed in an empty port and prevents damage to that port whenever a cable for the adjacent port connectors is plugged-in or removed.)

I/O bus architecture

  PCIe 3.0 but downward compatible to 2.0 and 1.0

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 cable features with new narrow HD connectors are used to attach to the other adapter or 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. See Serial attached SCSI cable planning.

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

- 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.
- 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.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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.
- Linux
  - Red Hat Enterprise Linux 6.4, or later.
  - SUSE Linux Enterprise Server 11 Service Pack 3, or later.
  - The latest version of iprutils can be downloaded from IBM Service and Productivity Tools website (http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html).

- IBM i
  - IBM i 7.1 (with TR7), or later.
  - IBM i 6.1 (with 6.1.1-M Machine Code), or later.
- Supported on Firmware level 7.8, or later.

This adapter requires the following drivers:
- AIX: devices.pci.14104A0 device driver package

PCIe3 4 x8 SAS Port Adapter (FC EJ10; CCIN 57B4)

Learn about the specifications and operating system requirements for the feature code (FC) EJ10 adapter.

Overview

The PCIe3 4 x8 SAS Port Adapter is a PCI Express (PCIe), generation 3, RAID SAS adapter that has a low-profile, short-form factor, but packaged for full height installation. The adapter is used in high-performance and high-density, serial attached SCSI (SAS) applications. It supports the attachment of SAS DVD or SAS tape by using four mini SAS high-density (HD) x4 connectors that allow the physical links to be used in various narrow and wide-port configurations. SAS tape attachment is only supported in a single adapter configuration and cannot be mixed with SAS disk on the same adapter. The adapter does not have write cache. Figure 19 on page 54 shows the PCIe3 4 x8 SAS Port Adapter.

A maximum of four DVD or tape drives can be attached per adapter by using four AE1 cables (FC ECBY). A maximum of eight DVD or tape drives can be attached by using four YE1 cables (ECBZ).

Externally attached devices are designed to run at a maximum data rate of 6 Gbps for SAS tape devices.

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

Figure 19 on page 54 shows the adapter. The connector plug **(A)** is installed in an empty port and prevents damage to that port whenever a cable for the adjacent port connectors is plugged-in or removed.
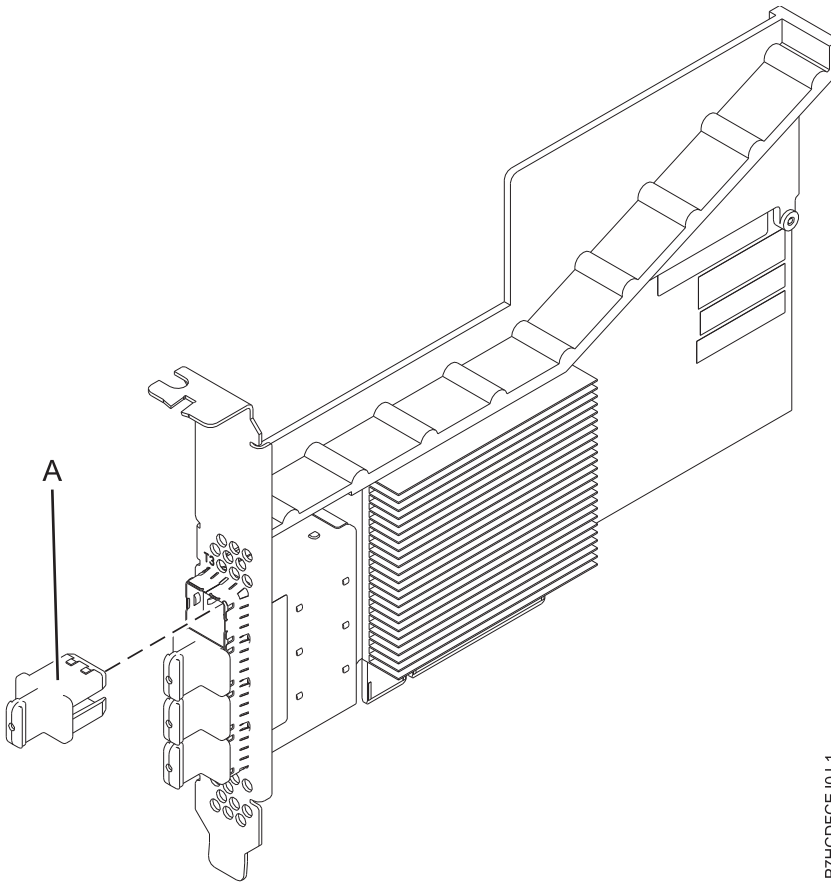
Figure 19. PCIe3 4 x8 SAS Port Adapter

Specifications

Item   Description

Adapter FRU number

    00E7167 (Designed to comply with RoHS requirement)

Connector plug part number

    00FW784 (The connector plug is installed in an empty port and prevents damage to that port
    whenever a cable for the adjacent port connectors is plugged-in or removed.)

I/O bus architecture

    PCIe 3.0 but compatible to PCIe 2.0 or PCIe 1.0 slots.

Slot requirement

    One available PCIe x8 slot per adapter.

Cables

    Specific AE1 or YE1 SAS cable features with new narrow HD connectors are used to attach the
    adapter to SAS devices.

    SAS device attachment requires specific cables that are provided with the subsystem or device
    features that are being attached.See Serial attached SCSI cable planning.

Voltage

    3.3 V

Form factor

    Short, low-profile but packaged for full-height installations.

Maximum number

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

Attributes

- Four external mini SAS HD 4x connectors provide attachment of SAS devices
- SAS Serial SCSI Protocol (SSP) and Serial Management Protocol (SMP)
- Concurrent firmware update
- Removable media device (DVD and SAS tape) are supported in a single controller configuration only and cannot be combined with disk devices attached to the same adapter. Removable media is not supported in multi-initiator and high availability (dual storage IOA) configurations
- Support for multi-initiator and high availability or single controller configurations

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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.
- Linux
  - Red Hat Enterprise Linux 6.4, or later.
  - SUSE Linux Enterprise Server 11 Service Pack 3, or later.
  - The latest version of iprutils can be downloaded from IBM Service and Productivity Tools website (http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html).
- IBM i
  - IBM i 7.1 (with TR7), or later.
  - IBM i 6.1 (with 6.1.1-M Machine Code), or later.
- Supported on Firmware level 7.8, or later.

This adapter requires the following drivers:
- AIX: devices.pci.14104A0 device driver package

PCI IOP (FC 2844, CCIN 2844)

Learn about the specifications and operating system requirements for the feature code (FC) 2844.

FC 2844 is a PCI I/O processor that drives PCI IOA adapters in the system unit and in HSL attached PCI or PCI-X I/O expansion units. A 2844 can drive a maximum of four IOAs, subject to configuration restrictions.

Fru number

39J1719*

39J3242**

* Designed to comply with RoHS requirement.

** Not designed to comply with the RoHS requirement.

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

PCI IOP for SAN Load Source (FC 2847, CCIN 2847)

Learn about the features of the PCI IOP for SAN Load Source.

This adapter provides the specialized function required to attach a IBM i operating system load source by way of a Fibre Channel adapter and boot from that load source. Feature code (FC) 2847 does not support multipath for the i load source disk unit, but does support multipath for all other logical units numbers (LUNs) attached to this IOP. A minimum of two IOPs are required for enabling redundancy.

Fru number

> 42R6471*
>
> 39J4035**
>
> * Designed to comply with RoHS requirement.
>
> ** Not designed to comply with the RoHS requirement.

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

 Installing PCI adapters

Related reference:

 IBM Prerequisite Web page

 Parts information

 PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

POWER GXT135P graphics PCI Adapter (FC 1980, FC 2849)

Learn about specifications for the POWER GXT135P graphics PCI Adapter.

The POWER GXT135P graphics PCI Adapter is a high-performance PCI graphics adapter that accelerates and enhances your system unit video. This adapter has no hardware switches to set. Mode selection is made through the software. Connection to the video monitor is made through a high-density 15-pin D-shell connector or a 28-pin DVI connector.
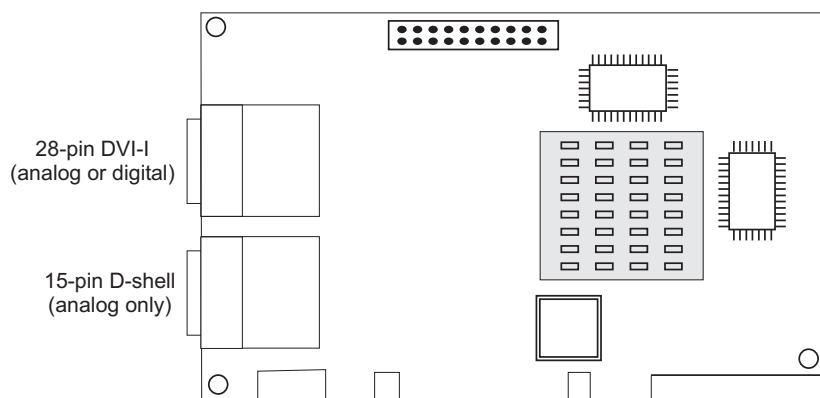
Figure 20. Feature 2849

Adapter specifications

Item   Description

FRU number
> 03N5853[*] or 00P5758[**]
>
> [*] Designed to comply with RoHS requirement.
> [**] Not designed to comply with the RoHS requirement.

Bus architecture
> PCI

Bus width
> 32-bit

Memory
> 16 MB SDRAM

Number of colors supported
> 8-bit or 24-bit

Analog screen resolutions
> 640x480 at 60 Hz vertical refresh
>
> 1024x768 at 60 - 85 Hz vertical refresh
>
> 1280x1024 at 60 - 85 Hz vertical refresh
>
> 1600x1200 at 75 - 85 Hz vertical refresh
>
> 2048x1536 at 60 - 75 Hz vertical refresh

Digital screen resolutions
> 640x480 at 60 Hz vertical refresh
>
> 1024x768 at 60 Hz vertical refresh
>
> 1280x1024 at 60 Hz vertical refresh
>
> 1600x1200 at 30 Hz vertical refresh

Display power management
> Supports VESA and DPMS

Connectors
> 15-pin D-shell connector
>
> 28-pin DVI-I connector

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe2 2-port 10GbE SR Adapter (FC 5287; CCIN 5287)

Learn about the specifications and operating system requirements for the feature code (FC) 5287 adapters.

Overview

The FC 5284 and FC 5287 are both the same adapter. FC 5284 is a low-profile adapter and the FC 5287 is a full-height adapter.

The PCIe2 2-port 10GbE SR adapter is a short, regular-height, high-performance, generation-2 PCIe adapter. This adapter provides two 10-Gb Ethernet ports that can be configured to run at 10 Gigabits per second (Gbps). Each of the Ethernet ports can be connected by using a little connector (LC) duplex-type connector over a multi-mode fiber (MMF) 850 nm fiber cable up to 300 meters (984.25 feet) in length. The adapter conforms to the IEEE, 802.3ae 10GBASE-SR specification for Ethernet transmission.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Specifications

Item   Description

Adapter FRU number

> 74Y3457 (Designed to comply with RoHS requirement)

I/O bus architecture

> PCIe2.0 x8

Slot requirement

> One PCIe x8, generation-2 slot.

Cables

> MMF 850 nm fiber cable are connected to LC duplex-type connectors.

Voltage

> 3.3 V

Form factor

> Low-profile

Maximum number

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

Attributes provided

- PCIe x8 Generation 2
- MSI-X and support of legacy pin interrupts
- 10GBASE-SR short-reach optics
- 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
- Ether II and 802.3 encapsulated frames
- Multiple MAC addresses per interface
- Jumbo frames up to 9.6 Kbytes
- TCP checksum offload for IPv4
- TCP segmentation Offload (TSO) for IPv4
- UDP checksum offload for IPv4
- Receive side scaling and packet steering
- Line rate packet filtering and attack protection
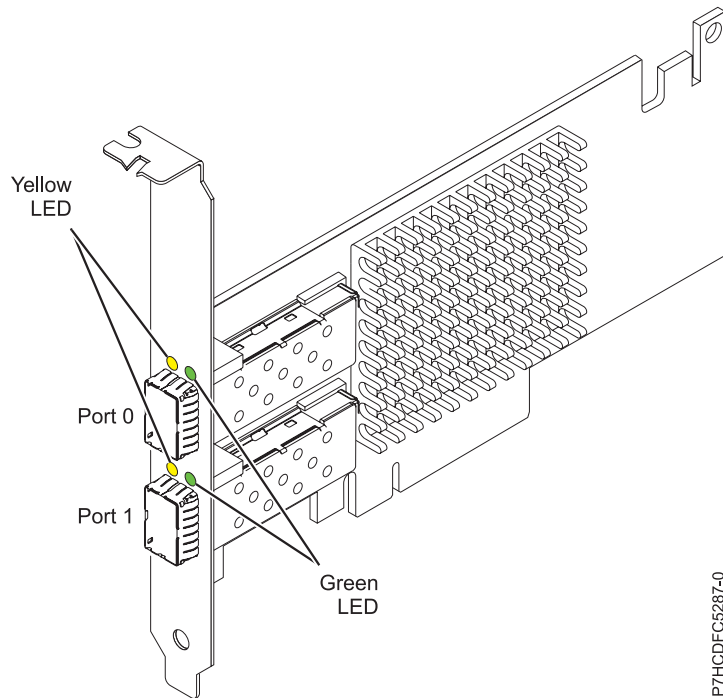
Figure 21. PCIe2 2-port 10GbE SR adapter

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 21 shows the location of the LEDs. Table 20 describes the different LED states and what those states indicate.

Table 20. 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

Operating system or partition requirements

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

- AIX
  - AIX Version 7.1 and Service Pack 3, or later.
  - AIX Version 6.1 with the 6100-06 Technology Level, and Service Pack 3, or later.
  - AIX Version 5.3 with the 5300-12 Technology Level and Service Pack 4, or later.
- Linux
  - Red Hat Enterprise Linux.
  - SUSE Linux Enterprise Server.
  - For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.htm)

- VIOS
  - VIOS support requires VIOS 2.2.0.11 with Fix Pack 24 and Service Pack 1, or later.

PCIe2 2-port 10GbE SFP+ Copper Adapter (FC 5288; CCIN 5288)

Learn about the specifications and operating system requirements for the feature code (FC) 5288 adapter.

Overview

The FC 5288 PCIe2 2-port 10GbE SFP+ copper adapter is the full-height version of the FC 5286 adapter, which is the low-profile adapter.

The PCIe2 2-port 10GbE SFP+ copper adapter is a generation-2 PCIe adapter that provides two 10 Gb copper small form-factor pluggable transceiver (SFP+) ports for connectivity with other servers or switches in the network. Each port provides Ethernet connectivity with a nominal data rate of 10 Gbps (gigabits per second), and they use SFP+ copper twinaxial cables up to 5 m (16.4 ft) in length.

Note: The SFP+ twinaxial copper cables have connectors that are not the same as the AS/400 5250 connector, the CX4 connector, or the 10 GBASE-T connector.

Each port has a maximum speed of 10 Gbps.

The FC 5288 requires an available slot.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Specifications

Item   Description
Adapter FRU number
        74Y3459 (Designed to comply with RoHS requirement)
I/O bus architecture
        PCIe2 x8
Slot requirement
        Requires an available PCIe x8 low-profile slot
Cables
        See "Cables" on page 61 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 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 3 or later
- Linux
  - Red Hat Enterprise Linux.
  - SUSE Linux Enterprise Server.

- For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.htm)

Cables

Feature code 5288 requires the use of compatible SFP+, 10 Gbps, copper, twinaxial, active, Ethernet cables. See Figure 22 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 i requirements.

Note: These cables are EMC Class A compliant.

The cables contain a unique vital product data (VPD) card that includes the vendor name, part number, EC number, serial number, and date of manufacture. See Table 21 for details about the feature codes.

P7ECF505-0
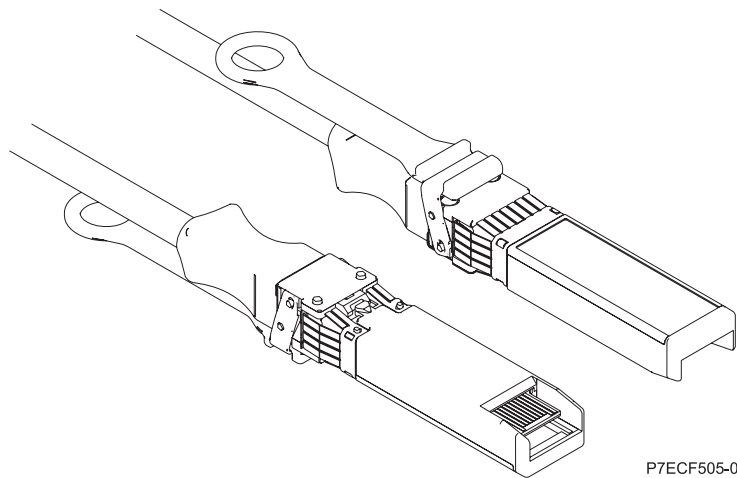
Figure 22. Top and bottom view of the cable

Table 21. 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

Gigabit Ethernet-SX PCI-X Adapter (FC 5700; CCIN 5700)

Learn about the specifications and LEDs for the Gigabit Ethernet-SX PCI-X Adapter.

The Gigabit Ethernet-SX PCI-X Adapter is a high-performance, highly integrated, universal, Ethernet LAN adapter for PCI-X and PCI systems. The adapter provides 1000 Mbps throughput on a standard shortwave (850 nm) 50 or 62.5 micron multimode optical cable and conforms to the IEEE 802.3z standards and supports distances of 260 meters for 62.5u MMF and 550 meters for 50.0u MMF. The adapter is designed to run in standard PCI-X V1.0a compliant systems with 32 or 64 bit PCI-X Bus Master slots at 66 or 133 MHz, and in PCI 2.2 compliant systems with 32 or 64 bit PCI bus master slots at 33 or 66 MHz. The adapter runs on 5.0 V.

The following figure shows the adapter:
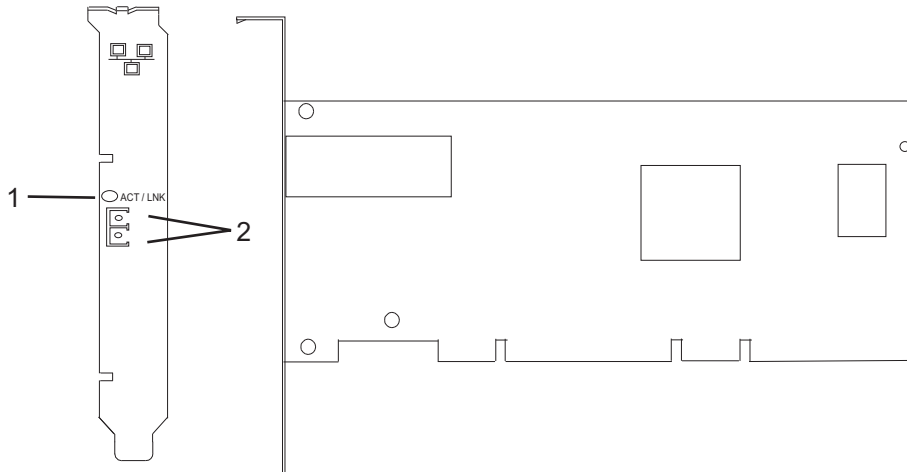
Figure 23. Feature 5700

1   LED
2   Multimode Fiber LC Receptacle

The LED on the Gigabit Ethernet-SX PCI-X Adapter provides information about the operation status of the adapter. The LED is visible through the mounting bracket of the adapter and, when lit, indicates the following conditions:

LED	Status
Off	No Link/No Activity
On (Green)	Link, No Activity
Flashing (Green)	Link, Activity

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Gigabit Ethernet-SX PCI-X adapter specifications

Item   Description
FRU number
    10N8586 (Designed to comply with 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
    LC fiber optic
Wrap plug
    LC fiber optic, part number 12R9314
Cables
    Customer supplied. 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

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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 forPOWER, or later
    - SUSE Linux Enterprise Server 11 Service Pack 1, or later
- IBM i
    - IBM i 7.1, or later
    - IBM i 6.1, or later

Related tasks:

⤷ Installing PCI adapters

Related reference:

⤷ IBM Prerequisite Web page

⤷ Parts information

⤷ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

10/100/1000 Base-TX Ethernet PCI-X Adapter (FC 1979, 5701; CCIN 5701)

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

The 10/100/1000 Base-TX Ethernet PCI-X Adapter is a high-performance, highly integrated, universal Ethernet LAN adapter for PCI-X and PCI systems. The adapter provides 10/100/1000 Mbps connectivity by using standard unshielded twisted pair (UTP) cable for distances of up to 100 meters. It conforms to IEEE 802.3ab 1000 Base-T standard. The adapter is designed to run in standard PCI-X V1.0a compliant systems with 32 or 64 bit PCI-X Bus Master slots at 66 or 133 MHz, and in PCI 2.2 compliant systems with 32 or 64 bit PCI bus master slots at 33 or 66 MHz. The adapter runs on 5.0 V and 3.3 V aux.

The following figure shows the adapter:
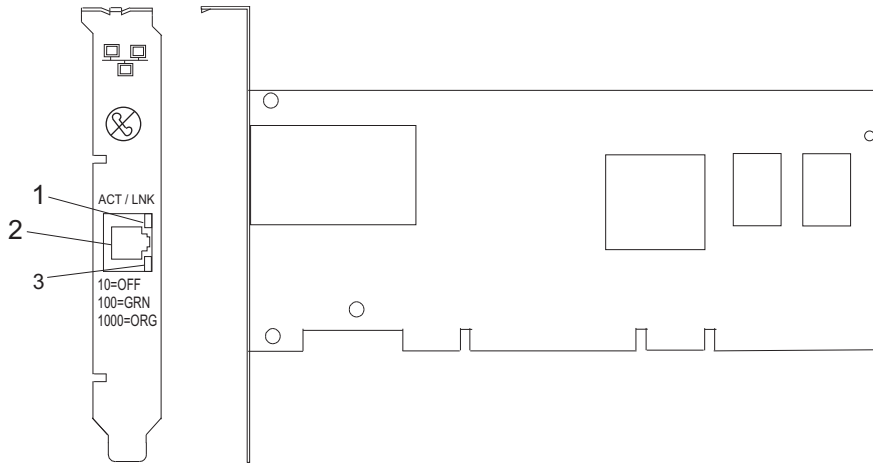
1	ACT/LNK LED
2	RJ-45 Connector
3	Link Speed LED

The LEDs on the 10/100/1000 Base-TX Ethernet PCI-X 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:

LED	Light	Description
Link Speed	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps
Link	Green	Good link
	Off	No link: indicates a bad cable, bad connector, configuration mismatch, or not selected
	Flashing	Indicates data activity

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

10/100/1000 Base-TX Ethernet PCI-X adapter specifications

Item   Description
FRU number

5701 is 03N6524* or 00P6130**

1979 is 03N6525* or 80P6445**

1959 is 03N6526* or 03N4700**

* 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* or 00G2380**

Cables

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

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new
feature and that you determine whether there are any prerequisites for this feature and attaching devices.
To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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, or later
  - SUSE Linux Enterprise Server 11 Service Pack 1, or later
- IBM i
  - IBM i 7.1, or later
  - IBM i 6.1, or later

Related tasks:

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

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

The 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter is a full duplex, dual ported, gigabit Ethernet
adapter that can be configured to run each port at 10, 100, or 1000 Mbps data rates. The adapter connects
to the system using a PCI or PCI-X bus and connects to a network using standard unshielded twisted
pair (UTP) cable for distances of up to 100 meters. 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:
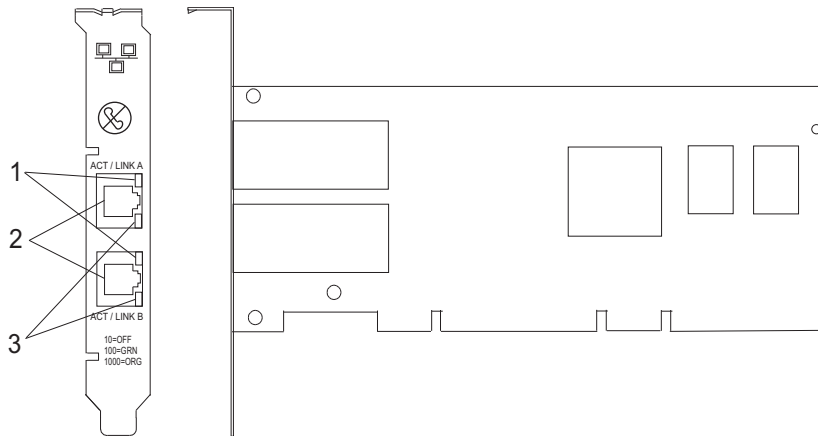
Figure 24. 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter

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

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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
    Customers supply the cables. For best performance, use cables that meet Cat 5e cabling standards, or later.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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
- IBM i
    - IBM i 7.1, or later
    - IBM i 6.1, or later

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Dual port gigabit Ethernet-SX PCI-X Adapter (FC 5707; CCIN 5707)

Learn about the specifications and LEDs for the dual port gigabit Ethernet-SX PCI-X Adapter.

The dual port gigabit Ethernet-SX PCI-X Adapter is a high-performance, highly integrated, universal, Ethernet LAN adapter for PCI-X and PCI systems. The adapter presents one electrical load but appears as two independent devices to software. The adapter provides 1000 Mbps throughput on a standard shortwave (850nm) 50/62.5 micron multimode optical cable and conforms to the IEEE 802.3z standard and supports distances of 260m for 62.5u MMF and 550m for 50.0u MMF.
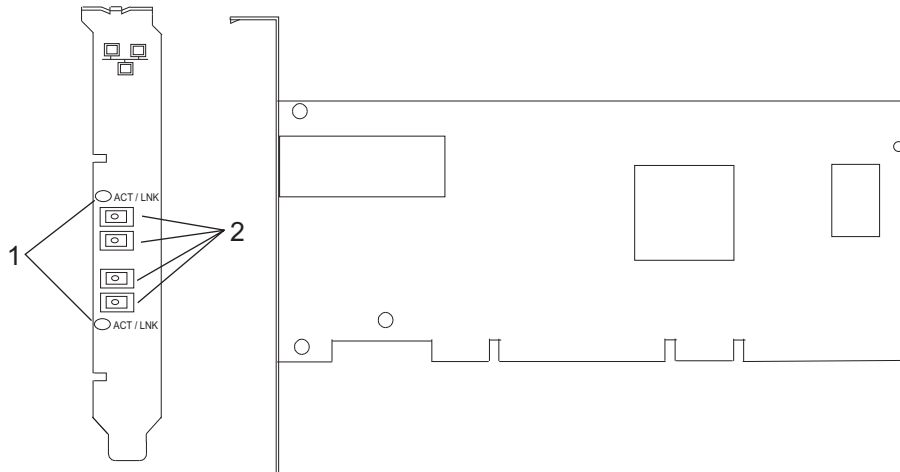
Figure 25. Feature 5707

1   LED
2   Multimode Fiber LC Receptacle

Understanding the adapter LED

The LED on the Dual Port Gigabit Ethernet-SX PCI-X Adapter provides information about the operation status of the card. The LED is visible through the mounting bracket of the card and, when lit, indicates the following conditions:

LED	Status
Off	No Link/No Activity
On (Green)	Link, No Activity
Flashing (Green)	Link, Activity

Specifications

Item   Description
FRU number
     03N6973* or 80P6451**

     * 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
     LC fiber optic
Wrap plug
     LC fiber optic, part number 12R9314
Cables
     Customer supplied. 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

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Related tasks:

➦ Installing PCI adapters

Related reference:

➦ IBM Prerequisite Web page

➦ Parts information

➦ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

Learn about the features, operating system requirements, and installation notes for the feature code (FC) 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.
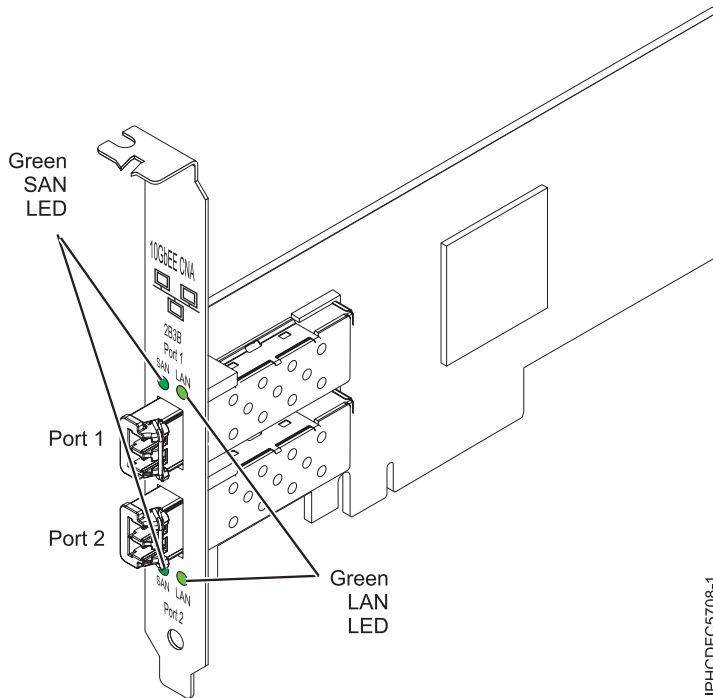
Figure 26. 10-Gb FCoE PCIe Dual Port Adapter

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

Table 22. 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

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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

Maximum number

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

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
- IBM i
  - Support of this feature with IBM i requires VIOS 2.2 or later
  - IBM i 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 that is required to support the new feature and that you determine whether there are any prerequisites. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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.

Related tasks:

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2

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

1 Gigabit iSCSI TOE PCI-X Adapter (FC 1986, 1987, 5713, 5714; CCIN 573B)

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

Related tasks:

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2

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

Description and technical overview

The IBM 1 Gigabit iSCSI TOE PCI-X Adapter encapsulates SCSI commands and data into TCP packets and transports them over a 1-gigabit-Ethernet network through IP. The adapter is dual function, operating as an iSCSI TOE (TCP/IP offload engine) adapter or as a general purpose Ethernet adapter where the TCP/IP protocol is offloaded onto the adapter.

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.
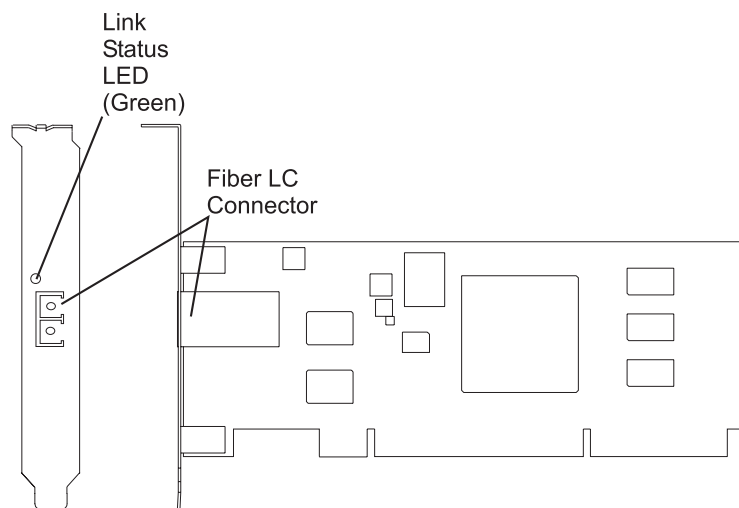
Figure 27. 1 Gigabit-SX iSCSI TOE PCI-X Adapter

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
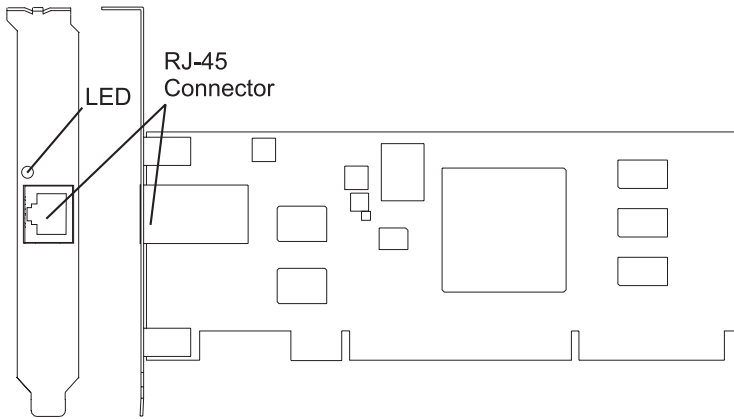
Figure 28. 1 Gigabit-TX iSCSI TOE PCI-X Adapter

Preparing to install the adapter

Preparing to install the adapter involves the following tasks.

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

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

Verifying your hardware requirements:

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

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

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

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

  Customers supply the cables.

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

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

Table 23. Fiber cable lengths for the 1 Gigabit-SX iSCSI TOE PCI-X Adapter (optical connector)

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

Verifying your software requirements:

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

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

For additional information, see the IBM Prerequisite website at http://www-912.ibm.com/e_dir/eServerPrereq.nsf

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 IBM 1 Gigabit iSCSI TOE PCI-X Adapter" on page 78. 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 IBM 1 Gigabit iSCSI TOE PCI-X Adapter" on page 78 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 IBM 1 Gigabit-SX iSCSI TOE PCI-X Adapter, type the following device package name:

   `devices.pci.1410cf02`

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

11. Press Enter.

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

12. Press Enter to accept the information.

    The ARE YOU SURE window displays.

13. Press Enter to accept the information.

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

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

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

15. Remove the installation media from the drive.

16. Press F10 to exit SMIT.

17. Go to "Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter" on page 78, to see the adapter installation procedure.

Verifying AIX software installation:

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

1. If necessary, log in as root user.

2. At the command line, type: `lslpp -l devices.pci.1410cf02.rte`

3. Press Enter. Possible results are as follows:
   - If the 1 Gigabit-SX iSCSI TOE PCI-X Adapter device driver is installed, the following is an example of the data that displays on your screen:

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

Verify that the **devices.pci.1410cf02.rte** filesets are installed at the AIX 5.2.0 or later level. If this information displays but you continue to have problems, go to "Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter" on page 78.

- 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 75. If you continue to experience problems, it may be necessary to call your system support organization. Refer to your operating system documentation for instructions.

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

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

Note: If you are installing your operating system at this time, install the adapter before you install the operating system. If you are installing only the device driver for this adapter, install the device driver before you install the adapter.
- If you should install your device driver software first, go to step 1 and continue with this section.
- If you should install your adapter hardware first, go to"Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter" on page 78. When you install AIX, your adapter device driver automatically installs.

Note: You only need to install device driver for the first instance of the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter. Any subsequent installation of the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter will not require device driver installation again. Go to "Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter" on page 78 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 IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter, type the following device package name:
   `devices.pci.1410d002`
10. Press Enter. The system finds and highlights this device driver software.
11. Press F7 to select the highlighted device driver software.
12. Press Enter.

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

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

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

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

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

16. Remove the installation media from the drive.

17. Press F10 to exit SMIT.

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

Verifying AIX software installation:

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

1. If necessary, log in as root user.

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

3. Press Enter. Possible results are as follows:

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

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

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

   • If no data displays on your screen, the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter device driver did not install correctly. Return to "Installing the device driver software for the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter" on page 77. If you continue to experience problems, it may be necessary to call your system support organization. Refer to your operating system documentation for instructions.

Installing the IBM 1 Gigabit iSCSI TOE PCI-X Adapter

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

Installing the adapter:

Learn how to install the adapter.

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

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

After you have installed the adapter, continue on to "Verifying the adapter installation" on page 79.

To install your device driver software first, go to "Installing the device driver software for the adapter" on page 75 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 80.
4. Configure the storage device. See "Configuring the storage device" on page 80.

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

Installing the device-specific storage support files:

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

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

Configuring the adapter in AIX:

Learn how to configure the adapter using AIX commands.

Using the **smit** command, do the following steps:
1. From the command prompt, type **smit iscsi**, then press Enter.
2. In the **smit** menu, move the cursor over the **iSCSI Adapter** entry, then press Enter.

3. In the menu that displays, from the **Change/Show** option, select the number of the adapter you are configuring (Examples: **ics0**, **ics1**). The following is an example of the settings displayed when you select an adapter number:

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



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

Notes:

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

Updating the iSCSI targets flat file:

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

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

Configuring the storage device:

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

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

Connecting the adapter to an Ethernet network

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

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

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

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

Understanding the adapter LED:

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

Light	State	Description
Green	On	Good Link
Green	Off	No link: could be the result of a bad cable, bad connector, or configuration mismatch
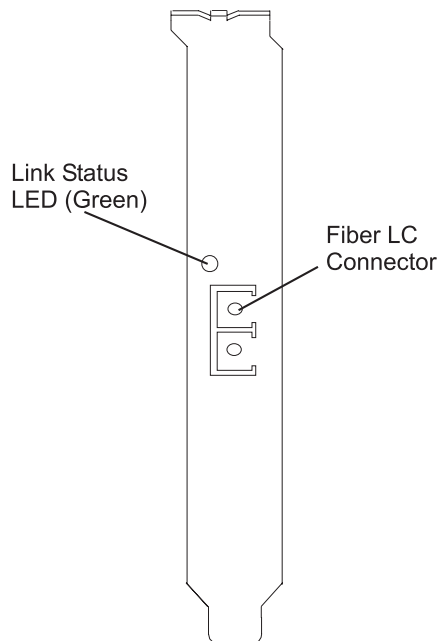
Figure 29. LED on the 1 Gigabit-SX iSCSI TOE PCI-X Adapter

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 74.

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

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

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

Connecting the network cables and adapter:

Use these instructions to connect the adapter to your network.

Before you begin connecting the adapter, make sure you have the hardware listed in "Verifying your hardware requirements" on page 74.

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
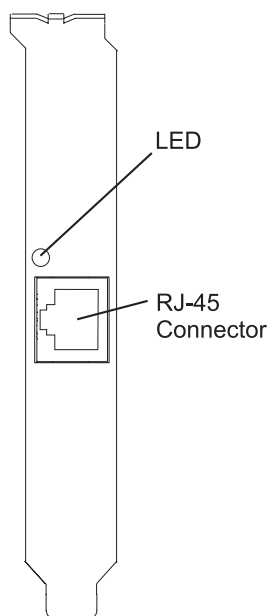
Figure 30. LED on the 1 Gigabit-TX iSCSI TOE PCI-X Adapter

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 24 on page 85 shows the detail sense data layout.
- Table 25 on page 85 shows the detail sense data descriptions.
- Special detail sense data and Table 26 on page 87 show a special format that is used for logging bulk data such as a crash record or an IOCB request or completion queue.
- Table 27 on page 87 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 24. 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
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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 25. 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

Table 25. Detail sense data descriptions (continued)

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

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

This format is used for logging bulk data such as a crash record or an IOCB request or completion queue. The first line of the detail data has a special format and all remaining lines of the detail data contain the bulk data being logged. Note that the bulk data may take up more than one of these records. The first line of the entry contains information to piece the data together. The first line is:

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

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

Table 26. 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 27. Error number values

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

Table 27. Error number values (continued)

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

Table 27. Error number values (continued)

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

Table 27. Error number values (continued)

Error number	Error template	Description of error
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 28 shows the detail sense data layout.
- Table 29 shows the detail sense data descriptions.
- shows the error number values.

Table 28. 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
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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 29. 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

Table 29. Detail sense data descriptions (continued)

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

Table 29. Detail sense data descriptions (continued)

Data	Description
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 30. Error number values

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

Table 30. Error number values (continued)

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

Table 30. Error number values (continued)

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

Table 30. Error number values (continued)

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

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

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

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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 31 describes the different LED states and what those states indicate.

The following figure shows the adapter:
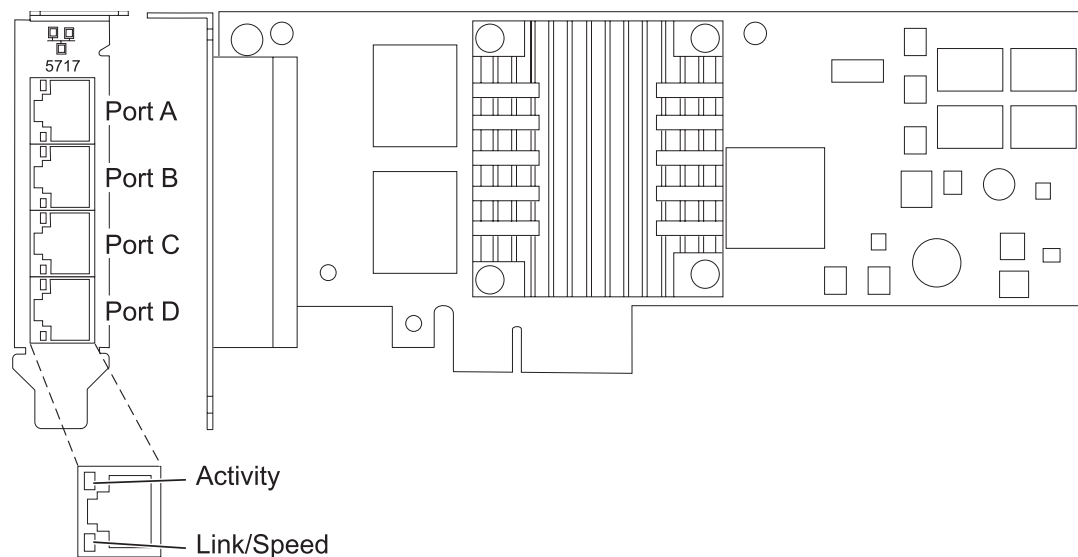
Figure 31. 4-Port 10/100/1000 Base-TX PCIe Adapter

Table 31. 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
  - For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.htm)

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 that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Preparing for installation

If you are installing the operating system at this time, install the adapter before you install the operating system. See "Installing the adapter" on page 100 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 99 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" on page 97.

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.

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

10 Gb Ethernet-SR PCI-X 2.0 DDR Adapter (FC 5721; CCIN 573A)

Learn about the features, operating system requirements, and installation notes for the 10 Gb Ethernet-SR PCI-X 2.0 DDR Adapter.

Overview

The 10 Gb Ethernet-SR PCI-X 2.0 DDR Adapter is designed to provide a PCI-X based server connection. The adapter conforms to the IEEE 802.3ae 10 Gigabit Ethernet standard and supports jumbo frames.

The 10 Gb Ethernet-SR PCI-X supports the following distances:

- Up to 33 m by using 62.5 um multimode fiber with 200 MHz*km minimum modal bandwidth at 850 nm
- Up to 300 m by using 50 um multimode fiber with 2000 MHz*km minimum modal bandwidth at 850 nm

The adapter is designed to run in standard PCI-X v2.0 and PCI-X v1.0a compliant systems with 64 bit PCI-X BusMaster slots at 133 Mode 1 or Mode 2. The adapter draws power from the PCI-X 3.3 V supplies

and is keyed to fit only into a 3.3 V slot. The adapter supports 1M x 8 bit boot FLASH ROM and has a 240 KB on-chip TX packet buffer and a 32 MB on-chip RX packet buffer.

The FRU part numbers for the adapter are:
- Adapter, 03N4590 (Designed to comply with RoHS requirement.)
- Wrap plug, 11P3847

The adapter provides the following features:
- Single-slot, short form factor, 6.6 by 4.2 inch, half-length PCI cards
- 64 bit Direct Bus Mastering on the PCI-X bus
- Dual Address Cycle for access to 64 bit addresses
- PCI-X split transactions
- DMA engine for movement of command, status, and network data across PCI-X
- 240 KB on-chip TX packet buffer
- 32 MB on-chip RX packet buffer
- 1 MB Boot Flash ROM
- Jumbo frames (9 KB)
- Interrupts coalescing
- 802.1q VLAN tagging and stripping (IBM System i® models do not support VLANs)
- Conforms to IEEE 802.3ae 10 Gigabit Ethernet standard

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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
- IBM i
  - IBM i 7.1, or later
  - IBM i 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 104 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.

Verifying your hardware requirements

The 10 Gigabit Ethernet-SR PCI-X 2.0 DDR 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 32. Adapter cable information

Cable type	Physical connector type	Maximum range (meters)
62.5 m MMF	LC	33
50 m MMF	LC	300

Verifying your software requirements

Ensure that your operating system supports this adapter before you install it. See "Operating system or partition requirements" on page 101.

Gathering tools and documentation

To install the adapter, ensure that you have access to the following items:
- The 10 Gb Ethernet-SR PCI-X 2.0 DDR adapter
- The operating system documentation
- The system unit documentation
- The PCI adapter placement information for the system unit
- Wrap plug
- A flat-blade screwdriver
- AIX 5L Base Operating System CD, which includes the device driver, or the AIX 5L device driver CD-ROM

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.

Be sure that you have read "Preparing for installation" on page 101 to determine:
- 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 104. When you install AIX 5L, your adapter device driver is automatically installed.

If you already have a supported level of AIX 5L installed, the device driver is already installed and you can go to "Installing the adapter" on page 104. Otherwise, install the device driver.

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-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, and do the following steps:
   - 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. For the adapter, type the following device package name: `devices.pci.1410EB02`
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 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.
    - 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.
14. Remove the installation media from the drive.
15. Press F10 to exit SMIT.
16. Go to the adapter installation procedure, "Installing the adapter" on page 104.

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.pci.1410EB02.rte`
3. Press Enter.

If the 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.1410EB02.rte	5.2.xx	COMMITTED	Ethernet adapter software

Verify that the **devices.pci.1410EB02.rte** filesets are installed at the AIX 5L version 5.2 with the 5200-08 Recommended Maintenance package or later level. If this information displays but you continue to have problems, go to "Installing the adapter" on page 104.

If no data displays 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 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 screen indicates that any of the ports is 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. See 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.

Note:
* 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 link and 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 of the adapter and, when lit, indicate the following conditions:

Table 33. Adapter LEDs

LED	Light	Description
TX	Off	No activity
	Flashing green	Transmit activity
RX	Off	No activity
	Flashing green	Receive activity
Link	Off	No link
	Green	Link established

Related tasks:

Installing PCI adapters

Related reference:

⮕ IBM Prerequisite Web page

⮕ Parts information

⮕ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

10 Gb Ethernet-LR PCI-X 2.0 DDR Adapter (FC 5722; CCIN 576A)

Learn about the features, operating system requirements, and installation notes for the 10 Gb Ethernet-LR PCI-X 2.0 DDR Adapter.

Overview

The 10 Gb Ethernet-LR PCI-X 2.0 DDR Adapter is designed to provide a PCI-X based server connection. The adapter conforms to the IEEE 802.3ae 10 Gigabit Ethernet standard and supports Jumbo frames.

The FRU part numbers for the adapter are:
- Adapter, 03N4588 (Designed to comply with RoHS requirement.)
- Wrap plug, 12R6249

The adapter provides the following features:
- Single-slot, short form factor, 6.6 by 4.2 inch, half-length PCI cards
- 64 bit Direct Bus Mastering on the PCI-X bus
- Dual Address Cycle for access to 64 bit addresses
- PCI-X split transactions
- DMA engine for movement of command, status, and network data across PCI-X
- 240 KB on-chip TX packet buffer
- 32 MB on-chip RX packet buffer
- 1 MB Boot flash ROM
- Jumbo frames (9 KB)
- Interrupts coalescing
- 802.1q VLAN tagging and stripping (IBM System i models do not support VLANs)
- Conforms to IEEE 802.3ae 10 Gigabit Ethernet standard

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

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 108 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.

Verifying your hardware requirements

The 10 Gb Ethernet-LR PCI-X 2.0 DDR adapter requires the following hardware:
- A wrap plug for the single mode fiber connector, if you are running the total diagnostics package
- Longwave (1310 nm) 9/50 micron single-mode fiber network attachment

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

Table 34. Adapter cable information

Cable type	Physical connector type	Maximum range (meters)
9 m SMF	SC	10 km

Verifying your software requirements

Ensure that your operating system supports this adapter before you install it. See "Operating system or partition requirements" on page 108.

Gathering tools and documentation

To install the adapter, ensure that you have access to the following items:
- The 10 Gb Ethernet-LR PCI-X 2.0 DDR adapter
- The operating system documentation
- The system unit documentation
- The PCI adapter placement information for the system unit
- Wrap plug
- A flat-blade screwdriver
- AIX 5L Base Operating System CD, which includes the device driver, or the AIX 5L device driver CD-ROM

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.

Be sure that you have read "Preparing for installation" on page 105 to determine:
- 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 108. When you install AIX 5L, your adapter device driver automatically installs.

If you already have a supported level of AIX 5L installed, the device driver is already installed and you can go to "Installing the adapter" on page 108. Otherwise, install the device driver.

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-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 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. Type the following to display the Find window: /

8. For the adapter, type the following device package name: `devices.pci.1410EC02`

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 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.
    - 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.

14. Remove the installation media from the drive.

15. Press F10 to exit SMIT.

16. Go to the adapter installation procedure, "Installing the adapter" on page 108.

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.pci.1410EC02.rte`

3. Press Enter.

If the adapter device driver is installed, an example of the data that displays on your screen is shown below:

File set	Level	State	Description
Path: /usr/lib/objrep osdevices.pci.1410EC02.rte	5.2.0.85	COMMITTED	Ethernet adapter software

Verify that the **devices.pci.1410EC02.rte** filesets are installed at the AIX 5L Version 5.2 with the 5200-08 Technology Level or later level. If this information displays but you continue to have problems, go to "Installing the adapter" on page 108.

If no data displays on your screen, the adapter device driver did not install correctly. Try reinstalling the driver.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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
- IBM i
  - IBM i 7.1, or later
  - IBM i 6.1, or later

Installing the adapter

See the customer-installable features publication for instructions on installing PCI adapters. After you have installed the adapter, continue on to Verifying 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 screen indicates that any of the ports is 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. See 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 SC connector of the fiber cable into the adapter SC connector.
2. Insert the male fiber SC connector of the other end of the cable into the network switch.

Note: It is necessary to configure an IP network interface to enable the adapter to detect link and 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 of the adapter and, when lit, indicate the following conditions.

Table 35. Adapter LEDs

LED	Light	Description
TX	Off	No activity
	Flashing green	Transmit activity
RX	Off	No activity
	Flashing green	Receive activity
Link	Off	No link
	Green	Link established

Related tasks:

→ Installing PCI adapters

Related reference:

→ IBM Prerequisite Web page

→ Parts information

→ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

Learn about the features, operating system requirements, and installation procedures for the feature code (FC) 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.
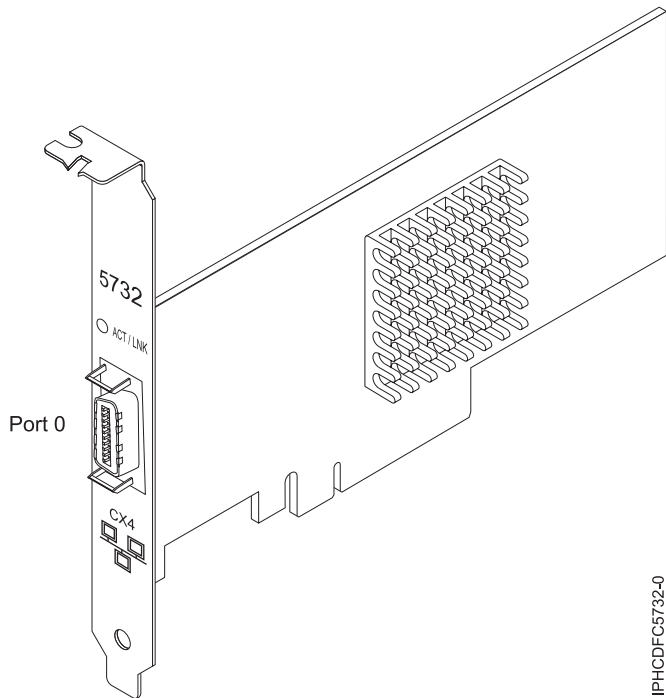
Figure 32. 10 Gigabit Ethernet-CX4 PCI Express (PCIe) Adapter

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

Table 36. 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.		

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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 111.

Installing the AIX device driver software

To install device driver software, follow the steps in "Installing the AIX device driver software" on page 276.

Installing the adapter

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

Verifying the adapter installation

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

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

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

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

4-Port 10/100/1000 Base-TX PCI-X Adapter (FC 5740, 1954)

Learn about the features, operating system requirements, and installation notes for the 4-Port 10/100/1000 Base-TX PCI-X Adapter.

Overview

The 4-Port 10/100/1000 Base-TX PCI-X Adapter is a 64 bit Ethernet card. It is a full height PCI-X 1.0a adapter, which supports four gigabit ports on a single adapter delivering increased bandwidth for PCI-X slot-constrained systems. It provides high connectivity and reliability using two integrated, dual-port gigabit Ethernet controllers and a PCI-X bridge chip. The adapter connects the system to an Ethernet LAN at speeds of 10, 100, or 1000 Mbps.

The FRU part numbers for the adapter are:
- FC 5740, 03N5444[*] or 03N5446[**]
- FC 1954, 03N5444[*] or 03N5446[**]

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

The 4-Port 10/100/1000 Base-TX PCI-X adapter provides the following features:
- 3.3 volts, 64 bit, 133 MHz with 64 bit Direct Bus Mastering on the PCI-X bus
- IEEE 802.3ab 1000 Base-T compliant
- IEEE 802.3u 100 Base-TX compliant
- IEEE 802.3 10 Base-T compliant
- 802.1q VLAN tagging
- Two Intel 82546 GB Gigabit Controllers
- Interrupt moderation
- TCP Segmentation offload and encapsulation in hardware
- Checksum offloading of IP, TCP, and UDP frame
- Remote Management Support (WfM, RIS, SNMP/DMI)
- Increased connectivity while significantly reducing central processing unit (CPU) utilization
- Four RJ 45 ports
- Two LED adapter status indicators per port for link activity and speed
- Boot ROM on two ports
- Advanced cable diagnostics
- Compliant with European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

The following figure shows the adapter:
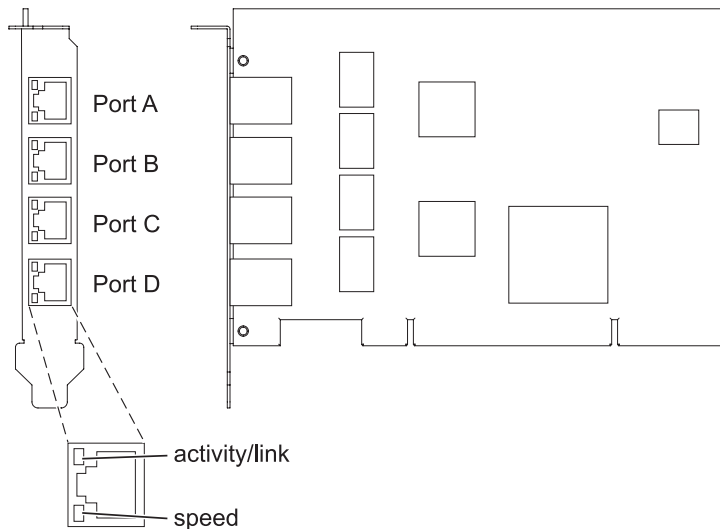
Figure 33. 4-Port 10/100/1000 Base-TX PCI-X adapter

For details about slot priorities and placement rules, 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 5L Version 5.3 with the 5300-04 Technology Level, or later
  – AIX 5L Version 5.2 with the 5200-08 Technology Level, or later
* Linux
  – Red Hat Enterprise Linux version 4 U2, or later
  – SUSE Linux Enterprise Server 9 SP3, or later

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Preparing for installation

This section helps you prepare to install your 4-Port 10/100/1000 Base-TX PCI-X adapter. Preparing to install the adapter involves the following tasks:
* Verifying your hardware requirements
* Verifying your software requirements
* Gathering tools and documentation

Note:
* 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 116 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 115 for instructions.

Verifying Your Hardware Requirements

The 4-Port 10/100/1000 Base-TX PCI-X adapter requires the following hardware:

- A wrap plug for the RJ-45 connector, if you are running the total diagnostics package
- Customer-supplied, unshielded twisted pair (UTP) cables:
  - Cat 5e (or higher) cables for 1000 Mbps network attachment
  - Cat 5 or Cat 3 cables for 100 Mbps or 10 Mbps network attachment

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

Verifying Your Software Requirements

Ensure that your operating system supports this adapter before you install it. See "Operating system or partition requirements" on page 114.

Gathering tools and documentation

To install the 4-Port 10/100/1000 Base-TX PCI-X adapter, make sure you have access to the following steps:
- The 4-Port 10/100/1000 Base-TX PCI-X adapter
- The operating system documentation
- The system unit documentation
- The PCI adapter placement information for the system unit.
- Wrap plug
- A flat-blade screwdriver
- AIX Base Operating System CD, which includes the device driver, or the AIX device driver CD-ROM

Installing the device driver software

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

Be sure you have read "Preparing for installation" on page 114 to determine:
- 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 116. When you install AIX, your adapter device driver automatically installs.

If your installed AIX operating system (AIX 5.2.0.85 or later; AIX 5.3.0.40 or later) supports the 4-Port 10/100/1000 Base-TX PCI-X adapter and you already have this adapter installed, the device driver is already installed and you can install the adapter. Go to "Installing the adapter" on page 116 for instructions. Otherwise, install the device driver.

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-ROM) into the appropriate media device. If your system does not have a CD-ROM drive, refer to your system documentation for performing a NIM (Network Installation Management) installation.
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 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. Type the following to display the Find window: /
8. For the 4-Port 10/100/1000 Base-TX PCI-X adapter, type the following device package name: `devices.pci.14101103`
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 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.
    - 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.
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.pci.14101103.rte`
3. Press Enter.

If the 4-Port 10/100/1000 Base-TX PCI-X adapter device driver is installed, an example of the data that displays on your screen is shown below:

Fileset	Level	State	Description
Path: /usr/lib/objrepos devices.pci.14101103.rte	5.2.0.0	COMMITTED	4-Port 10/100/1000 Base-TX PCI-X Adapter Software

Verify that the **devices.pci.14101103.rte** filesets are installed at the AIX 5.2.0.0 (or later level) or AIX 5L 5.3.0.0 (or later level). If this information displays but you continue to have problems, go to "Installing the adapter."

If no data displays on your screen, the 4-Port 10/100/1000 Base-TX PCI-X 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.

After you have installed the adapter, continue on to Verifying 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 4-Port 10/100/1000 Base-TX PCI-X 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 is 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 UTP network. Refer to your local procedures for information about connecting the 4-Port 10/100/1000 Base-TX PCI-X adapter to your Ethernet network.

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 one of the RJ-45 connectors on the adapter.
2. Insert the RJ-45 jack of the other end of the UTP cable into the network switch.

Adapter LEDs

The LEDs on the 4-Port 10/100/1000 Base-TX PCI-X adapter provide information about the operation status of the card. The LEDs are visible through the mounting bracket of the card and, when lit, indicate the following conditions:

Table 37. Adapter LEDs

LED	Light	Description
ACT/LNK	Green	Good link
	Off	No link (The absence of a link could be the result of a bad cable, a bad connector, or a configuration mismatch)
	Flashing	Data activity
Link Speed	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

Port A

Port B

Port C
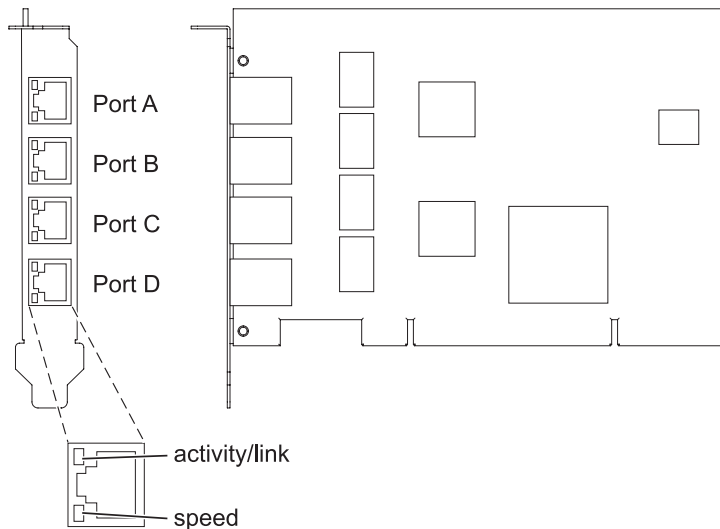
Port D

activity/link

speed

Figure 34. 4-Port 10/100/1000 Base-TX PCI-X adapter

Related tasks:

➜ Installing PCI adapters

Related reference:

➜ IBM Prerequisite Web page

➜ Parts information

➜ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe2 2x10GbE SR 2x1GbE UTP Adapter (FC 5744; CCIN 2B44)

Learn about the specifications and operating system requirements for the feature code (FC) 5744 adapters.

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 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 35 on page 119 shows the FC 5745 adapter.
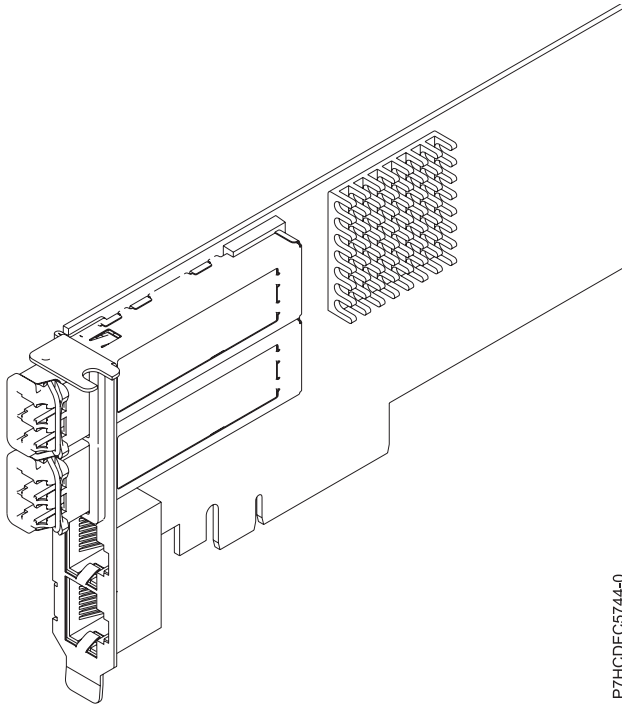
Figure 35. PCIe2 2x10GbE SR 2x1GbE UTP Adapter

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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

Related tasks:

⮕ Installing PCI adapters

Related reference:

⮕ IBM Prerequisite Web page

⮕ Parts information

⮕ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe2 2x10GbE SFP+ Copper 2x1GbE UTP Adapter (FC 5745; CCIN 2B43)

Learn about the specifications and operating system requirements for the feature code (FC) 5745 adapters.

Overview

FC 5745 is a full height adapter, and the FC 5279 is a low-profile 2U adapter. The 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 36 on page 121shows 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.
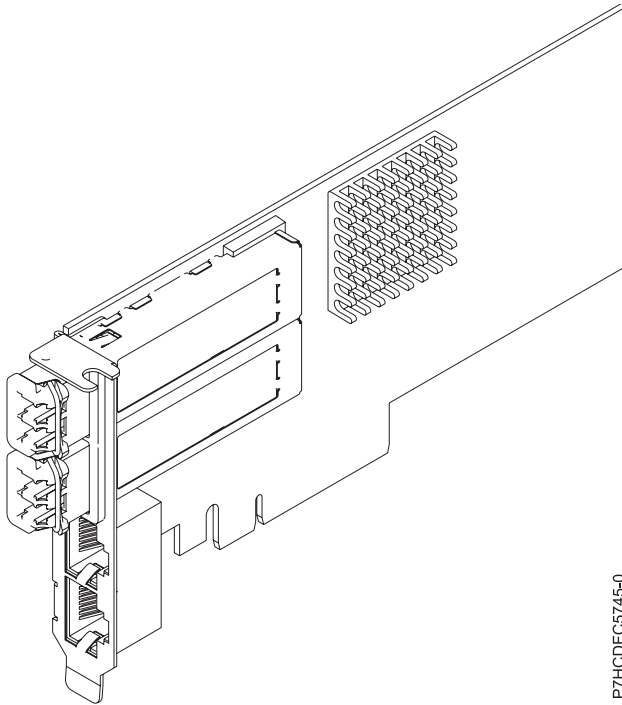
Figure 36. PCIe2 2x10GbE SFP+ Copper 2x1GbE UTP Adapter

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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 122 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 37 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 38 for details about the feature codes.

P7ECF505-0
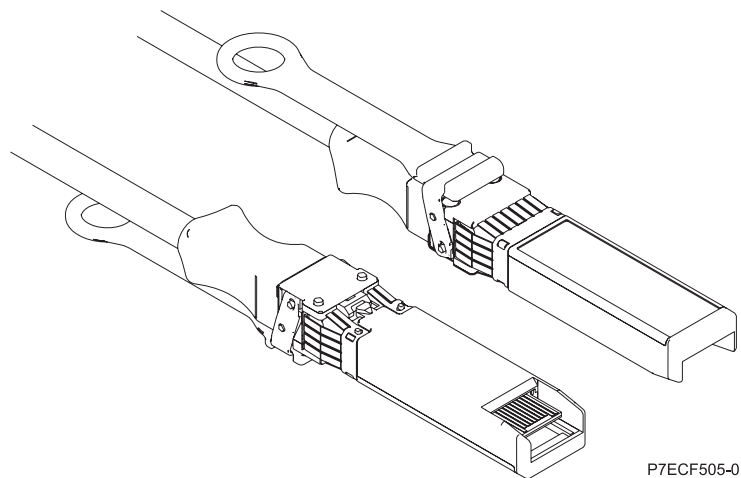
Figure 37. Top and bottom view of the cable

Table 38. 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

Related tasks:

➜ Installing PCI adapters

Related reference:

➜ IBM Prerequisite Web page

➜ Parts information

➜ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

Learn about features, requirements, and specifications for the 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 39 describes the different LED states and what those states indicate. The following figure shows the adapter.
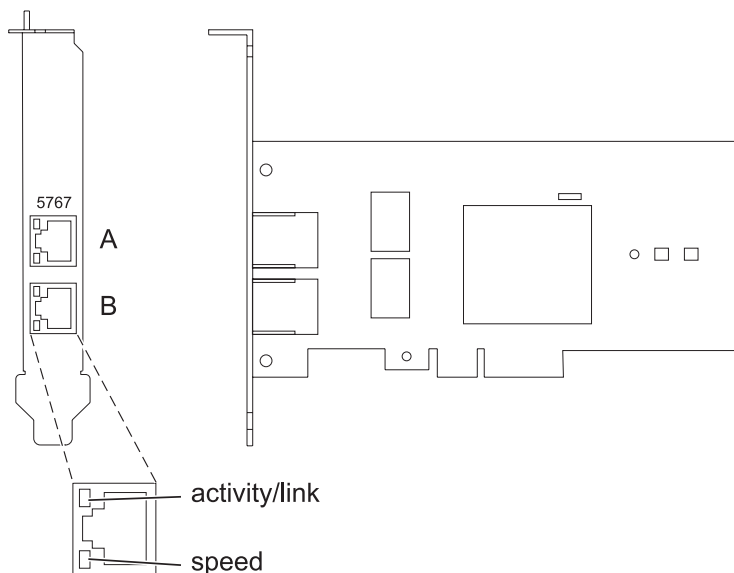
Figure 38. 2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter

Table 39. 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

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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.
- IBM i
  - IBM i 7.1, or later.
  - IBM i 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 127 for instructions.

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

If you already have one of these adapters installed and working with your AIX operating system and you are preparing to install additional adapters, the device driver is already installed and you 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" on page 124.

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.

Related tasks:

➽ Installing PCI adapters

Related reference:

➽ IBM Prerequisite Web page

➽ Parts information

➽ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

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

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

The adapter provides the following features:

- Supports interrupt moderation to deliver increased performance while significantly reducing 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 39 on page 129 shows the location of the LEDs. Table 40 on page 129 describes the different LED states and what those states indicate. The following figure shows the adapter.
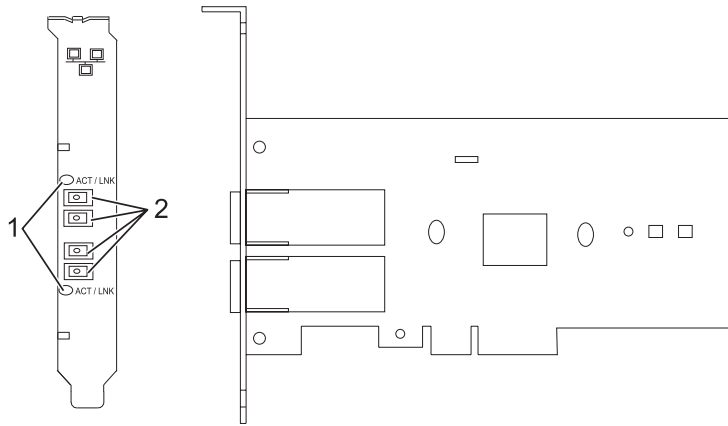
Figure 39. 2-Port Gigabit Ethernet-SX PCI Express Adapter

1   LEDs

2   Multimode Fiber LC receptacles

Table 40. 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

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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.
* IBM i
    – IBM i 7.1, or later.
    – IBM i 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" 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.

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 41. 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.

Related tasks:

 Installing PCI adapters

Related reference:

 IBM Prerequisite Web page

 Parts information

 PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

Learn about the features, operating system requirements, and installation procedures for the 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.
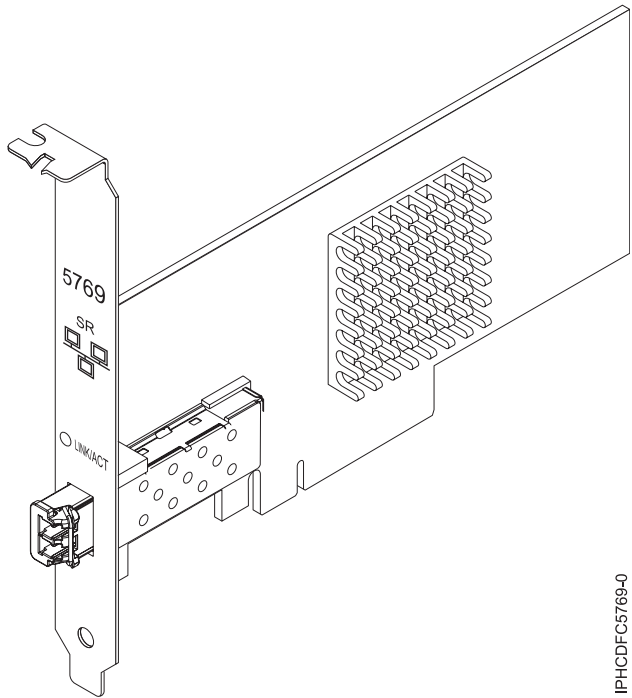
Figure 40. 10 Gigabit Ethernet-SR PCIe Adapter

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

Table 42. Adapter LED

LED	Light	Description
Activity/Link	Green	Good link, no activity
	Flashing Orange	Transmit activity
	Off	No link[*]
Adapter card status	Red	Not initialized[**]
	Off	Initialized

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

[**]The adapter has not been initialized by the operating system. During such time, the following conditions are true:
- If no cable is connected, the Green LED is **ON**.
- If cable is connected and the LINK is sensed, the Green LED is **OFF**.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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 43. 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 134.

Installing the AIX device driver software

To install device driver software, follow the steps in "Installing the AIX device driver software" on page 276.

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 43 on page 135.
- If your switch has an SC receptacle, you need an LC-SC converter cable.
- It is necessary to configure an IP network interface to enable the adapter to detect a link and to illuminate the link LED.

Related tasks:

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

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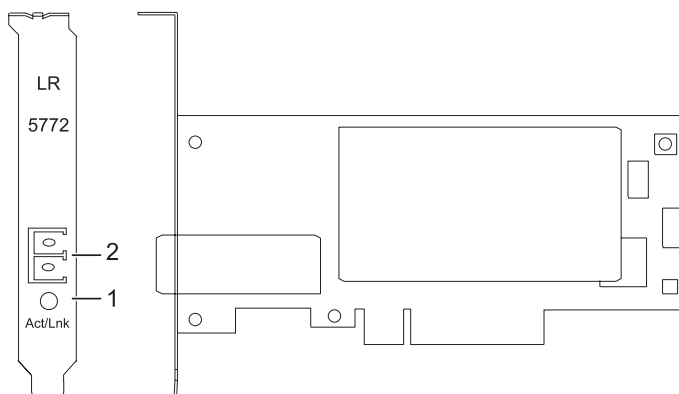

Figure 41. 10 Gigabit Ethernet-LR PCI Express Adapter

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.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for
your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new
feature and that you determine whether there are any prerequisites for this feature and attaching devices.
To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

The adapter is supported on the following versions of the operating systems:
- AIX
    - AIX 7.1, or later
    - AIX 6.1, or later
    - AIX 5.3, or later
- Linux
    - Red Hat Enterprise Linux 5.6 for POWER, or later
    - SUSE Linux Enterprise Server 11 Service Pack 1, or later
- IBM i
    - IBM i 7.1, or later
    - IBM i 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 140 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.

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 44. 10 Gigabit Ethernet-LR PCI Express Adapter cable information

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

Verifying your software requirements

Ensure that your operating system supports this adapter before you install it. See "Operating system or partition requirements" on page 137.

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 137 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 140. 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" on page 140.

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 44 on page 138.
- 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 45. Adapter LEDs

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

Related tasks:

 Installing PCI adapters

Related reference:

 IBM Prerequisite Web page

 Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

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

Overview

The PCIe2 LP 4-port 1 GbE 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. 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.

Each of the Ethernet ports can be connected by using:
- CAT5e (or later) UTP cables for 1000 Mbps network attachment
- CAT5 or CAT3 UTP cables for 100 Mbps or 10 Mbps network attachment

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 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

Specifications

Item   Description
Adapter FRU number
      74Y4064 (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, CAT5e, 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.

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

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
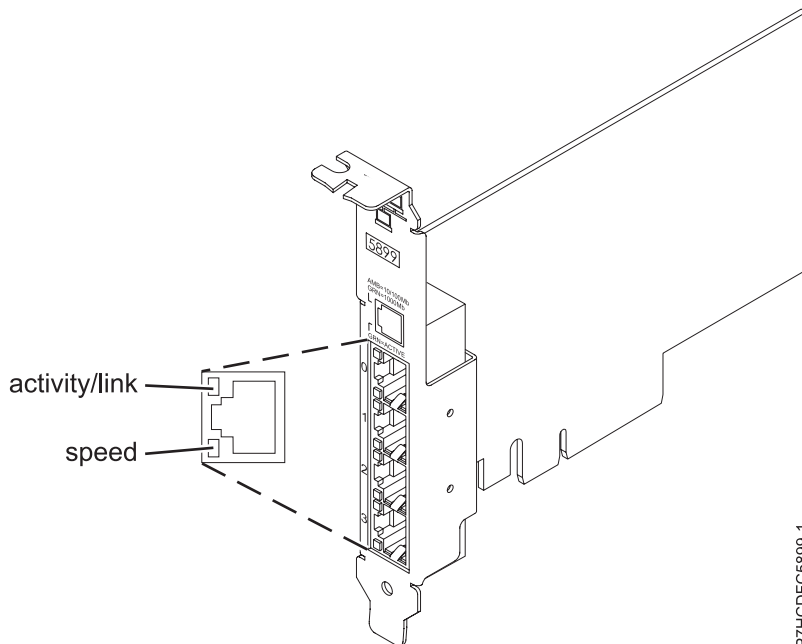> * VIOS

The following figure shows the adapter.

Figure 42. Adapter

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. Figure 42 shows the location of the LEDs. Table 46 on page 143 describes the different LED states and what those states indicate.

Table 46. Adapter LEDs and descriptions

LED	Light	Description
Speed	Yellow	10 Mbps or 100 Mbps
	Green	1000 Mbps or 1 Gbps
Activity/link	Green flashing	Active link or data activity
	Off	No link
		The absence of a link can indicate a defective cable, defective connector, or a configuration mismatch.

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, or later.
  - Red Hat Enterprise Linux 5.8, or later.
  - SUSE Linux Enterprise Server 11, Service Pack 2, or later (with update package).
  - For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.htm)
- IBM i
  - IBM i 7.1, or later.
  - IBM i 6.1 with 6.1.1 machine code 6.1.1, or later.
- VIOS
  - VIOS support requires VIOS 2.2.1.4, or later.

Related tasks:

➥ Installing PCI adapters

Related reference:

➥ IBM Prerequisite Web page

➥ Parts information

➥ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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 145 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.

Limitations
>   This adapter cannot be used to boot an LPAR via AIX NIM or Linux Network Install. Systems that require installation from a network source must be configured with another Ethernet adapter that supports boot capability.

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:
  – Red Hat Enterprise Linux Version 6.3 for POWER, or later, with current maintenance updates available from Red Hat.

- SUSE Linux Enterprise Server 11 Service Pack 2, or later, with current maintenance updates available from SuSE.
- Firmware level 7.6, or later.

Cables

Feature codes EC27 and EC28 require the use of compatible SFP+, 10 Gbps, copper, twinaxial, active, Ethernet cables. See Figure 43 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 47 for details about the feature codes.

P7ECF505-0
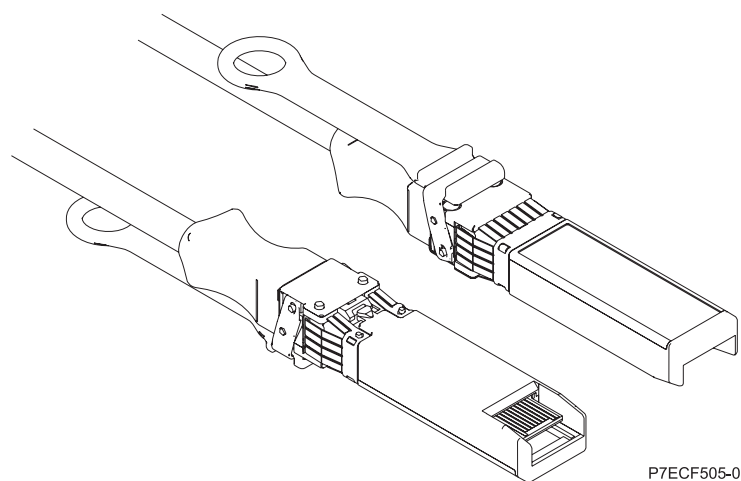
Figure 43. Top and bottom view of the cable

Table 47. 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

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe 2-Port 10 GbE SFN6122F Adapter (FC EC2J; CCIN EC2G)

Learn about the specifications and operating system requirements for the feature code (FC) EC2J adapters.

Overview

The FC EC2J PCIe 2-Port 10 GbE SFN6122F adapter is a regular-height adapter equivalent to the FC EC2G, which is a low-profile 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 instantiating protected virtual network interface controller (vNIC) interfaces for each running guest operating system or application, which gives it a direct pipeline to the Ethernet network. This architecture provides the most efficient way to maximize network and processor efficiency. The adapter supports Solarflare OpenOnload (http://support.solarflare.com/oem/ibmpower) for environments that require high performance and low latency. You can download the Solarflare NET drivers that support this adapter, from the Solarflare Support Site (http://support.solarflare.com/oem/ibmpower).

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.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.
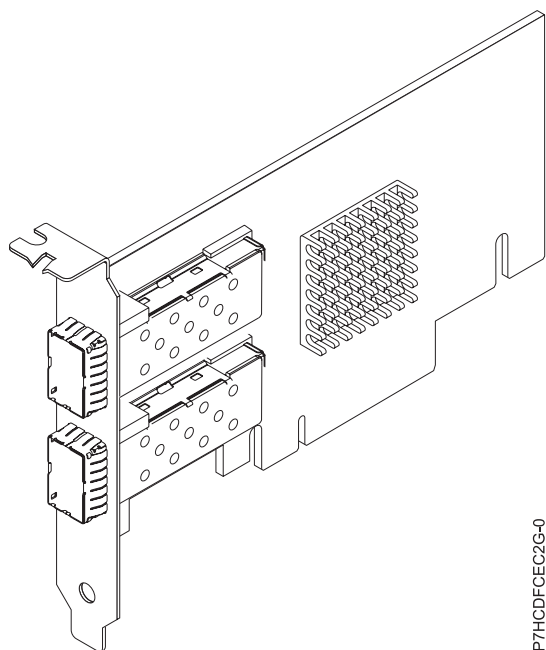
Figure 44 shows the adapter.

Figure 44. FC EC2J adapter

Specifications

Item   Description
Adapter FRU number
        00E8224 (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

For details, see "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 version of the operating system:

- Red Hat Enterprise Linux Version 6.4 for POWER, or later, with current maintenance updates available from Red Hat.

Note: OpenOnload and performance optimized drivers are available for download directly from the Solarflare Support Site (http://support.solarflare.com/oem/ibmpower).

Cables

FC EC2J requires the use of compatible SFP+, 10 Gbps, copper, twinaxial, active Ethernet cables. For a view of the cable top and cable bottom, see Figure 45. 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.

For details about the cable feature codes, see Table 48.
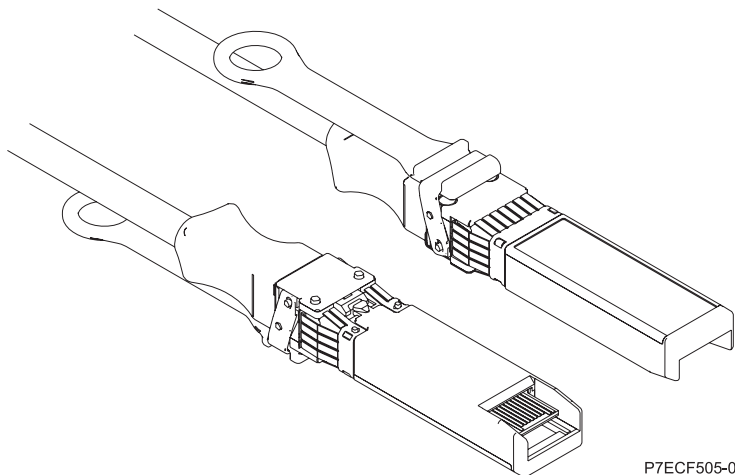

P7ECF505-0

Figure 45. Top and bottom view of the cable

Table 48. FC 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)
FC	EN01	EN02	EN03

Table 48. FC and part number for varying lengths of the cable (continued)

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

PCIe 2-Port 10 GbE SFN5162F Adapter (FC EC2K; CCIN EC2H)

Learn about the specifications and operating system requirements for the feature code (FC) EC2K adapters.

Overview

The FC EC2K PCIe 2-Port 10 GbE SFN5162F adapter is a regular-height adapter equivalent to the FC EC2K, which is a low-profile 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 instantiating protected virtual network interface controller (vNIC) interfaces for each running guest operating system or application, which gives it a direct pipeline to the Ethernet network. This architecture provides the most efficient way to maximize network and processor efficiency. You can download the Solarflare NET drivers that support this adapter, from the Solarflare Support Site (http://support.solarflare.com/oem/ibmpower).

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.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.
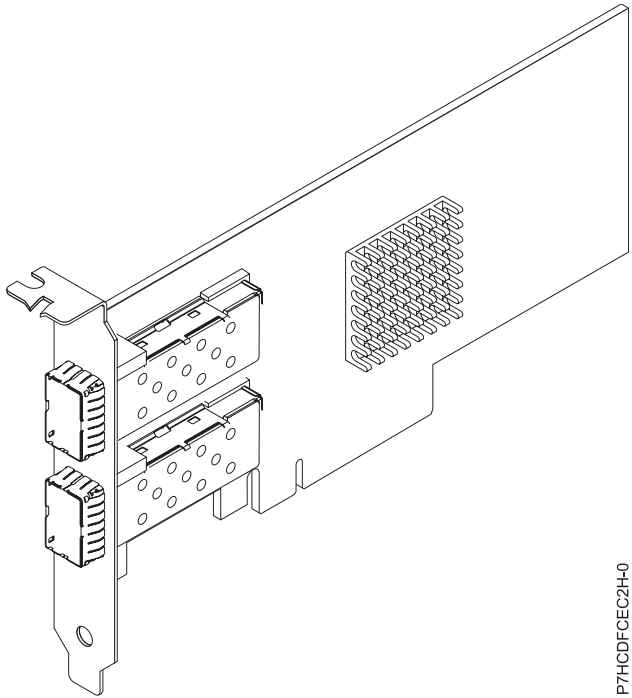
P7HCDFCEC2H-0

Figure 46. FC EC2K adapter

Specifications

Item   Description
Adapter FRU number
    00E8230 (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
    For details, see "Cables" on page 150.
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 version of the operating system:

• Red Hat Enterprise Linux Version 6.4 for POWER, or later, with current maintenance updates available from Red Hat.

   Note: OpenOnload and performance optimized drivers are available for download directly from the Solarflare Support Site (http://support.solarflare.com/oem/ibmpower).

Cables

FC EC2K requires the use of compatible SFP+, 10 Gbps, copper, twinaxial, active Ethernet cables. For a view of the cable top and cable bottom, see Figure 47. 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.

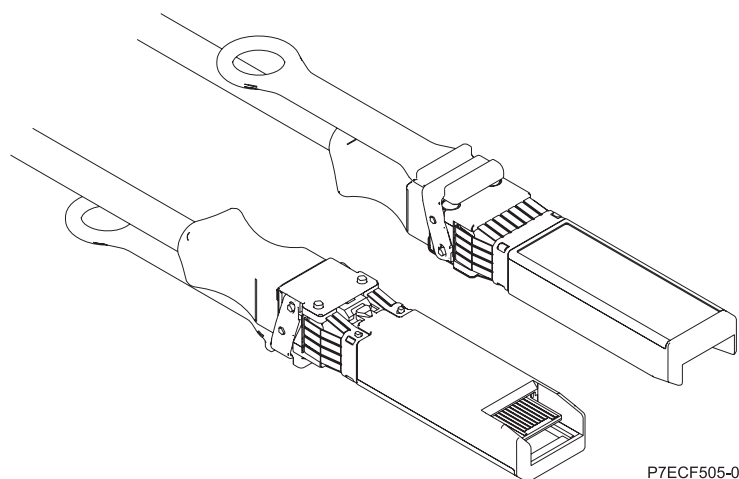For details about the cable feature codes, see Table 49.

P7ECF505-0

Figure 47. Top and bottom view of the cable

Table 49. 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 LP 2-Port 10 GbE RoCE SR Adapter (FC EC30; CCIN EC29)

Learn about the specifications and operating system requirements for the feature code (FC) EC30 adapters.

Overview

The FC EC29 and FC EC30 are the same adapter. FC EC29 is a low-profile adapter, and FC EC30 is a full-height adapter. The names of these two adapters are:
- FC EC29: PCIe2 LP 2-Port 10 GbE RoCE SR adapter
- FC EC30: PCIe2 2-Port 10 GbE RoCE SR 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 supports the InfiniBand trade association (IBTA) standard for remote direct memory access (RDMA) over converged Ethernet (RoCE). The adapter supports short range (SR) optical connectivity. 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 processor and providing enhanced performance. The adapter minimizes processor usage by efficiently using memory access.

The adapter has a preinstalled optical transceiver. Little connector (LC) type connectors connect the adapter to standard 10-Gb SR optical cabling and provide up to 300 m (984.25 ft) cable length. The two transceiver ports are used for connectivity with other servers or switches in the network. Each port provides Ethernet connectivity with a nominal data rate of 10 gigabits per second (Gbps). The link aggregation and failover features of the adapter are ideal for critical network applications that require redundancy and high availability.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Specifications

Item   Description
Adapter FRU number
> 00E1601 (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
> Supports standard 10-Gb SR optical cabling and up to 300 m (984.25 ft) cable length.

Voltage
> 3.3 V

Form factor
> Short

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

Limitations
> This adapter cannot be used to boot an LPAR via AIX NIM or Linux Network Install. Systems that require installation from a network source must be configured with another Ethernet adapter that supports boot capability.

Operating system or partition requirements

This adapter is supported for the following versions of the operating system:
- AIX:
  - AIX Version 7.1, or later
  - AIX Version 6.1, or later
- Linux:
  - Red Hat Enterprise Linux Version 6.3 for POWER, or later, with current maintenance updates available from Red Hat.
  - SUSE Linux Enterprise Server 11 Service Pack 2, or later, with current maintenance updates available from SuSE.
- Firmware level 7.6, or later.

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

# PCIe2 2x10Gb FCoE 2x1GbE SFP+ Adapter (FC EN0H; CCIN 2B93)

Learn about the specifications and operating system requirements for the feature code (FC) EN0H adapters.

Overview

The PCIe2 2x10Gb FCoE 2x1GbE SFP+ Adapter is a PCI Express (PCIe) generation 2, low-profile capable adapter. The adapter has four-ports and is a Fibre Channel over Ethernet (FCoE) converged network adapter (CNA). This adapter provides a PCIe 2.0 host bus interface. The adapter is a high-performance adapter that consolidates traffic for networking and Fibre Channel storage. The adapter is optimized for cloud computing, virtualization, storage, and other data center applications. Both FCoE and network interface controller (NIC) functions are available for both FCoE ports. Use of the FCoE requires that you use convergence enhanced Ethernet (CEE) switches. The link aggregation and failover features of the adapter make it suitable for critical network applications that require redundancy and high availability.

The four-port adapter provides two 10 Gb FCoE SR small form-factor pluggable (SFP+) ports and two 1 Gb RJ45 Ethernet ports. The two 10 Gb FCoE ports are connected by little connector-type (LC) connectors. Each FCoE port provides Ethernet connectivity with a nominal data rate of 10 Gbps (gigabits per second). Each of the 1 Gb ports provides Ethernet connectivity at a data rate of 1 Gbps and is connected with Ethernet cables. A 10 Mb data rate is not supported. Figure 48 shows the FC EN0H adapter.

Restriction: The 1 Gb Ethernet ports do not support data rates of 10 Mbps (megabits per second).
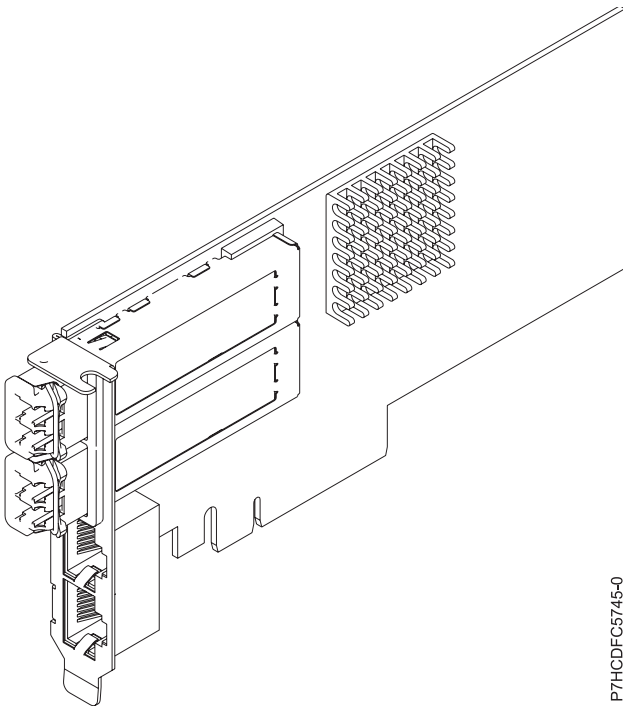
Figure 48. FC EN0H adapter

Specifications

Item   Description

Adapter FRU number
>   00E3498 (Designed to comply with RoHS requirement)

Wrap plug FRU number
>   12R9314 (for Fibre LC connector)
>
>   10N7405 (for RJ45 connector)

I/O bus architecture
>   PCIe2 x8

Slot requirement

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

Cables
>   SR SFP+ optical fiber cables and Cat5 Ethernet cables

Voltage
>   3.3 V, 12 V

Form factor
>   Short, regular sized bracket, low-profile capable

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

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new
feature and that you determine whether there are any prerequisites for this feature and attaching devices.
To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

The adapter is supported on the following versions of the operating systems:
- AIX
    - AIX 7.1, or later
    - AIX 6.1, or later
- Linux
    - Red Hat Enterprise Linux
    - SUSE Linux Enterprise Server
    - For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/
      lopdiags/info/LinuxAlerts.htm)
- IBM i
    - IBM i 7.1, or later
    - IBM i 6.1, or later

PCIe2 4-Port (10Gb+1GbE) SR+RJ45 Adapter (FC EN0S; CCIN 2CC3)

Learn about the specifications and operating system requirements for the feature code (FC) EN0S adapter.

Overview

The PCIe2 4-Port (10Gb+1GbE) SR+RJ45 Adapter is a PCI Express (PCIe) generation 2, x8, short
form-factor, low-profile capable, regular-height adapter. The adapter provides two 10 Gb SR optical ports
and two 1 Gb RJ45 ports. This adapter provides a PCIe 2.0 host bus interface. The adapter supports the
Ethernet network interface controller (NIC) function. The adapter is a high-performance adapter that
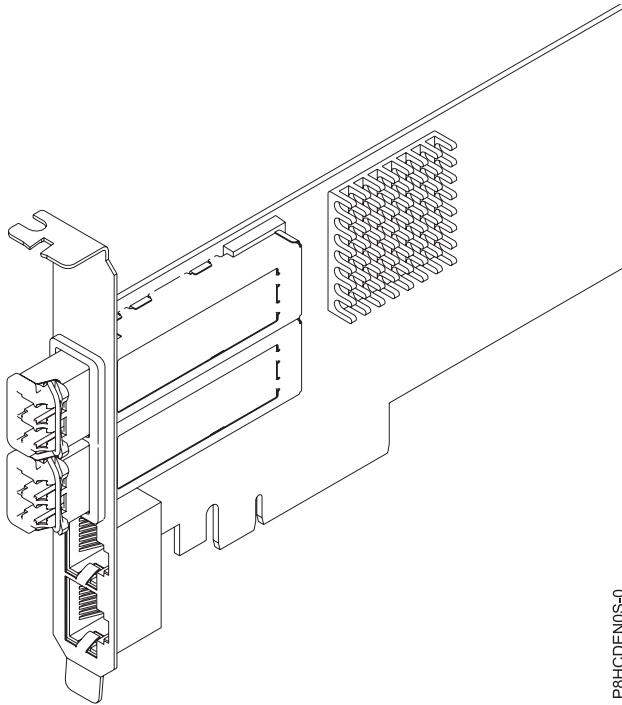
consolidates traffic for networking. The link aggregation and failover features of the adapter make it suitable for critical network applications that require redundancy and high availability.

The four-port adapter provides two 10 Gb small form-factor pluggable (SFP+) optical SR transceiver ports and two 1 Gb RJ45 Ethernet ports. The two 10 Gb SR ports have little connector (LC) duplex-type connectors. The optical transceiver uses shortwave laser optics and is attached with MMF-850nm fiber cabling with LC connectors. See "Cables" on page 155 for more information about the optical cables. Each 10 Gb port provides Ethernet connectivity with a nominal data rate of 10 Gbps (gigabits per second). Figure 49 on page 155 shows the FC EN0S adapter.

Each of the 1 Gb RJ45 port provides Ethernet connectivity at a data rate of 1 Gbps. Each of the 1 Gb ports is connected with a 4-pair, CAT-5 unshielded twisted pair (UTP) cable or with a cable of higher specification, and is supported for distances of up to 100 meters. In addition to 1 Gb (1000 Mb) networks, 100 Mb networks are also supported.

The adapter provides the following features:
- The adapter is a PCIe2 NIC network convergence adapter.
- The 10 Gb SR ports can function in the NIC mode.
- The adapter can be used as the host local area network (LAN) adapter.
- The adapter supports interrupt moderation to deliver increased performance while significantly reducing processor utilization
- The adapter supports dual port operation in any PCIe3 or PCIe2 slot.
- The adapter supports auto-negotiation, full-duplex only.
- The adapter supports multiple media-access control (MAC) per interface.
- The adapter supports integrated media-access control (MAC) and physical layer (PHY).
- The adapter supports the following standards for the different ports and functions:
  - IEEE 802.3ae in the 10 GbE ports
  - 802.3ab in the 1 GbE ports
  - Ether II and IEEE 802.3 for encapsulated frames
  - 802.1p for setting up priority levels in tagged VLAN frames
  - 802.1Q for VLAN tagging
  - 802.3x for flow control
  - 802.3ad for load-balancing and failover
  - IEEE 802.3ad and 802.3 for link aggregation
- The adapter provides message signal interrupts (MSI), MSI-X, and support of legacy pin interrupts.
- The adapter supports jumbo frames up to 9.6 KB.
- The adapter supports gigabit EtherChannel (GEC) with the existing software.
- The adapter supports TCP checksum offload transmission control protocol (TCP), user datagram protocol (UDP), TCP segmentation Offload (TSO) for IPv4 and IPv6.
- Supports TCP segmentation or large send offload
- Supports EEPROM-SPI and single EEPROM
- Compliant with European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

Figure 49. FC EN0S adapter

Specifications

Item   Description

Adapter FRU number

00E2715 (Designed to comply with RoHS requirement)

Low-profile tailstock part number: 00E2720

Wrap plug FRU number

12R9314 (SFP+ SR wrap plug)

74Y7010 (Twinax wrap plug)

10N7405 (1 Gb UTP wrap plug)

I/O bus architecture

PCIe2 x8

Slot requirement

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Cables

See "Cables" for details.

Voltage

3.3 V

Form factor

Short, regular-height tailstock, low-profile capable

Maximum number

For details about the maximum number of adapters that are supported, see the PCI adapter placement topic collection for your system.

Cables

Use multimode fiber optic cables with shortwave lasers that adhere to the following specifications:

- OM3 or OM4: Multimode 50/125 micron fiber, 2000 MHz x km bandwidth

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

Because core sizes are different, OM1 cables only can be connected to other OM1 cables. For best results, OM2 cables must not be connected to OM3 or OM4 cables. However, if an OM2 cable is connected to an OM3 or OM4 cable, the characteristics of the OM2 cable apply to the entire length of the cables. The following table shows the supported distances for the different fiber optic cable types at different link speeds.

Table 50. Supported distances for multimode fiber optic cables

Header	Cable Type and Distance		
Rate	OM1	OM2	OM3
10 Gbps	0.5 meters to 33 meters (1.64 feet to 108.26 feet)	0.5 meters to 82 meters (1.64 feet to 269.02 feet)	0.5 meters to 300 meters (1.64 feet to 984.25 feet)

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

The adapter is supported on the following versions of the operating systems:
- AIX
  - AIX 6.1 with the 6100-09 Technology Level and Service Pack 3 and APAR IV56366, or later
  - AIX 7.1 with the 7100-03 Technology Level and Service Pack 3 and APAR IV56367, or later
  - AIX 7.1 with the 7100-01 Technology Level and Service Pack 10, or later
  - AIX 7.1 with the 7100-02 Technology Level and Service Pack 5, or later
  - AIX 6.1 with the 6100-07 Technology Level and service Pack 10, or later
  - AIX 6.1 with the 6100-08 Technology Level and service Pack 5, or later
- Linux
  - SUSE Linux Enterprise Server Version 11 Service Pack 3, or later, with current maintenance updates available from SUSE
  - Red Hat Enterprise Linux Version 6.5, or later, with current maintenance updates available from Red Hat
  - Red Hat Enterprise Linux Version 7, or later, with current maintenance updates available from Red Hat
  - For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.htm)
- IBM i supported through VIOS
  - IBM i Version 7.1, or later , supported through VIOS 2.2.2, or later

This adapter requires the following drivers:
- AIX: `devices.pciex.e4148a1614109304` for SFP+ optical ports and `devices.pciex.e4148a1614109404` for RJ45 ports
- Linux: bnx2x driver
- The latest version of the device driver or iprutils can be downloaded from IBM Service and Productivity Tools website (http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html).

Related tasks:

Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe2 4-port (10Gb+1GbE) Copper SFP+RJ45 Adapter (FC EN0U; CCIN 2CC3)

Learn about the specifications and operating system requirements for the feature code (FC) EN0U adapter.

Overview

The PCIe2 4-port (10Gb+1GbE) Copper SFP+RJ45 Adapter is a PCI Express (PCIe) generation 2, x8, short form-factor, low-profile capable, regular-height adapter. The adapter provides two 10 Gb copper twinax small form-factor pluggable (SFP+) ports and two 1 Gb RJ45 ports. This adapter provides a PCIe 2.0 host bus interface. The adapter supports the Ethernet network interface controller (NIC) function. The adapter is a high-performance adapter that consolidates traffic for networking. The link aggregation and failover features of the adapter make it suitable for critical network applications that require redundancy and high availability.
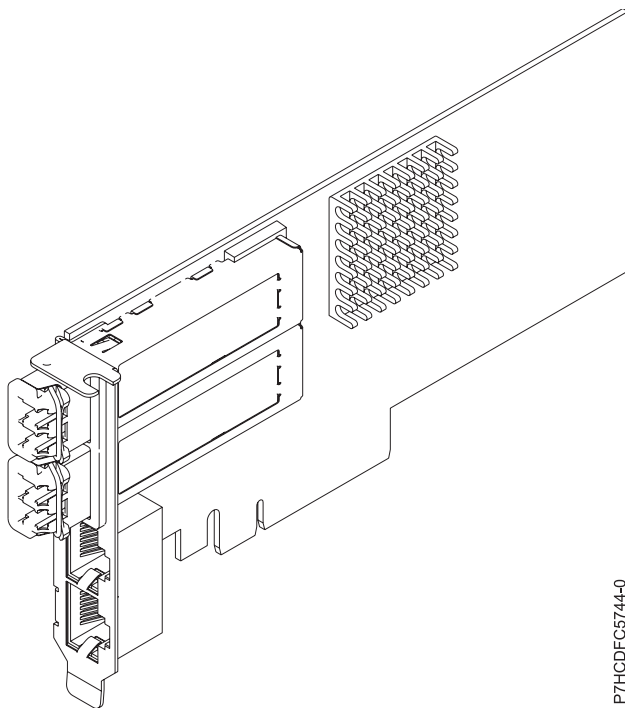
The two 10 Gb are SFP+ and do not include a transceiver. Active Copper twinax cables up to 5 meter in length are supported such as provided by feature codes EN01, EN02 or EN03. A transceiver is included with these cables. See "Cables" on page 159 for details. Each 10 Gb port provides Ethernet connectivity with a nominal data rate of 10 Gbps (gigabits per second). Figure 50 on page 158 shows the FC EN0U adapter.

Each of the 1 Gb RJ45 port provides Ethernet connectivity at a data rate of 1 Gbps. Each of the 1 Gb ports is connected with a 4-pair, CAT-5 unshielded twisted pair (UTP) cable or with a cable of higher specification, and is supported for distances of up to 100 meters. In addition to 1 Gb (1000 Mb) networks, 100 Mb networks are also supported.

The adapter provides the following features:
- The adapter is a PCIe2 NIC network convergence adapter.
- The 10 Gb ports can function in the NIC mode.
- The adapter can be used as the host local area network (LAN) adapter.
- The adapter supports interrupt moderation to deliver increased performance while significantly reducing processor utilization
- The adapter supports dual port operation in any PCIe3 or PCIe2 slot.
- The adapter supports auto-negotiation, full-duplex only.
- The adapter supports multiple media-access control (MAC) per interface.
- The adapter supports integrated media-access control (MAC) and physical layer (PHY).
- The adapter supports the following standards for the different ports and functions:
  - IEEE 802.3ae in the 10 GbE ports
  - 802.3ab in the 1 GbE ports
  - Ether II and IEEE 802.3 for encapsulated frames
  - 802.1p for setting up priority levels in tagged VLAN frames
  - 802.1Q for VLAN tagging

- – 802.3x for flow control
- – 802.3ad for load-balancing and failover
- – IEEE 802.3ad and 802.3 for link aggregation
- The adapter provides message signal interrupts (MSI), MSI-X, and support of legacy pin interrupts.
- The adapter supports jumbo frames up to 9.6 KB.
- The adapter supports gigabit EtherChannel (GEC) with the existing software.
- The adapter supports TCP checksum offload transmission control protocol (TCP), user datagram protocol (UDP), TCP segmentation Offload (TSO) for IPv4 and IPv6.
- Supports TCP segmentation or large send offload
- Supports EEPROM-SPI and single EEPROM
- Compliant with European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

Figure 50. FC EN0U adapter

Specifications

Item   Description
Adapter FRU number
>   00E2715 (Designed to comply with RoHS requirement)
>
>   Low-profile tailstock part number: 00E2720

Wrap plug FRU number
>   12R9314 (SFP+ SR wrap plug)
>
>   74Y7010 (Twinax wrap plug)
>
>   10N7405 (1 Gb UTP wrap plug)

I/O bus architecture
>   PCIe2 x8
Slot requirement

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Cables

See "Cables" for details.

Voltage

3.3 V

Form factor

Short, regular-height tailstock, low-profile capable

Maximum number

For details about the maximum number of adapters that are supported, see the PCI adapter placement topic collection for your system.

Cables

This adapter feature requires the use of compatible SFP+, 10 Gbps, copper, twinaxial, active, Ethernet cables. See Figure 51 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 51 for details about the feature codes.

P7ECF505-0
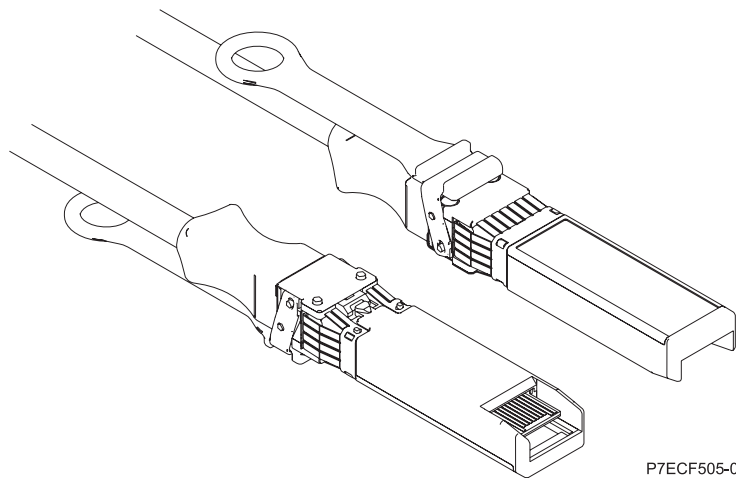
Figure 51. Top and bottom view of the cable

Table 51. 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

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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

- AIX
  - AIX 6.1 with the 6100-09 Technology Level and Service Pack 3 and APAR IV56366, or later
  - AIX 7.1 with the 7100-03 Technology Level and Service Pack 3 and APAR IV56367, or later
  - AIX 7.1 with the 7100-01 Technology Level and Service Pack 10, or later
  - AIX 7.1 with the 7100-02 Technology Level and Service Pack 5, or later
  - AIX 6.1 with the 6100-07 Technology Level and service Pack 10, or later
  - AIX 6.1 with the 6100-08 Technology Level and service Pack 5, or later
- Linux
  - SUSE Linux Enterprise Server Version 11 Service Pack 3, or later, with current maintenance updates available from SUSE
  - Red Hat Enterprise Linux Version 6.5, or later, with current maintenance updates available from Red Hat
  - Red Hat Enterprise Linux Version 7, or later, with current maintenance updates available from Red Hat
  - For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.htm)
- IBM i supported through VIOS
  - IBM i Version 7.1, or later , supported through VIOS 2.2.2, or later

This adapter requires the following drivers:
- AIX: `devices.pciex.e4148a1614109304` for SFP+ optical ports and `devices.pciex.e4148a1614109404` for RJ45 ports
- Linux: bnx2x driver
- The latest version of the device driver or iprutils can be downloaded from IBM Service and Productivity Tools website (http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html).

Related tasks:

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement
"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe2 2-port 10 GbE BaseT RJ45 Adapter (FC EN0W; CCIN 2CC4)

Learn about the specifications and operating system requirements for the feature code (FC) EN0W adapter.

Overview

The PCIe2 2-port 10 GbE BaseT RJ45 Adapter is a PCI Express (PCIe) generation 2, x8, short form-factor, low-profile capable, regular-height adapter. The adapter provides two 10 Gb RJ45 ports. This adapter provides a PCIe 2.0 host bus interface. The adapter supports the Ethernet network interface controller (NIC) function. The adapter is a high-performance adapter that consolidates traffic for networking. The link aggregation and failover features of the adapter make it suitable for critical network applications that require redundancy and high availability. Figure 52 on page 162 shows the FC EN0W adapter.

The ports default to auto negotiate the highest speed either at 10 Gb (10G BaseT), 1Gb (1000 BaseT), or 100 Mb (100 BaseT) full duplex. Each RJ45 port can be configured independent of the other port. Each RJ45 port is connected with a 4-pair, CAT-6A cable, and is supported for distances of up to 100 meters.

The adapter provides the following features:
- The adapter is a PCIe2 NIC network convergence adapter.
- The 10 Gb RJ45 ports can function in the NIC mode.
- The adapter can be used as the host local area network (LAN) adapter.
- The adapter supports interrupt moderation to deliver increased performance while significantly reducing processor utilization
- The adapter supports dual port operation in any PCIe3 or PCIe2 slot.
- The adapter supports auto-negotiation, full-duplex only.
- The adapter supports multiple media-access control (MAC) per interface.
- The adapter supports integrated media-access control (MAC) and physical layer (PHY).
- The adapter supports the following standards for the different ports and functions:
  - IEEE 802.3ae in the 10 GbE ports
  - 802.3ab in the 1 GbE ports
  - Ether II and IEEE 802.3 for encapsulated frames
  - 802.1p for setting up priority levels in tagged VLAN frames
  - 802.1Q for VLAN tagging
  - 802.3x for flow control
  - 802.3ad for load-balancing and failover
  - IEEE 802.3ad and 802.3 for link aggregation
- The adapter provides message signal interrupts (MSI), MSI-X, and support of legacy pin interrupts.
- The adapter supports jumbo frames up to 9.6 KB.
- The adapter supports gigabit EtherChannel (GEC) with the existing software.
- The adapter supports TCP checksum offload transmission control protocol (TCP), user datagram protocol (UDP), TCP segmentation Offload (TSO) for IPv4 and IPv6.
- Supports TCP segmentation or large send offload
- Supports EEPROM-SPI and single EEPROM
- Compliant with European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

Figure 52. FC EN0W adapter

Specifications

Item   Description

Adapter FRU number

00E2714 (Designed to comply with RoHS requirement)

Regular-height tailstock part number: 00E2862

Low-profile tailstock part number: 00E2721

Wrap plug FRU number

10N7405 (RJ45 wrap plug)

I/O bus architecture

PCIe2 x8

Slot requirement

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Cables

CAT-6A cable

Voltage

3.3 V

Form factor

Short, regular-height tailstock, low-profile capable

Maximum number

For details about the maximum number of adapters that are supported, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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

- AIX
  - AIX 6.1 with the 6100-09 Technology Level and Service Pack 3 and APAR IV56366, or later
  - AIX 7.1 with the 7100-03 Technology Level and Service Pack 3 and APAR IV56367, or later

- AIX 7.1 with the 7100-01 Technology Level and Service Pack 10, or later
- AIX 7.1 with the 7100-02 Technology Level and Service Pack 5, or later
- AIX 6.1 with the 6100-07 Technology Level and service Pack 10, or later
- AIX 6.1 with the 6100-08 Technology Level and service Pack 5, or later
- Linux
  - SUSE Linux Enterprise Server Version 11 Service Pack 3, or later, with current maintenance updates available from SUSE
  - Red Hat Enterprise Linux Version 6.5, or later, with current maintenance updates available from Red Hat
  - Red Hat Enterprise Linux Version 7, or later, with current maintenance updates available from Red Hat
  - For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.htm)
- IBM i supported through VIOS
- VIOS
  - VIOS 2.2.3.3 with ifix IV56366, or later
  - VIOS 2.2.2.5, or later
  - VIOS 2.2.1.9, or later

This adapter requires the following drivers:
- Linux: `bnx2x driver`
- The latest version of the device driver or iprutils can be downloaded from IBM Service and Productivity Tools website (http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html).

Related tasks:

➦ Installing PCI adapters

Related reference:

➦ IBM Prerequisite Web page

➦ Parts information

➦ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe2 4-port (10Gb FCoE and 1GbE) Copper and RJ45 Adapter (FC EN0K; CCIN 2CC1)

Learn about the specifications and operating system requirements for the feature code (FC) EN0K adapters.

Overview

The PCIe2 4-port (10Gb FCoE and 1GbE) Copper and RJ45 Adapter is a PCI Express (PCIe) generation 2, regular-height adapter. The adapter has four-ports and is a Fibre Channel over Ethernet (FCoE) converged network adapter (CNA). This adapter provides a PCIe 2.0 host bus interface. The adapter is a high-performance adapter that consolidates traffic for networking and Fibre Channel storage. The adapter is optimized for cloud computing, virtualization, storage, and other data center applications. Both the FCoE and network interface controller (NIC) functions are available for all the four ports. Use of the

FCoE requires that you use convergence enhanced Ethernet (CEE) switches. The link aggregation and failover features of the adapter make it suitable for critical network applications that require redundancy and high availability.

The four-port adapter provides two 10 Gb FCoE Copper Twin-axial ports and two 1 Gb RJ45 Ethernet ports. The two 10 Gb FCoE ports are connected by little connector-type (LC) connectors. Each FCoE port provides Ethernet connectivity with a nominal data rate of 10 Gbps (gigabits per second). Each of the 1 Gb ports provides Ethernet connectivity at a data rate of 1 Gbps and is connected with Ethernet cables. A 10 Mb data rate is not supported. Figure 53 shows the FC EN0K adapter.

Restriction: The 1 Gb Ethernet ports do not support data rates of 10 Mbps (megabits per second).

The adapter is Single Root I/O Virtualization (SR-IOV) capable. The adapter can function as a boot adapter. The adapter supports all Fibre Channel and Ethernet topologies.

Figure 53. FC EN0K adapter
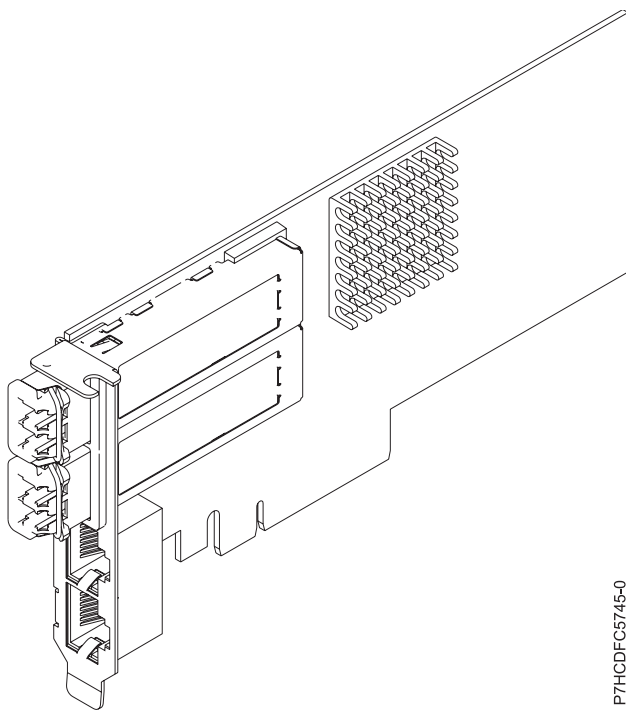
Specifications

Item   Description
Adapter FRU number
 00E8140 (Designed to comply with RoHS requirement)
Wrap plug FRU number
 12R9314 (for Fibre LC connector)

 10N7405 (for RJ45 connector)
I/O bus architecture
 PCIe2 x8
Slot requirement

 For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Cables

SR SFP+ Copper Twinax and Cat5 Ethernet cables

Voltage

3.3 V, 12 V

Form factor

Short, low-profile

Maximum number

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

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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

- AIX
  - AIX 7.1, or later
  - AIX 6.1, or later
- Linux
  - SUSE Linux Enterprise Server Version 11 SP 3, or later
  - Red Hat Enterprise Linux Version 6.5, or later
  - For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.htm)
- IBM i
  - IBM i Version 7.1, or later , supported through VIOS 2.2.2, or later

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

Learn about the specifications for the feature code (FC) 2728 adapters.

The FC 2728 4-Port USB PCIe Adapter is a single-lane (1x) PCIe high-performance expansion adapter that provides the following features and support:

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

[1] The four external ports are shared and controlled by three internal USB controllers. AIX might list only the three controllers; however, all four ports are operational.

The following figure shows the adapter.
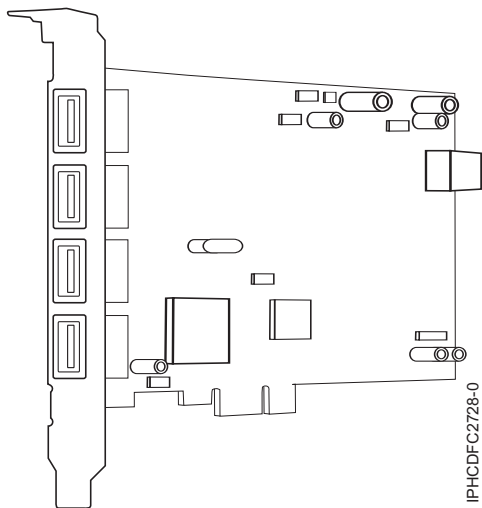
Figure 54. 4-Port USB PCIe Adapter

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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 7.1
  - AIX 6.1
  - AIX 5.3 for POWER
- Linux
  - Red Hat Enterprise Linux
  - SUSE Linux Enterprise Server

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

➦ Installing PCI adapters

Related reference:

➦ IBM Prerequisite Web page

➦ Parts information

➦ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

2-port USB PCI Adapter (FC 2738; CCIN 28EF)

Learn about the specifications for the 2-port USB PCI Adapter.

The 2-port USB PCI Adapter is a 32-bit, 33 MHz high-performance expansion adapter that provides the following features:

- 32-bit, 33MHz PCI Local Bus Specification Revision 2.2
- Single-slot, half-size PCI card
- +5 V or +3.3 V signaling
- FCC Class B
- Two downstream USB ports
- Full 12 MHz bandwidth on each port
- Full compliance with Universal Serial Bus Specifications, Revision 1.1 and 2.0
- Compatible with OpenHCI Open Host Controller Interface Specifications for USB, Release 1.10a
- EHCI compatible
- Integrated Dual-Speed USB Transceivers
- Up to 127 devices for each port
- Peripheral hot-swap and wake-up
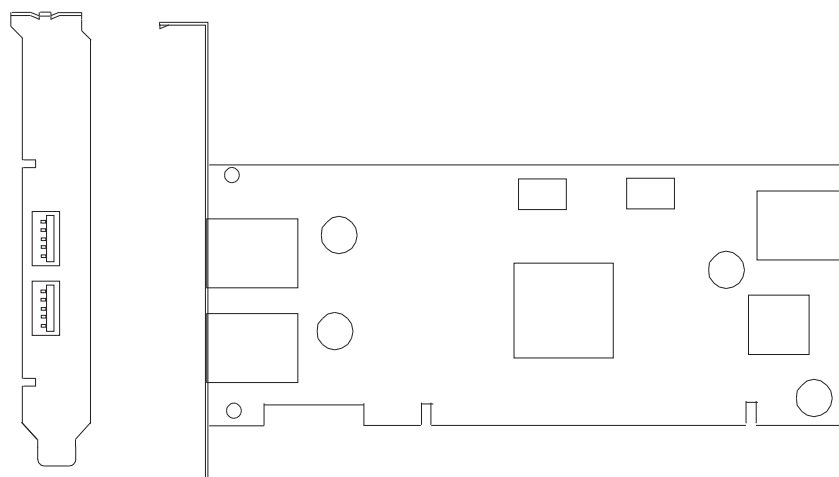
2 Port USB PCI adapter specifications

Item   Description

FRU number
> 80P2994 [**]

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

Bus architecture
> PCI 2.2 compliant

Busmaster
> Yes

Card type
> Half 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

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

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

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

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

Specifications and requirements

Item   Description

FRU number

> 41U0442[*] or 12R6540[**]

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

Battery kit

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

Adapter type

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

Placement information

> For 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 172.

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. You can also view or download the manual from the IBM Power Systems™ hardware information website at http://publib.boulder.ibm.com/infocenter/eserver/v1r3s/index.jsp.

For details about slot priorities and placement rules, 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 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 172 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 171 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" on page 172.

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

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

To replace the batteries, follow these steps:
1. Turn off the computer and all attached devices.
2. Disconnect all cables, including the power cable.

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

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

   Attention: Electrostatic discharge (ESD) can damage the card and its components. Wear an ESD wrist strip while handling and installing the card, or take the following precautions:
   - Limit your movements 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 55 on page 174. 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 52. Connectors and jumpers on the PCI-X Cryptographic Coprocessor

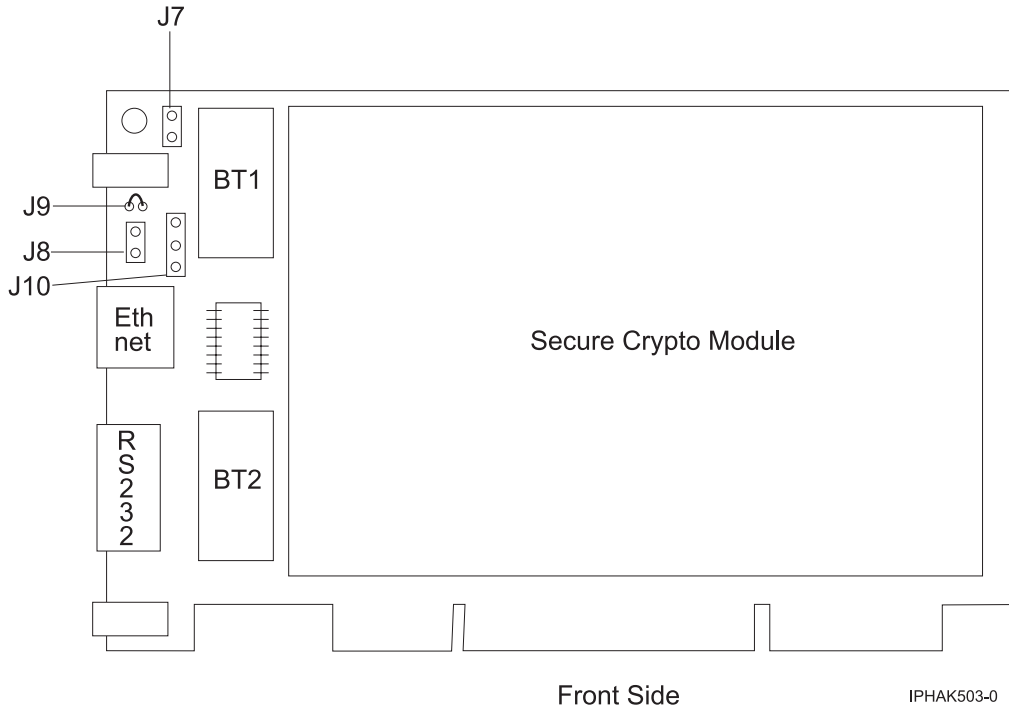| Connectors	Name of jumper	Default position
J7	PCI-X EEPROM write	Jumper installed
J8	External intrusion latch disable	Jumper not installed
J9	Battery disconnect wire	Jumper (wire loop) installed
J10	Temporary-battery connector	Jumper not installed
J11	External intrusion latch	Jumper not installed

Figure 55. Front side of the adapter
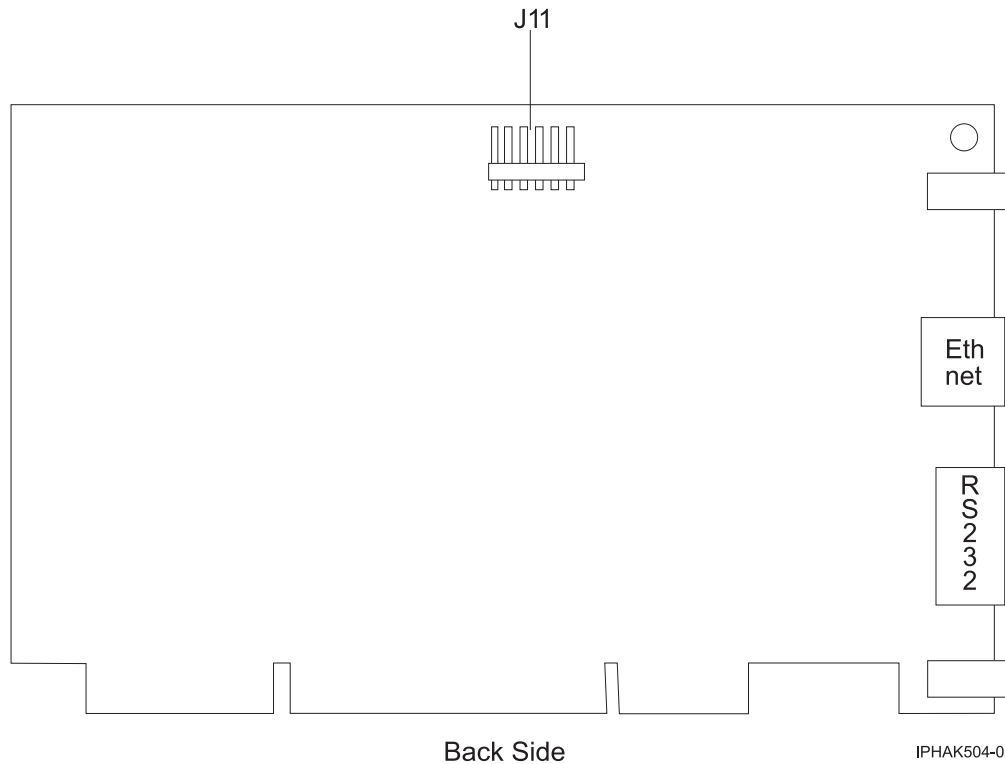
J11

Eth net

R S 2 3 2

Back Side

IPHAK504-0

Figure 56. Rear side of the adapter

Related tasks:

Installing PCI adapters

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

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement
"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Cryptographic Accelerator (FC 4805, 4960; CCIN 2058)

Learn about the specifications for the cryptographic Accelerator.

The cryptographic accelerator provides high cryptographic performance through hardware acceleration by offloading computationally intensive public-key processing from a host processor. The overall operation control, including command decoding, is implemented in hardware.

As a result, e-business applications requiring Public Key Cryptography might experience an increase in performance. At the same time, the cryptographic accelerator releases the host processor to respond to other Internet transactions, database transactions, customer requests, and so on.

The adapter supports the following encryption and decryption functions:
- DES

- T-DES
- DES MAC
- T-DES MAC
- SHA-1
- Parallel processing of the same input data using DES and SHA
- DES to SHA
- Modular Exponentiation (with and without CRT)
- Modular Multiplication.

You install the cryptographic accelerator in a PCI card slot.

Note: This adapter does not incorporate a microprocessor subsystem (CPU, DRAM, Flash), a secure programming environment, nor tamper detection and response functions.
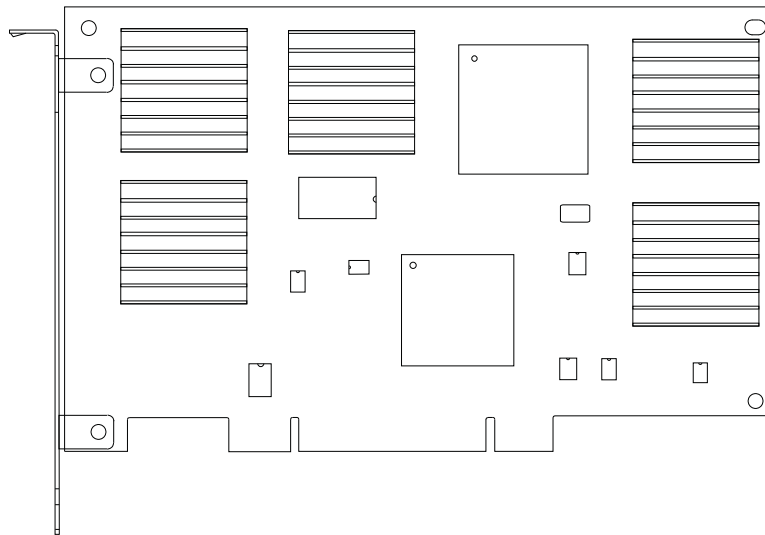
Figure 57. Cryptographic Accelerator

Cryptographic accelerator specifications

The following items are requirements and specifications for this adapter.

FRU part number
11P3106 (Not designed to comply with RoHS requirement.)

Power consumption
Typical, 20 watts

Voltage
+5.0 Vdc ±10 percent

Temperature
Operating, +10 to +40 degrees C (50 to 104 degrees F)

Storage, +1 to +40 degrees C (5 to 104 degrees F)

Relative humidity
8 to 80 percent

Physical dimensions
174.63 mm by 106.68 mm

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

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

➡ Installing PCI adapters

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

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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)

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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.
- IBM i
  - IBM i 7.1, or later.
  - IBM i 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. For information about replacing the batteries, see the Installation Manual at the IBM Cryptocard website at http://www-03.ibm.com/security/cryptocards/.

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

Related tasks:

➜ Installing PCI adapters

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

Related reference:

➜ IBM Prerequisite Web page

➜ Parts information

➜ PCI adapter placement
"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe2 2-port 4X InfiniBand QDR Adapter (FC 5283, FC 5285; CCIN 58E2)

Learn about the specifications and operating system requirements for the feature code (FC) 5283 and FC 5285 adapters.

Overview

The PCIe2 2-port 4X IB QDR Adapters are generation-2 4X InfiniBand QDR adapters that provides high speed connectivity with other servers or InfiniBand switches.

The names for these adapters are:
- FC 5283: PCIe2 LP 2-port 4X InfiniBand QDR Adapter
- FC 5285: PCIe2 2-port 4X InfiniBand QDR Adapter

Each port has a maximum of 40 Gb allotted to it.

The FC 5283 is a low-profile adapter and requires an available generation-2 low-profile slot in FC 5685 (PCIe Riser Card (Generation-2)). FC 5285 has a high-profile tailstock and requires a full-height generation-2 slot.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Specifications

Item   **Description**

Adapter FRU number
> 74Y2987 (Designed to comply with RoHS requirement)

I/O bus architecture
> PCIe x8

Slot requirement
> Requires an available slot in FC 5685

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 systems:

- AIX:
  - AIX 7.1 with Service Pack 3, or later.
  - AIX 6.1 with the 6100-06 Technology Level, and Service Pack 5 or later.
  - AIX 6.1 with the 6100-05 Technology Level, and Service Pack 6 or later.
- Linux:
  - SUSE Linux Enterprise Server 10, Service Pack 3, or later
  - SUSE Linux Enterprise Server 11, Service Pack 1, or later
  - Red Hat Enterprise Linux, Version 5.6, or later
  - Red Hat Enterprise Linux, Version 6, or later

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe RAID and SSD SAS adapter 3 Gb (FC 2053, FC 2055; CCIN 57CD)

Learn about the specifications and operating system requirements for the feature code (FC) 2053 or 2055 adapter.

Overview

The PCIe-based solid-state drive (SSD) offering consists of a SAS PCIe adapter and an SSD module. The RAID and SSD SAS adapter is a double-wide, low-profile, short, PCIe x8 adapter that requires two adjacent PCIe slots. You can plug one, two, or four SSD modules directly onto the adapter and avoid the use of any SFF, 3.5 inch SAS bays, or any cabling to the SAS disk enclosures.

Though it is physically the same PCIe adapter, there are two feature codes (FC):
- PCIe RAID and SSD SAS Adapter 3 Gb (FC 2053) designates a low-profile PCIe adapter to be used in the Power 710 Express, Power 720 Express, Power 730 Express, and Power 740 Express low-profile slots.
- PCIe RAID and SSD SAS Adapter 3 Gb with Blind Swap Cassette (FC 2055) designates that the PCIe adapter is in a double-wide blind swap cassette for use in a 12X-attached 5802 and 5877 PCIe I/O drawer.

Though it is physically the same SSD module, two feature codes are used to describe the different operating system environments. The following are the two codes that enable the IBM configurator tools to track the different SSD protection rules that are associated with the AIX, IBM i, and Linux operating systems:
- 177 GB SSD Module with enterprise multi-level cell (EMLC) (AIX or Linux) is FC 1995
- 177 GB SSD Module with EMLC (IBM i) is FC 1996

There are multiple configuration options that provide SSD protection and redundancy. If you want redundancy at an adapter level, you can mirror the SSD module of one PCIe RAID and SSD SAS Adapter against the SSD module of another PCIe RAID and SSD SAS Adapter by using the IBM AIX, IBM i, or Linux operating system. This configuration is suggested because there is no write cache in the PCIe RAID and SSD SAS Adapter. However, the RAID 5 or RAID 6 can also be used. If you want RAID 0, you must mirror the SSD module though the operating system. Ensure that if an SSD module requires to be replaced or moved, the PCIe RAID and SSD SAS Adapter on which the SSD module is located must be removed from the server or I/O drawer before the SSD module can be accessed. This action is different from the existing 69 GB SSD configurations, which can use the SAS bay hot-plug capability to remove and replace a single SSD module without removing the associated PCI SAS adapter.

For the AIX and Linux operating systems, if you do not want to have PCIe RAID and SSD SAS Adapter redundancy, but still want to protect the SSD module content, the PCIe RAID and SSD SAS Adapter can provide RAID 5 or RAID-6 level protection on the PCIe adapter. RAID 10 is not supported for the PCIe RAID and SSD SAS adapter. Hot-spare capability can optionally be used with RAID 5 but the spare SSD module must be on that same PCIe RAID and SSD SAS adapter.

The following figure shows the adapter.
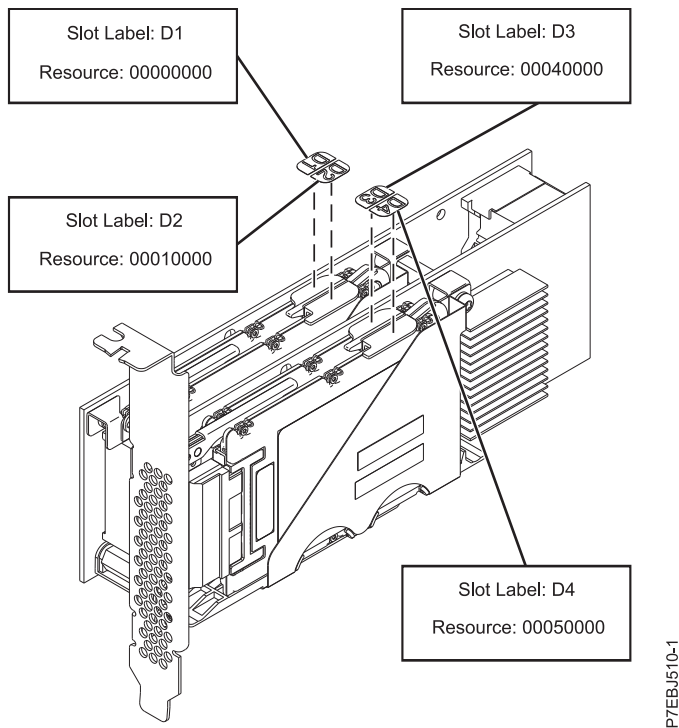
Figure 58. PCIe Dual - x4 3 Gb SAS RAID Adapter

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Specifications

Item   Description

Adapter FRU number

        Low-profile FRU 74Y6406

        Full height FRU 74Y6409

        (Designed to comply with RoHS requirement.)

SSD Module (CCIN 58B2) FRU number

        1.8 inch 177 GB small form factor solid-state drive on PCIe SAS RAID and SSD adapter.

        FRU 43W7749

I/O bus architecture

        PCIe x8

Slot requirement

        Two PCIe x8 slots per adapter. (The adapter physically plugs into one slot and covers the adjacent slot to the left.)

Cables

        No cables are 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.

Attributes

- The PCIe adapters and their associated SSD modules are supported in the IBM Power 710 Express, IBM Power 720 Express, IBM Power 730 Express, IBM Power 740 Express, and IBM Power 750 Express system units or in the feature 5802 and 5877 12X PCIe I/O drawers when attached to the IBM Power 720 Express, IBM Power 740 Express, IBM Power 750 Express, IBM Power 770, and IBM Power 780.
- The adapter is not supported in the IBM Power 770 and IBM Power 780 system units. It is not supported in the 12X-attached feature 5803 and 5873 PCIe I/O drawers. It is not supported on POWER6® servers.
- Each RAID formatted (528-byte blocks) SSD module provides up to 177 GB of capacity in the IBM AIX, IBM i, or Linux environment. Modules can also be formatted as a JBOD (512 byte blocks) and provide up to 200 GB of capacity in an AIX and Linux environment. Formatting for RAID provides additional data integrity and the option to use RAID 0 (when SSD modules are mirrored at the operating system level), RAID 5, or RAID 6.

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 with the 6100-06 Technology Level
  - AIX Version 6.1 with the 6100-03 Technology Level and Service Pack 7
  - AIX Version 6.1 with the 6100-04 Technology Level and Service Pack 7
  - AIX Version 6.1 with the 6100-05 Technology Level and Service Pack 3
  - AIX for POWER Version 5.3 with the 5300-10 Technology Level and Service Pack 5
  - AIX for POWER Version 5.3 with the 5300-11 Technology Level and Service Pack 5
  - AIX for POWER Version 5.3 with the 5300-12 Technology Level and Service Pack 2
- Linux
  - Red Hat Enterprise Linux Version 5, with update 5, or later
  - SUSE Linux Enterprise Server 10, with Service Pack 3, or later
  - SUSE Linux Enterprise Server 11, with Service Pack 1, or later
- IBM i
  - IBM i Version 7.1
  - IBM i Version 6.1, or later
- VIOS
  - VIOS Version 2.2, or later

This adapter requires the following drivers:
- AIX: devices.pciex.14103903 device driver package
- Linux:
  - iprutils version 2.2.21 and ipr driver version 2.2.0.3 (or newer) for RHEL5 kernels
  - iprutils version 2.2.21 and ipr driver version 2.2.0.3 (or newer) for SLES10 kernels
  - iprutils version 2.2.21 and ipr driver version 2.4.3 (or newer) for SLES11 kernels

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Cables

None

Related tasks:

Serial-attached SCSI cable planning
Learn about how to install the SAS cables to the hard disk drives, solid-state drives or CD-ROMs.

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Related information:

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

SAS RAID controllers for IBM i
Information about usage and maintenance information for the SAS RAID Controller for the IBM i.

SAS RAID controllers for Linux
Information about the useage and maintenance information for the SAS RAID Controller for Linux.

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 feature code (FC) 5903 and FC 5805 adapters.

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 or 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 or 5805 adapters provide mirrored write-cache data and mirrored RAID parity footprints between the adapters. If the 5903 or 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 IBM i topics for more information and important considerations for multi-initiator and high availability or dual storage IOA configurations

The 5903 or 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 provides RAID 0, RAID 5, RAID 6, and RAID 10 for the AIX and Linux operating systems. Under the IBM i operating system, mirroring and data spreading are provided by the operating system, and RAID 5 and RAID 6 are provided by the adapter.

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 or 5805 contains a LED (**(C)** in Figure 59) 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 59 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 IBM i operating systems, see Displaying rechargeable battery information.

Note: When configuring a raid array using the IBM toolkit and the FC5903 adapter for a system running Linux, the list of supported Direct Attach Storage Devices (DASD) is visible in the HMC only if you select the LVM configure option in the IBM toolkit.

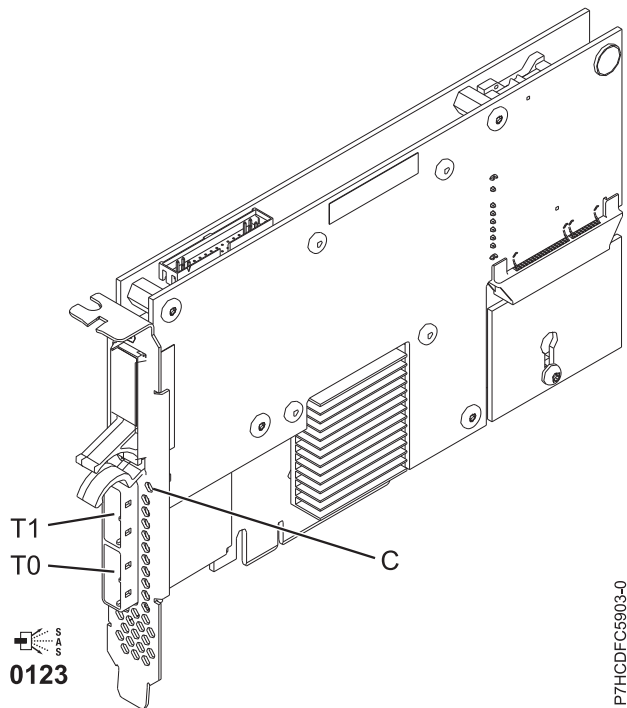The following figure shows the adapter.

Figure 59. 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

For details about slot priorities and placement rules, 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:
  - 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
- IBM i

– IBM i 6.1.1 and Resave A, or later, is required for Dual Storage IOA support.

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

Serial-attached SCSI cable planning
Learn about how to install the SAS cables to the hard disk drives, solid-state drives or CD-ROMs.

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Related information:

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

SAS RAID controllers for IBM i
Information about usage and maintenance information for the SAS RAID Controller for the IBM i.

SAS RAID controllers for Linux
Information about the useage and maintenance information for the SAS RAID Controller for Linux.

PCI-X DDR External Dual – x4 Port SAS Adapter (FC 5900; CCIN 572A)

Learn about the specifications and operating system requirements for the feature code (FC) 5900 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 systems running the AIX or Linux operating system. Under the IBM i operating system, mirroring and data spreading is provided by the operating system and RAID 5 and RAID 6 is provided by the adapter.

The adapter does not have write cache. (The write performance of RAID level 5 and RAID level 6 may be poor on adapters which do not provide write cache. Consider using an adapter which provides write cache when using RAID level 5 or RAID level 6.)

The adapter can address up to 48 SAS disk drives, although the actual number of drives in a system is subject to the physical placement limitations of the system. Externally attached devices are designed to run at a data rate of 1.5 Gb/s for Serial Advanced Technology Attachment (SATA) devices, and 3 Gb/s for SAS devices. This card supports RAID and non-RAID DASD, tape, and optical devices. Feature 5900 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 IBM i topics for more information and important considerations for multi-initiator and high availability or dual storage IOA configurations

The following figure shows the adapter.
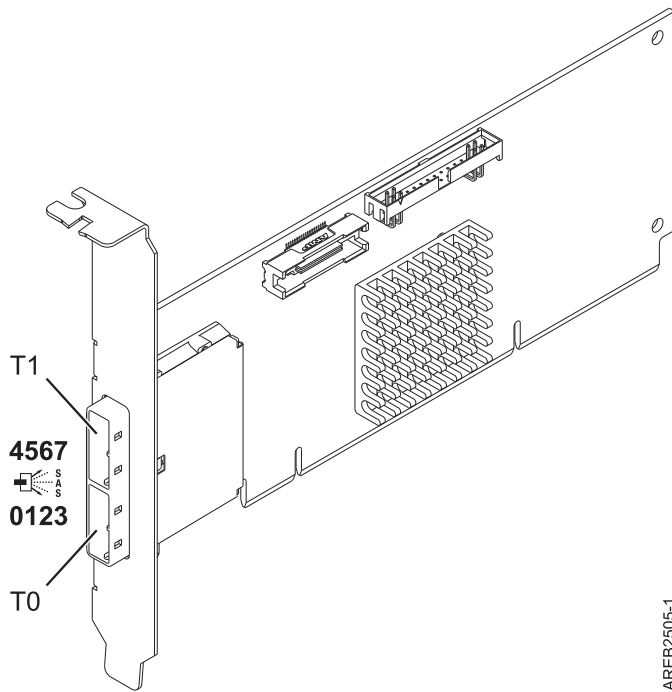
Figure 60. PCI-X DDR External Dual – x4 Port SAS Adapter

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Specifications

Item   Description
Adapter FRU number
        FC 5900: 44V3296[*]

        [*] 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
        3.3 V
Form factor
        Short, low-profile
Maximum number
        For the maximum adapters supported, see the PCI adapter placement topic collection for your system.
Attributes 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

Operating system or partition requirements

The adapter is supported on the following versions of the operating systems:
- AIX
  - AIX 6.1
  - AIX 5.3, with Service Pack 4, or later
- Linux
  - Red Hat Enterprise Linux Version 5, with update 1, or later
  - SUSE Linux Enterprise Server 10, with Service Pack 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 following drivers:
- AIX: devices.pci.1410bd02 device driver package
- Linux:
  - Version 2.0.11.5, or later, for RHEL 4 kernels
  - Version 2.2.0.1, or later, for RHEL 5 kernels
  - Version 2.2.0.1, or later, for SLES 10 kernels
  - Version 2.3.0, or later, for kernel.org kernels (kernel version 2.6.20, or later)

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

Serial-attached SCSI cable planning
Learn about how to install the SAS cables to the hard disk drives, solid-state drives or CD-ROMs.

➥ Installing PCI adapters

Related reference:

➥ IBM Prerequisite Web page

➥ Parts information

➥ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Related information:

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

SAS RAID controllers for IBM i
Information about usage and maintenance information for the SAS RAID Controller for the IBM i.

SAS RAID controllers for Linux
Information about the useage and maintenance information for the SAS RAID Controller for Linux.

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. IBM i 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. IBM i 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 IBM i 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).
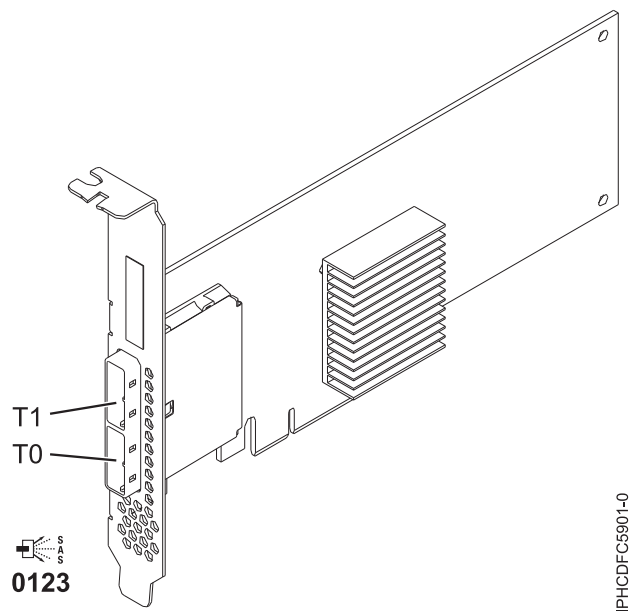
Figure 61. PCIe Dual - x4 SAS adapter

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

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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.
  - SUSE Linux Enterprise Server 11 Service Pack 1, or later.
- IBM i
  - IBM i 7.1, or later.
  - IBM i 6.1, or later.

This adapter requires the following device drivers:
- AIX: devices.pci.1410bd02 device driver package
- Linux:
  - iprutils version 2.4.1 and ipr driver version 2.0.11.6 (or newer) for RHEL4 kernels
  - iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or newer) for RHEL5 kernels
  - iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or newer) for SLES10 kernels

Related tasks:

Serial-attached SCSI cable planning
Learn about how to install the SAS cables to the hard disk drives, solid-state drives or CD-ROMs.

➥ Installing PCI adapters

Related reference:

➥ IBM Prerequisite Web page

➥ Parts information

➥ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Related information:

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

SAS RAID controllers for IBM i
Information about usage and maintenance information for the SAS RAID Controller for the IBM i.

SAS RAID controllers for Linux
Information about the useage and maintenance information for the SAS RAID Controller for Linux.

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

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

Overview

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

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

The following figure shows the adapter.

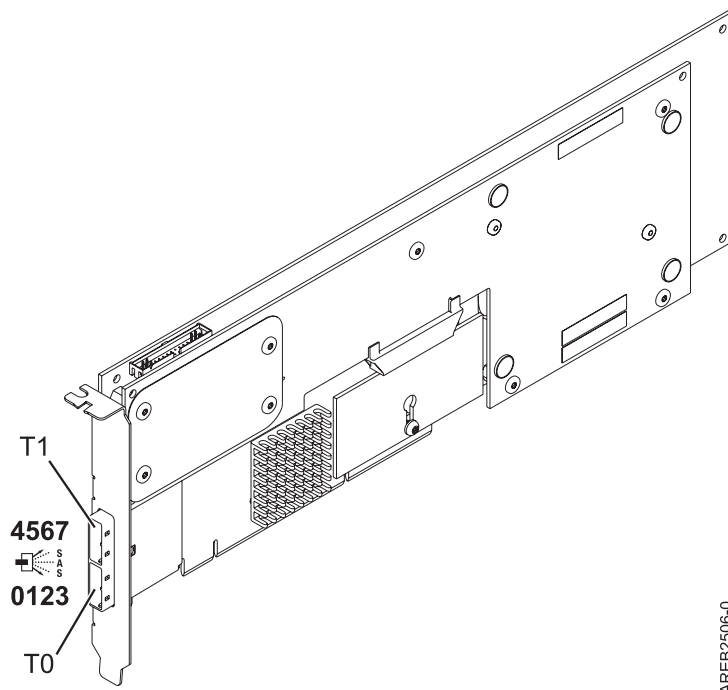*Figure 62. PCI-X DDR Dual –x4 Port SAS RAID Adapter*

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)

For details about slot priorities and placement rules, 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 Version 6.1 with the 6100-01 Technology Level, or later
- AIX 5L Version 5.3 with the 5300-08 Technology Level, or later
- Red Hat Enterprise Linux Version 4, with update 7, or later
- Red Hat Enterprise Linux Version 5, with update 2, or later
- SUSE Linux Enterprise Server 10, with service pack 2, or later

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

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

Serial-attached SCSI cable planning
Learn about how to install the SAS cables to the hard disk drives, solid-state drives or CD-ROMs.

➜ Installing PCI adapters

Related reference:

➜ IBM Prerequisite Web page

➜ Parts information

➜ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Related information:

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

SAS RAID controllers for IBM i
Information about usage and maintenance information for the SAS RAID Controller for the IBM i.

SAS RAID controllers for Linux
Information about the useage and maintenance information for the SAS RAID Controller for Linux.

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

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

Overview

The PCI-X DDR 1.5 GB cache SAS RAID Adapter is a SAS disk controller with a maximum of 1.5 GB compressed write cache and a maximum 1.6 GB compressed read cache. Auxiliary write cache and concurrent battery maintenance are provided. The controller is implemented by using two physical adapters that are securely connected to form a double-wide adapter. The double-wide adapter requires two adjacent Peripheral Component Interconnect-X (PCI-X) slots. The auxiliary write cache side of the double-wide adapter contains a dual, concurrently maintainable cache battery pack which maintains cache memory on both adapters in the event of an abnormal termination.

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

Feature 5904, 5906, and 5908 are all feature codes that represent the same PCI-X DDR 1.5 GB cache SAS RAID Adapter. Different feature codes indicate whether a blind swap cassette is used and its type:

- Feature 5904 indicates no blind swap cassette. The feature is used in enclosures that do not use blind swap cassettes.
- Feature 5906 indicates a gen-2.5 blind swap cassette. The feature is used in the 5797 and 5798 enclosures.
- Feature 5908 indicates a gen-3 blind swap cassette. This feature is used in the 5790 and 5796 enclosures.

572F is the CCIN number on the RAID adapter side of the double-wide adapter pair. 575C is the CCIN number on the write-cache adapter.

The adapter provides RAID 0, RAID 5, RAID 6, and RAID 10 for the AIX and Linux operating systems. Under the IBM i operating system, mirroring and data spreading are provided by the operating system, and RAID 5 and RAID 6 are provided by the adapter. [1]

The adapter provides three mini-SAS 4x connectors for the attachment of SAS drives in 5886 EXP 12S Expansion Drawers. The adapter supports a maximum of five 5886 EXP 12S Expansion Drawers.[1] With correct 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 if a SAS failure occurs.

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. The fourth mini-SAS connector on each card set is used to directly connect the card sets by using a SAS AA cable.

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

The following figure shows the adapter.
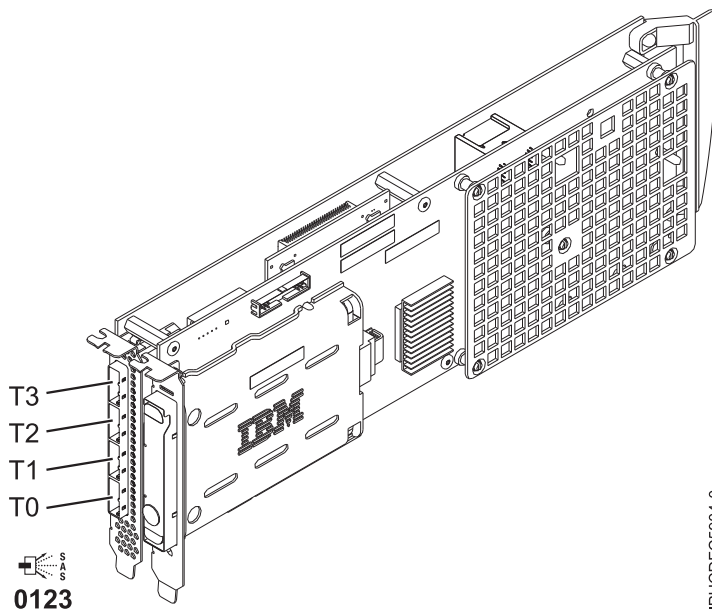
Figure 63. PCI-X DDR 1.5GB cache SAS RAID Adapter

Note: Port T3 does not support any device attachment. T3 is only used in dual controller I/O configurations for adapter to adapter communication.

Specifications

Item   Description
Adapter FRU number
        44V8622 (Adapter only - Designed to comply with RoHS requirement.)

        42R4008 (Gen-3 blind swap cassette only)

        44V7627 (Adapter in 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 that are being attached. Special cabling is required for multi-initiator and high availability configurations. See Serial-attached SCSI cable planning

Voltage
> 3.3V

Form factor
> Long

Maximum number
> See PCI adapter placement.

Attributes
- SAS speed: 3 Gbps
- SAS, SAS Serial SCSI Protocol (SSP), and Serial Management Protocol (SMP) supported
- Single controller supported with SAS y cables (3692, 3693, 3694)
- Dual controller supported with SAS x cables (3661, 3662, 3663) and SAS 2:6 cable (3681, 3682)
- Single controller supports mirrored write cache data with auxiliary cache
- Dual controller supports mirrored-write cache data and mirrored-RAID parity footprints between card sets
- Removable media devices are not supported

Operating system or partition requirements

This adapter is supported for the following operating systems:
- AIX:
  - AIX 5L Version 5.3 with the 5300-07 Technology Level and Service Pack 8, or later
  - AIX 5L Version 5.3 with the 5300-08 Technology Level and Service Pack 6, or later
  - AIX 5L Version 5.3 with the 5300-09 Technology Level and Service Pack 2, or later
  - AIX 5L Version 5.3 with the 5300-10 Technology Level, or later
  - AIX 6.1 and Service Pack 8, or later
  - AIX Version 6.1 with the 6100-01 Technology Level and Service Pack 4, or later
  - AIX 6.1 with the 6100-02 Technology Level and Service Pack 3, or later
  - AIX 6.1 with the 6100-03 Technology Level, or later
- Linux:
  - Red Hat Enterprise Linux version 4, with update 7, or later
  - Red Hat Enterprise Linux version 5, with update 2, or later
  - SUSE Linux Enterprise Server 10, with service pack 2, or later
- IBM i
  - IBM i V5R4M5 and Resave F, or later
  - IBM i 6.1 and Resave F, or later

This adapter requires the following device drivers:
- AIX: devices.pci.1410bd02 device driver package
- Linux:
  - iprutils version 2.4.1 and ipr driver version 2.0.11.6 (or newer) for RHEL4 kernels
  - iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or newer) for RHEL5 kernels
  - iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or newer) for SLES10 kernels

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Concurrent maintenance procedure

Concurrent maintenance of this double-wide adapter is not supported through the Hardware Management Console (HMC). Concurrent maintenance must be done from within the partition operating system. In IBM i, the Hardware Service Manager (HSM) of the system or owning partition will automatically power off or on both PCI slots when either slot is selected. In AIX or Linux, you must manually power off and on each slot separately.

Important:
- Both PCI slots must be powered off when installing or removing this adapter with the system power on.
- If this adapter is the load source IOA, or any other storage IOA with critical DASD attached for the system, this concurrent maintenance procedure should be performed by a qualified service provider.

Related tasks:

Serial-attached SCSI cable planning
Learn about how to install the SAS cables to the hard disk drives, solid-state drives or CD-ROMs.

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Related information:

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

SAS RAID controllers for IBM i
Information about usage and maintenance information for the SAS RAID Controller for the IBM i.

SAS RAID controllers for Linux
Information about the useage and maintenance information for the SAS RAID Controller for Linux.

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

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

575C is the CCIN number on the write-cache adapter.

The adapter provides RAID 0, RAID 5, RAID 6, and RAID 10 for the AIX and Linux operating systems. Under the IBM i operating system, mirroring and data spreading are provided by the operating system, and RAID 5 and RAID 6 are provided by the adapter. [1]

The adapter provides three mini-SAS 4x connectors for the attachment of SAS drives located in 5886 EXP 12S Expansion Drawers. The adapter supports a maximum of five 5886 EXP 12S Expansion Drawers.[1] With proper cabling and configuration, multiple wide ports are used to provide redundant paths to each dual port SAS drive. The adapter manages SAS path redundancy and path switching should a SAS failure occur.

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 IBM i topics for more information and important considerations for multi-initiator and high availability or dual storage IOA configurations

The following figure shows the adapter.
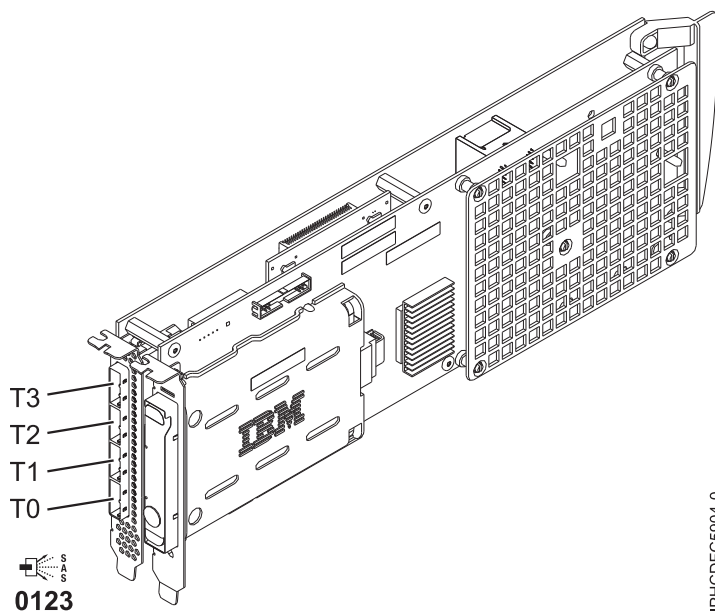
Figure 64. PCI-X DDR 1.5GB cache SAS RAID Adapter

Note: Port T3 does not support any device attachment. T3 is only used in dual controller I/O configurations for adapter to adapter communication.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

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

3.3V

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

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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.
- IBM i
  - IBM i 7.1, or later
  - IBM i 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

Concurrent maintenance procedure

Concurrent maintenance of this double-wide adapter is not supported through the Hardware Management Console (HMC). Concurrent maintenance must be done from within the partition operating system. In IBM i, the Hardware Service Manager (HSM) of the system or owning partition automatically turns off or turns on the power on both PCI slots when either slot is selected.In AIX or Linux , you must manually power off and on each slot separately.

Important:
- You must turn off the power to both PCI slots if you are installing or removing this adapter with the power to the system 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.

Related tasks:

Serial-attached SCSI cable planning
Learn about how to install the SAS cables to the hard disk drives, solid-state drives or CD-ROMs.

▶ Installing PCI adapters

Related reference:

▶ IBM Prerequisite Web page

▶ Parts information

▶ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Related information:

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

SAS RAID controllers for IBM i
Information about usage and maintenance information for the SAS RAID Controller for the IBM i.

SAS RAID controllers for Linux
Information about the useage and maintenance information for the SAS RAID Controller for Linux.

PCI Express x8 Ext Dual-x4 3 Gb SAS Adapter and Cable Card (FC 5909; CCIN 57B9)

Learn about the specifications and operating system requirements for feature code (FC) 5909 adapters.

Overview

Note: FC 5911 is the FRU replacement for FC 5909. To learn about feature 5911, see "SAS adapter for internal Split DASD option (FC 5911; CCIN 57BA)" on page 204.

The PCI Express x8 Ext Dual-x4 3 Gb SAS Adapter and Cable Card is an x8 PCI Express (PCIe) SAS adapter combined with a cable card in a single cassette assembly. With this feature, three of the six internal serial-attached SCSI (SAS) disk slots (4, 5, and 6) in the system unit enclosure are controlled by the SAS adapter contained in this feature.

There are three connectors on the tailstock of this single cassette assembly. The top connector (**C** in Figure 65) is the cable card link to the three internal SAS disk slots in the system unit. The middle connector is covered with a label and is not used. The bottom connector (**D** in Figure 65) is the SAS adapter.

An external AI-cable (**B** in Figure 66 on page 203) connects the top connector with the bottom connector, thereby connecting the three internal SAS disk slots to the SAS adapter. Both the top and bottom connectors are mini-SAS 4x ports.

The SAS adapter contained in this feature is a 64-bit, bootable SAS adapter providing RAID 0, 5, 6, and 10 capability, but with no write cache.

Figure 65 shows the PCI Express x8 Ext Dual-x4 3 Gb SAS Adapter and Cable Card in a cassette with the cassette cover removed to show an internal view of the feature.
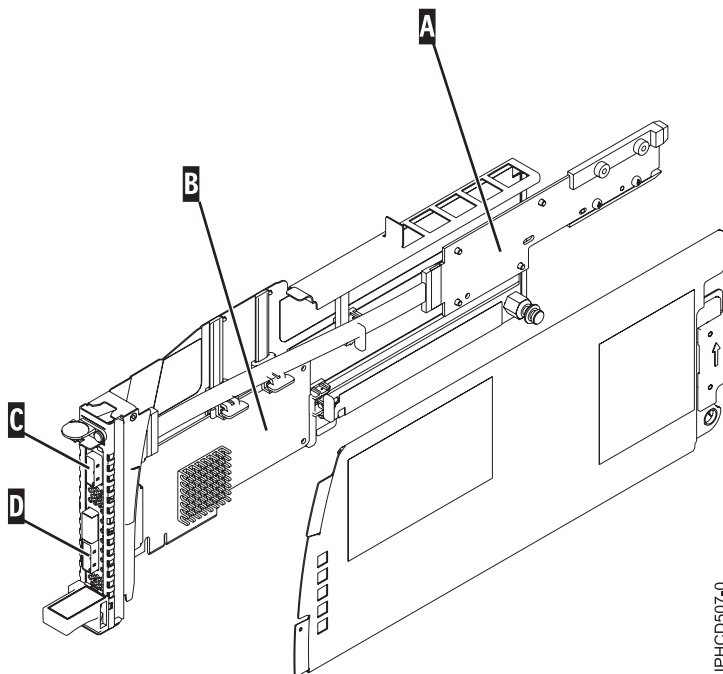

Figure 65. PCI Express x8 Ext Dual-x4 3 Gb SAS Adapter and Cable Card in a cassette

A   Cable card

B   SAS adapter

C   4x SAS port provides connection to the internal SAS disk slots

D   4x SAS port for the SAS adapter

Figure 66 on page 203 shows a rear view of a system with feature 5909 installed and cabled.
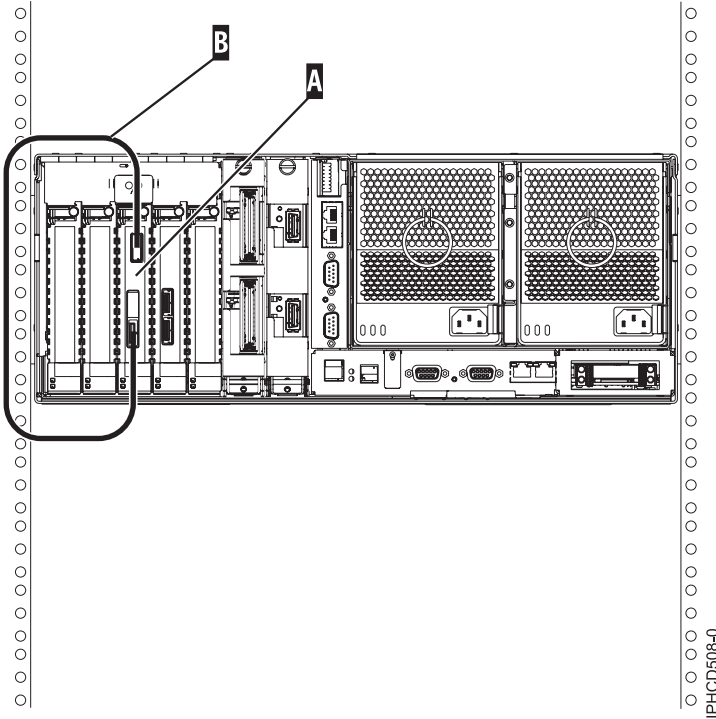
Figure 66. Rear view of system unit with feature 5909 installed and cabled

A   Cassette containing feature 5909

B   SAS 4x AI-cable.

Specifications

Item   **Description**

Adapter FRU number

      44V4813 (Designed to comply with RoHS requirement.)

I/O bus architecture

      PCIe x8

Slot requirement

      PCIe slot P1-C3 in a system unit

Cables

      SAS 4x AI-cable:
- FC 3679
- FRU number 44V4041

      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.

Maximum number

      One per system unit enclosure.

      This feature is only supported in the P1-C3 slot in system unit.

Attributes provided
- One external 4x SAS port on the PCIe SAS adapter provides attachment to the internal SAS disk slots using an external AI-cable attached to the combined cable card.
- SAS Serial SCSI Protocol (SSP), Serial ATA Tunneling Protocol (STP) and Serial Management Protocol (SMP)
- RAID 0, 5, 6, 10
- Concurrent Firmware Update

- 440 - 500 Mhz PowerPC (PPC)
- Optimized for SAS disk configurations that use dual paths through dual expanders for redundancy and reliability.

Operating system or partition requirements

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

This adapter requires the following drivers:
- AIX: devices.pciex.14103903 device driver package
- Linux:
  - iprutils version 2.2.8 and ipr driver version 2.0.11.6 (or newer) for RHEL4 kernels
  - iprutils version 2.2.8 and ipr driver version 2.2.0.2 (or newer) for RHEL5 kernels
  - iprutils version 2.2.8 and ipr driver version 2.2.0.2 (or newer) for SLES10 kernels

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

SAS adapter for internal Split DASD option (FC 5911; CCIN 57BA)

Learn about the specifications and operating system requirements for feature code (FC) 5911 adapters.

Overview

The SAS adapter for internal Split DASD option is an x8 PCI Express (PCIe) serial-attached SCSI (SAS) adapter combined with a cable card in a single cassette assembly.

Three mini SAS 4x connectors are on the tailstock of this cassette assembly. The top connector (T2) is the cable card link to the system's SAS backplane. The other two connectors are for the PCIe SAS adapter within the 5911 assembly. A one meter SAS cable (feature 3679) is used to connect the top mini SAS 4x connector to either of the lower mini SAS 4x connectors, thereby connecting the three internal SAS disk slots to the SAS adapter within the 5911 assembly. The remaining mini SAS 4x connector (either of the lower connectors) can be attached to an EXP 12S Disk Drawer or a SAS removable media expansion unit.

The SAS adapter contained in this feature is a 64-bit, bootable SAS adapter providing RAID 0, 5, 6, and 10 capability. The adapter does not provide write cache. Write performance of RAID 5 and RAID 6 might be poor on adapters that do not provide write cache. Consider using RAID 0 or 10 when using this adapter.

This feature cannot be used in a multi-initiator, high availability configuration using two adapters in a dual controller mode.

The following figure shows the adapter.
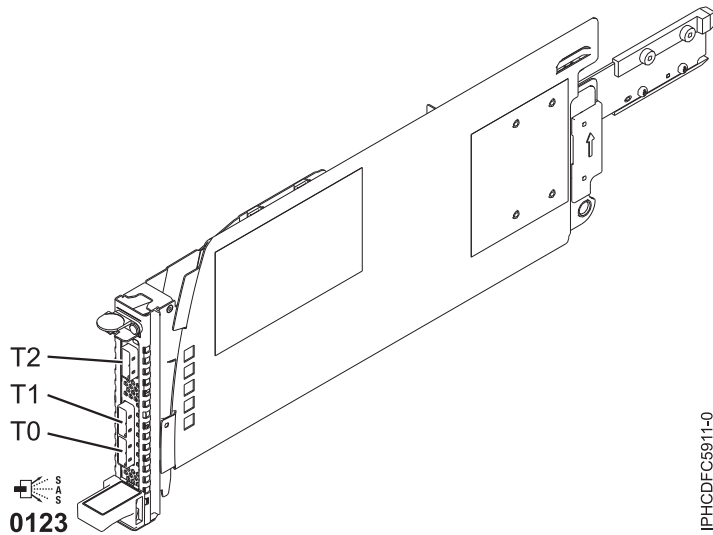
Figure 67. SAS adapter for internal Split DASD option

shows a rear view of the system with feature 5911 installed and cabled.
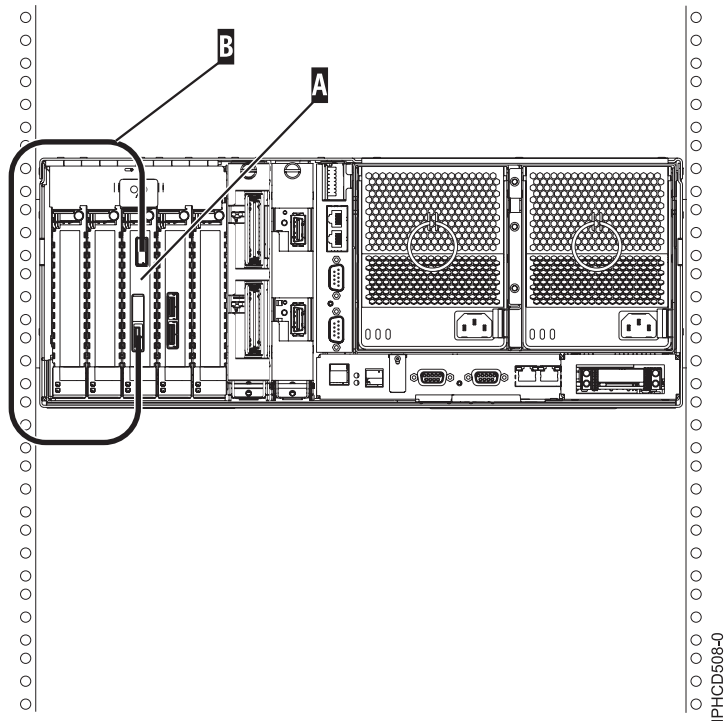
Figure 68. Rear view of system with feature 5911 installed and cabled

(A)   Cassette containing feature 5911

(B)   SAS 4x AI-cable

Specifications

Item   Description
Adapter FRU number
     44V4854 (Designed to comply with RoHS requirement.)
I/O bus architecture
     PCIe x8
Slot requirement
     PCIe slot P1-C3 in a 9117-MMA system
Cables
     SAS 4x AI-cable:
     • FC 3679
     • FRU number 44V4041

     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.
Maximum number
     One per system enclosure.
Attributes
     • 27 SAS disks are supported when configured with two 5886 EXP 12S Disk Drawers and the
       internal disk slots
     • Removable media devices are supported
     • SAS speed: 3 Gbps
     • SATA speed: 1.5 Gbps
     • SAS Serial SCSI Protocol (SSP), Serial ATA Tunneling Protocol (STP), and Serial Management
       Protocol (SMP) are supported

- Concurrent firmware update supported
- Does not support solid-state drives (SSD)

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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 6, or later
  - Red Hat Enterprise Linux Version 5, with update 1, or later
  - SUSE Linux Enterprise Server 10, with service pack 1, or later

This adapter requires the following drivers:

- AIX: devices.pciex.14103903 device driver package
- Linux:
  - iprutils version 2.1.2 and ipr driver version 2.0.11.5 (or newer) for RHEL4 kernels
  - iprutils version 2.1.2 and ipr driver version 2.2.0.1 (or newer) for RHEL5 kernels
  - iprutils version 2.1.2 and ipr driver version 2.2.0.1 (or newer) for SLES10 kernels

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

▶ Installing PCI adapters

Related reference:

▶ IBM Prerequisite Web page

▶ Parts information

▶ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCI-X DDR External Dual – x4 Port SAS Adapter (FC 5912; CCIN 572A)

Learn about the specifications and operating system requirements for the 5912 adapter.

Overview

The Peripheral Component Interconnect-X (PCI-X) DDR External Dual – x4 Port SAS Adapter is a low-profile adapter for high-performance and high-density, serial-attached SCSI (SAS) applications. The adapter provides two mini SAS 4x connectors, which allow the eight physical links to be used in various narrow and wide-port configurations. The adapter is a 64-bit, 3.3 V, bootable SAS adapter that provides RAID 0, 5, 6, and 10 capability. Some RAID level support is operating system dependent. The adapter provides RAID 0, RAID 5, RAID 6 and RAID 10 for AIX and Linux. Under the IBM i operating system, mirroring and data spreading is provided by the operating system and RAID 5 and RAID 6 is provided by the adapter.

The adapter does not have write cache. (The write performance of RAID level 5 and RAID level 6 may be poor on adapters which do not provide write cache. Consider using an adapter which provides write cache when using RAID level 5 or RAID level 6.)

The adapter can address up to 48 SAS disk drives, although the actual number of drives in a system is subject to the physical placement limitations of the system. Externally attached devices are designed to run at a data rate of 1.5 Gb/s for Serial Advanced Technology Attachment (SATA) devices, and 3 Gb/s for SAS devices. This card supports RAID and non-RAID DASD, tape, and optical devices. Feature 5912 supports the multi-initiator and high availability configurations.

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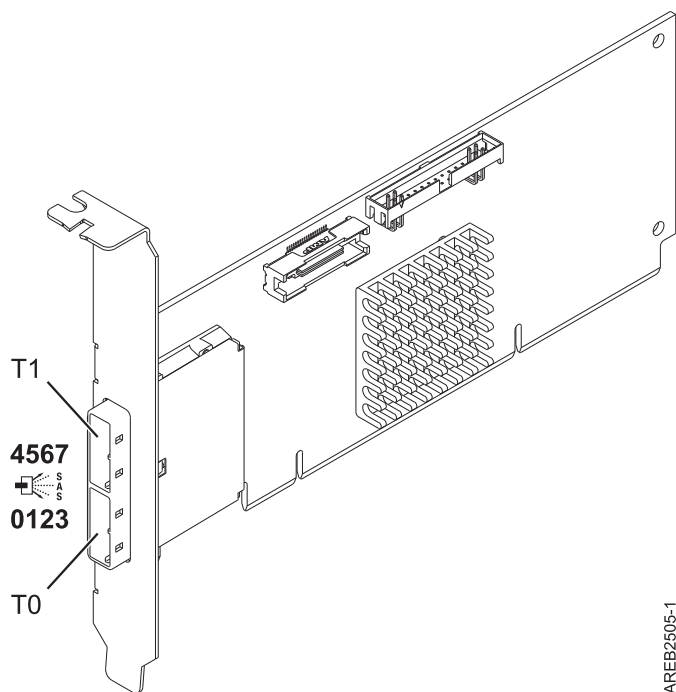
The following figure shows the adapter.

Figure 69. 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)

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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.
- IBM i
  - IBM i 7.1, or later
  - IBM i 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)

Related tasks:

Serial-attached SCSI cable planning
Learn about how to install the SAS cables to the hard disk drives, solid-state drives or CD-ROMs.

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Related information:

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

SAS RAID controllers for IBM i
Information about usage and maintenance information for the SAS RAID Controller for the IBM i.

SAS RAID controllers for Linux
Information about the useage and maintenance information for the SAS RAID Controller for Linux.

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 feature code (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 70 on page 212 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 IBM i 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.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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 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 that are installed in FC 5802 or FC 5803, then the FC 5913 adapter pairs must be in that FC 5802 or FC 5803. The AA cable is required on the top

mini-SAS HD port of the adapter pair. Use a pair of FC 3689, 0.6 m AT SAS cables to connect the FC 5913 adapter pair to the SAS connectors. An 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 that is 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.
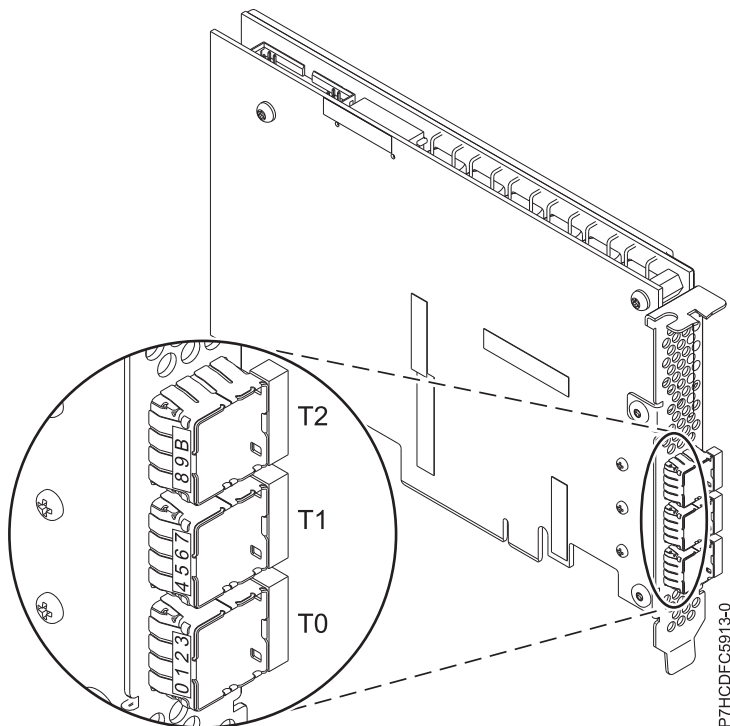
Figure 70. 5913 Adapter

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
  - – For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.htm)
- IBM i
  - – IBM i 7.1 Technology Refresh 3.
  - – IBM i 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 8202-E4B, 8202-E4C, 8202-E4D, 8205-E6B, 8205-E6C, or 8205-E6D 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.

Related tasks:

Serial-attached SCSI cable planning
Learn about how to install the SAS cables to the hard disk drives, solid-state drives or CD-ROMs.

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Related information:

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

SAS RAID controllers for IBM i
Information about usage and maintenance information for the SAS RAID Controller for the IBM i.

SAS RAID controllers for Linux
Information about the useage and maintenance information for the SAS RAID Controller for Linux.

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

The 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 5887 EXP24S, FC 5802, or FC 5803 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 5802 12X PCIe I/O drawer has a maximum of 18 SSDs. The FC 5803 PCIe I/O Drawer has a maximum of 26 SSDs. The FC 5887 EXP24S Drawer has a maximum of 24 SSDs. If the SSDs are located in FC 5802 or FC 5803, one or both of the controlling adapter pair must be located in that FC 5802 or FC 5803.

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 IBM i operating system. IBM i provides both mirroring and data spreading. Systems or partitions running the AIX or Linux operating system and VIOS provide mirroring (logical volume manager (LVM)).

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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.
- IBM i
  - IBM i 6.1.0 with machine code 6.1.1, or later.
- VIOS
  - VIOS support requires VIOS 2.2.1.4, or later

Related tasks:

Serial-attached SCSI cable planning
Learn about how to install the SAS cables to the hard disk drives, solid-state drives or CD-ROMs.

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Related information:

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

SAS RAID controllers for IBM i
Information about usage and maintenance information for the SAS RAID Controller for the IBM i.

SAS RAID controllers for Linux
Information about the useage and maintenance information for the SAS RAID Controller for Linux.

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.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your 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.
- IBM i
  - IBM i 7.1
  - IBM i 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)

Related tasks:

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

➡ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCI-X Ultra RAID Disk Controller (FC 2757; CCIN 2757)

Learn about the specifications for the PCI-X Ultra RAID Disk Controller.

This adapter is a Peripheral Component Interconnect-X (PCI-X) SCSI controller with a maximum compressed write cache of 757 MB. The 2757 provides RAID-5 protection for internal disks and also supports internal tape units, internal CD/DVD-ROM and internal DVD-RAM units. The 2757 has four LVD SCSI buses. Hardware data compression is not supported.

Specifications

Item   Description
FRU number
　　039J5057 [**]

　　[**]Not designed to comply with RoHS requirement.
I/O bus architecture
　　PCI 2.2 compliant
Slot requirement
　　One available 3.3 volt PCI or PCI-X slot
Operating system or partition requirements
　　IBM i V5R3, or later

　　If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).
Tools None
Cables
　　Attachment cables are included with the attaching subsystem or device.

Related tasks:

➡ Installing PCI adapters

Related reference:

➡ IBM Prerequisite Web page

➡ Parts information

⯈ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCI-X Ultra4 RAID Disk Controller (FC 2780; CCIN 2780)

Learn about the specifications for the PCI-X Ultra RAID Disk Controller.

This adapter is an Ultra4 (Ultra320) SCSI controller with a maximum compressed write cache of 757 MB and a maximum compressed read cache size of 1 GB that provides RAID-5 protection for internal disks and also supports internal tape units, CD-ROM and DVD units. The feature code (FC) 2780 has four Ultra4 (Ultra320) SCSI buses. In addition to providing RAID-5 protection for disks, it is also designed to work as a high performance controller for disks protected by system mirroring or disks with no protection. This controller also uses a Cache Battery Pack, which can be replaced concurrently with system operation.

A FC 5708 or 574F Auxiliary Cache IOA is required for RAID. The Auxiliary Cache IOA is to be connected to the 4th SCSI bus of the FC 2780.

Specifications

Item   **Description**
FRU number
    042R7704 *

    *Designed to comply with RoHS requirement.
I/O bus architecture
    PCI 2.2 compliant
Slot requirement
    One available 3.3 volt PCI or PCI-X slot
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 operating systems:
- AIX
  - AIX 5L Version 5.2 with the 5200-10 Technology Level, or later
  - AIX 5L Version 5.3 with the 5300-06 Technology Level, or later
- Linux:
  - Red Hat Enterprise Linux version 4 U4, or later
  - SUSE Linux Enterprise Server 10, or later
- IBM i:
  - IBM i V5R3, or later

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Related tasks:

⯈ Installing PCI adapters

Related reference:

⯈ IBM Prerequisite Web page

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Auxiliary-write cache IOA (FC 5580; CCIN 5708)

Learn about the specifications and installation notes for the auxiliary-write cache IOA adapter and the PCI-X Ultra4 RAID disk-controller adapters used with it.

Feature 5580 includes a 2780 Peripheral Component Interconnect-X (PCI-X) Ultra4 RAID disk-controller adapter, a CCIN 5708 auxiliary-write cache IOA adapter, and the required connection cable.

The following figure shows the adapter:

IPHCD506-0
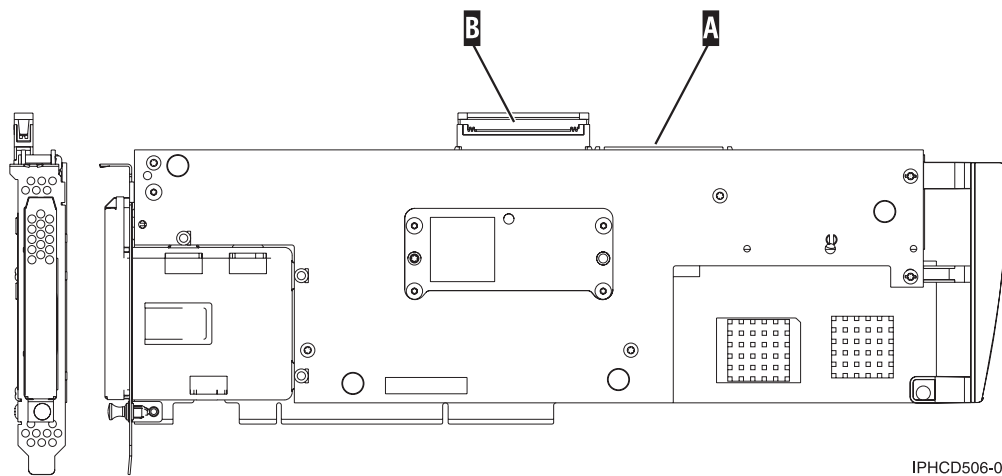
Figure 71. 5708, auxiliary-write cache IOA

A   SCSI port used to attach the auxilary-write cache IOA to a supported disk-controller. See "Installing the SCSI cable" on page 221.

B   Unused SCSI port shown here with a cover over it.

A physical cable connection is required between the 5708 adapter and SCSI port 4 of a 2780 or 2757 adapter. Both the 5708 adapter and the disk-controller adapter it is connected to must be installed in the same physical system unit or expansion unit, and must be installed in the same partition.

The 5708 adapter has 757 MB of auxiliary maximum compressed write cache. The adapter mirrors the write cache of the disk-controller adapter that it is connected to. Protection of data is enhanced by having two copies of the write cache stored on separate adapters. If a failure occurs to the write cache of the disk-controller, the 5708 adapter provides a backup copy during the recovery of the failed IOA.

Considerations for installing or converting to feature 5580

Attention: Converting your adapters to feature 5580 will require extensive planning. If the planning is not done correctly, the result could be an extended server outage, loss of data, or both. You might need to do a full system restoration.

Read the following questions in relation to your system:
- Are you converting from feature 2780 to feature 5580?
- Are you replacing any other existing storage adapters with features 5580?

- Is your server partitioned (LPAR)?

If the answer to any of these questions is yes, or you are unsure of the answers, contact your authorized service provider for planning and deployment services.

For planning information and examples of deployment for features 5580, see Planning for Disk Storage Availability with Cache Solutions

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

5708 adapter specifications

Item	Description
Adapter FRU number	39J0686
Battery FRU number	97P4846
Cable FRU number	39J1702
Cables	Specific Storage Adapter to Auxiliary Storage Adapter SCSI cable is necessary and is provided with each feature or conversion.
I/O bus architecture	PCI 2.2 power/bus compliant
Unit description	- Long, 64 bit, 133 MHz, 3.3 V edge connector, single-slot - PCI-X 2.0 compliant - Compatible down to 32 bit, 33 MHz PCI adapter slots
Operating system or partition requirements	Supported in the IBM i operating systems or partitions only, versions V5R2, V5R3, and later. If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).
Maximum number	For the maximum adapters supported, see the PCI adapter placement topic collection for your system.
Partition information	- If you are placing the feature in the primary partition or any non-partitioned system, the auxiliary cache IOA for the load source adapter must be in the same enclosure as the load source IOA. - If you are placing the feature in the secondary partition on any system, the auxiliary cache IOA for the load source adapter must be under the load source IOP.
Related information	- The disk controller adapter and the auxiliary-write cache adapter each require one PCI slot. - Both adapters must be installed in the same enclosure. - The adapters are connected by a SCSI cable (provided). - The operating system identifies the 5708 adapter as a storage controller with no devices attached. - The 5708 adapter is not supported in an environment without an IOP. - Types 2780 and 2757 will not appear on ordering, shipping, or inventory documentation when received as part of these features.

Installing the adapters

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

Return here for instruction on installing the SCSI cable.

Installing the SCSI cable

The disk controller adapter and the auxiliary-write cache adapter are connected by a SCSI cable.

Attention: Do not install or remove the adapter cable if the adapters have the power on. Use the service procedures to turn off the power to the adapter slots or shut down the system or partition in which the adapters are placed.

To install the SCSI cable, do the following steps:
1. Attach the SCSI cable to SCSI bus port 3 (fourth physical port) of the disk controller adapter. See the following figure.
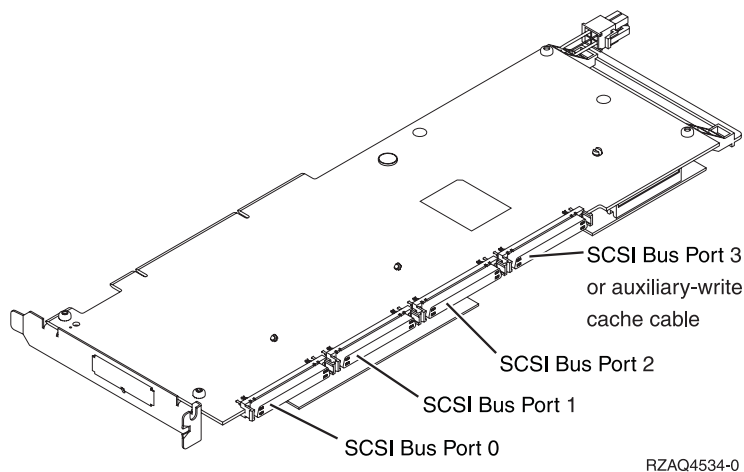
2. Attach the cable to SCSI port **A** on the auxiliary-write cache adapter. See Figure 71 on page 219.

Note:
1. Attaching the cable to the disk controller reduces the number of SCSI buses that support disk drives from four to three.
2. Reducing the number of SCSI buses might also reduce the number of disk drives supported by the disk controller, depending on the system unit or expansion drawer in which the disk controller is installed.
3. No disk drives are driven by the auxiliary-write cache adapter. This adapter protects against extended outage caused by loss of write cache, but does not protect against a disk controller failure.

Related tasks:

↪ Installing PCI adapters

Related reference:

↪ IBM Prerequisite Web page

↪ Parts information

↪ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCI-X Quad-Channel Ultra320 SCSI RAID Adapter (FC 5582, 5583, 5738, 5777; CCIN 571E)

Learn about the features and specifications for the PCI-X Quad-Channel Ultra320 SCSI RAID Adapter.

Feature codes

- 571E is the custom card identification number (CCIN) on the adapter.
- 5738 is the IOP-based feature code for the adapter for the IBM i operating system.
- 5777 is the IOPless feature code for the adapter for the IBM i operating system.
- The 5582 includes an IOP-based 5738 PCI-X Quad-Channel Ultra320 SCSI RAID Adapter and a CCIN 574F auxiliary-write cache IOA.
- The 5583 includes an IOPless, 5777 PCI-X Quad-Channel Ultra320 SCSI RAID Adapter and a CCIN 574F auxiliary-write cache IOA

Adapter features

- 64 bit, 3.3 volt
- Address support for up to 60, 16-bit SCSI physical disk drives on 4 independent internal SCSI buses. (The actual number of drives is limited by physical device placement limitations.)
- Four internal (only) U320 SCSI ports. Internally attached Ultra320 devices are designed to run at a data rate of up to 320 MB per second on systems that have internal backplanes that are capable of supporting Ultra320 speeds.
- Utilizes Low Voltage Differential (LVD) drivers and receivers. It can support single ended (SE) and LVD devices on SCSI bus 1, but LVD devices only on other SCSI busses.
- Up to 1.5 GB of compressed write cache, and up to 1.6 GB of compressed read cache
  - 390 MB/1.5 GB compressed write cache.
  - 415 MB/1.6 GB compressed read cache.
- Removable cache card with a concurrently maintainable battery. The removable transportable cache card can be used by service providers for cache data recovery procedures.
- Peripheral Component Interconnect-X (PCI-X) support
- RAID capability:
  - Supports RAID and non-RAID DASD, tape, and optical devices.
  - 0649 provides RAID 0, 10, 5, 6 capability.
  - 5582 and 5583 provide RAID 5 or RAID 6 capability.
    - A minimum of 3 disk drives is required for RAID 5.
    - A minimum of 4 disk drives is required for RAID 6.
    - 574F Auxiliary Cache IOA is required for either RAID level.

      For information about using an auxiliary-write cache IOA, see http://publib.boulder.ibm.com/infocenter/powersys/v3r1m5/topic/p7hcd/fc574f.htm.

Specifications

Item	Description
Adapter FRU number	42R5130
Cache battery FRU number	39J5554
Cables	Attachment cables are included with the attaching subsystem or device.
I/O bus architecture	PCI-X compliant

Item	Description
Slot requirement	One available 3.3 volt PCI or PCI-X slot when the disk controller adapter is used by itself. Two available 3.3 volt PCI or PCI-X slot when the disk controller adapter is used with an auxiliary-write cache adapter.
Maximum number	For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

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

- AIX
  - AIX 5L Version 5.2 with the 5200-10 Technology Level, or later
  - AIX 5L Version 5.3 with the 5300-06 Technology Level, or later
- Linux
  - AIX 5L Version 5.2 with the 5200-10 Technology Level, or later
  - AIX 5L Version 5.3 with the 5300-06 Technology Level, or later
  - See the Linux Alert site for the support details.
- IBM i
  - IBM i V5R3 and V5R3m5
  - IBM i V5R4 with PTFs

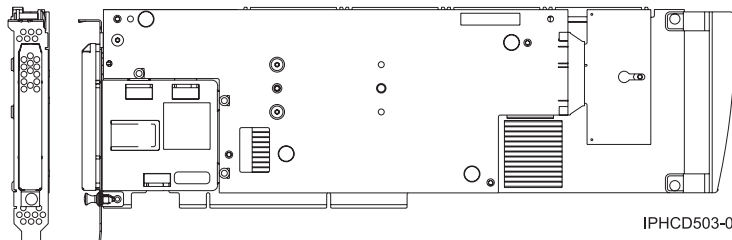## Adapter side view, end view, and SCSI connectors

IPHCD503-0

Figure 72. Adapter side view and end view
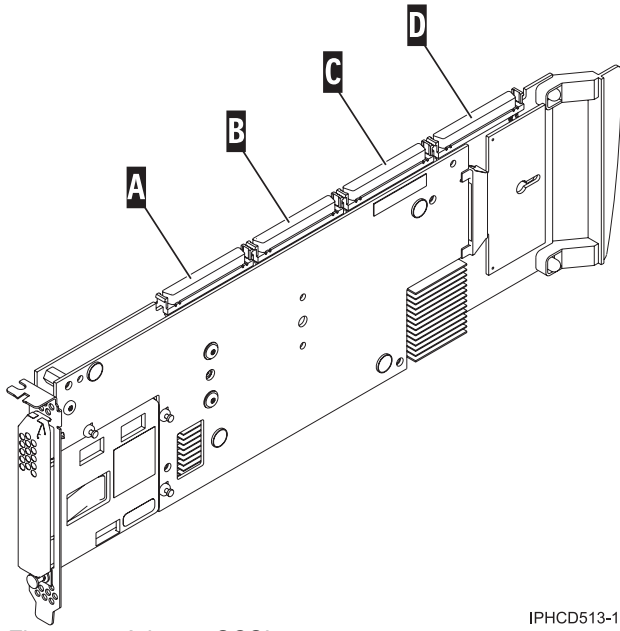
Figure 73. Adapter SCSI connectors

A SCSI connector 1 = bus 0

B SCSI connector 2 = bus 1

C SCSI connector 3 = bus 2

D SCSI connector 4 = bus 3

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

Auxiliary-write cache IOA (FC 5583, 5590; CCIN 574F)

Learn about the specifications and installation notes for the auxiliary-write cache IOA adapter.

Custom Card Identification Number (CCIN) 574F is an auxiliary-write cache IOA that provides 1.5 GB of (compressed) auxiliary-write cache when paired with a RAID disk controllers.

- The 574F auxiliary-write cache IOA can be used with the 5738, 5777, 2780, 2757, disk controllers.
- The 574F can be used as a replacement IOA for the 5708 auxiliary-write cache IOA.
- The 0641 includes a direct attach 2780 Peripheral Component Interconnect-X (PCI-X) Ultra4 RAID Disk Controller and a CCIN 574F auxiliary-write cache IOA.
- The 0649 includes a direct attach 5738 PCI-X Quad-Channel Ultra320 SCSI RAID Adapter and a CCIN 574F auxiliary-write cache IOA
- The 5582 includes an IOP-based 5738 PCI-X Quad-Channel Ultra320 SCSI RAID Adapter and a CCIN 574F auxiliary-write cache IOA.
- The 5583 includes an IOPless, 5777 PCI-X Quad-Channel Ultra320 SCSI RAID Adapter and a CCIN 574F auxiliary-write cache IOA

- The 5590 includes a 2780 PCI-X Ultra4 RAID Disk Controller and a CCIN 574F auxiliary-write cache IOA.

The auxiliary-write cache IOA mirrors the write cache of the disk-controller IOA to which it is connected. If a failure occurs to the write cache of the disk-controller, the auxiliary-write cache IOA provides a backup copy during the recovery of the failed IOA.

The disk controller IOA and the secondary, auxiliary-write cache IOA each require one PCI-X slot and must be installed together in the same enclosure. The disk controller IOA and the auxiliary-write cache IOA are connected by a SCSI cable (provided). The connecting SCSI cable is attached to SCSI bus port 3 of the disk controller IOA, reducing the number of SCSI buses that support disk drives from four to three. The reduction of SCSI buses can also reduce the number of disk drives supported by the disk controller, depending on the enclosure in which the disk controller is installed. No disk drives are driven by the auxiliary-write cache IOA.

IPHCD501-1
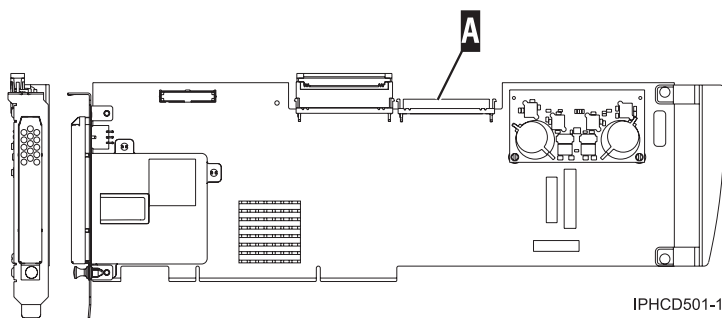
Figure 74. Auxiliary-write cache IOA

A   SCSI connector

Considerations for installing or converting to feature 5582 or 5583

Attention: Converting your adapters to feature 5582 or 5583 requires extensive planning. If the planning is not done correctly, the result could be an extended server outage, loss of data, or both. You might need to do a system restoration.

Read the following questions as they pertain to your system:
- Are you converting from feature 5738 to feature 5582 or 5583?
- Are you replacing any other existing storage adapters with features 5582 and 5583?
- Is your server partitioned, meaning is it an LPAR?

If the answer to any of these questions is yes, or you are unsure of the answers, it is a good idea to contact your authorized service provider for planning and deployment services.

For planning information and examples of deployment, see Planning for Disk Storage Availability with Auxiliary Write Cache Solutions

574F adapter specifications

Item	Description
Adapter FRU number	42R5133
Cache battery FRU number	39J5554

Item	Description
Cable FRU number	39J1702
Cables	A specific storage adapter to auxiliary storage adapter SCSI cable is necessary and is provided with each feature or conversion.
Unit description	• Long, 64 bit, 133 MHz, 3.3 V edge connector, single-slot • PCI-X 2.2 compliant • Compatible down to 32 bit, 33 MHz PCI adapter slots
Operating system or partition requirements	**IBM i** • When 574F is used with the 2780 or 2757 controller, the feature is supported in V5R2 or later. • When 574F is used with the 5738 or 5777 controller, the feature is supported in V5R3 or later. **Important:** See the IBM Prerequisites website for software prerequisites. **AIX** • AIX 5L Version 5.2 with the 5200-10 Technology Level • AIX 5L Version 5.3 with the 5300-06 Technology Level
Partition information	• If you are placing the feature in the primary partition or any non-partitioned system, the auxiliary cache IOA for the load source (LS) adapter must be in the same enclosure as the LS IOA. • If you are placing the feature in the secondary partition on any system, the auxiliary cache IOA for the LS adapter must be under the LS IOP.

Related information	• The disk controller adapter and the auxiliary-write cache adapter each require one PCI slot.
	• Both adapters must be installed in the same enclosure.
	• The adapters are connected by a SCSI cable that is provided.
	• The operating system identifies the auxiliary-write cache IOA as a storage controller with no devices attached. The operating system does not identify which controller the auxiliary-write cache IOA is connected to.
	• The adapter pairs must both be IOPless, or IOP controlled.
	  – The 5582 includes an IOP-based 5738 PCI-X Quad-Channel Ultra320 SCSI RAID Adapter and a CCIN 574F auxiliary-write cache IOA.
	  – The 5583 includes an IOPless, 5777 PCI-X Quad-Channel Ultra320 SCSI RAID Adapter and a CCIN 574F auxiliary-write cache IOA

Installing the adapters

To install the adapters, refer to the PCI Adapters topic, and then return here for instruction on installing the SCSI cable:

Installing the SCSI cable
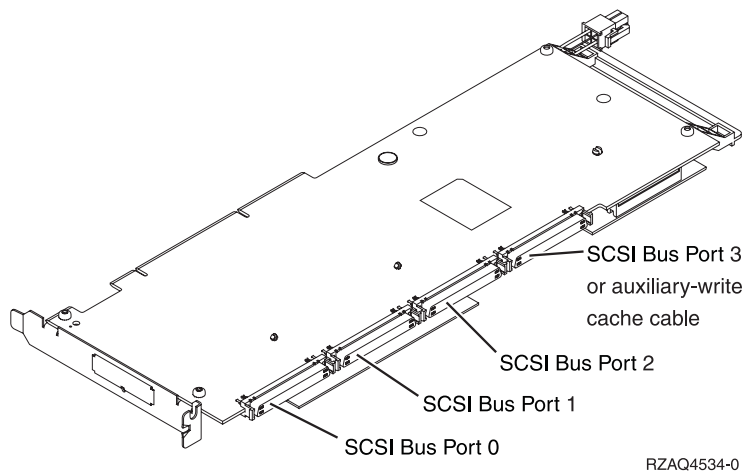
The disk controller adapter and the auxiliary-write cache adapter are connected by a SCSI cable.

Attention: Do not install or remove the adapter cable if the adapters have the power on. Use the service procedures to turn off the power to the adapter slots or shut down the system or partition in which the adapters are placed.

To install the SCSI cable, do the following steps:

1. Attach the SCSI cable to SCSI bus port 3 (fourth physical port) of the disk controller adapter.

SCSI Bus Port 3
or auxiliary-write
cache cable

SCSI Bus Port 2

SCSI Bus Port 1

SCSI Bus Port 0

RZAQ4534-0

2. Attach the cable to the SCSI port on the auxiliary-write cache adapter.

Note:
- Attaching the cable to the disk controller reduces the number of SCSI buses that support disk drives from four to three.
- Reducing the number of SCSI buses might also reduce the number of disk drives supported by the disk controller, depending on the system unit or expansion drawer in which the disk controller is installed.
- No disk drives are driven by the auxiliary-write cache adapter. This adapter protects against extended outage caused by loss of write cache, but does not protect against a disk controller failure.

Related tasks:

➦ Installing PCI adapters

Related reference:

➦ IBM Prerequisite Web page

➦ Parts information

➦ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCI-X DDR Dual-Channel Ultra320 SCSI RAID Adapter (FC 5737, 5776; CCIN 571B)

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

The PCI-X DDR Dual-Channel Ultra320 SCSI RAID Adapter is a high-performance SCSI adapter for Peripheral Component Interconnect-X (PCI-X) and PCI systems. The adapter provides RAID 0, 5, 6, or 10 capability, 90 MB of write cache, and can address up to 30 16-bit SCSI physical disk drives on two independent SCSI buses. The adapter uses and supports low voltage differential (LVD) drivers and receivers only. Each SCSI bus can either be internal (on systems that support internal SCSI devices or backplane attachments) or external, but not both. Internally attached Ultra320 devices run at a data rate of up to 320 MBps on systems that have internal backplanes that are capable of supporting Ultra320 speeds.
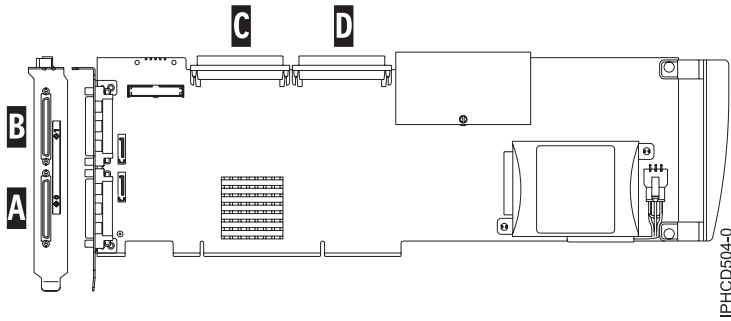
Figure 75. PCI-X DDR Dual-Channel Ultra320 SCSI RAID Adapter

A   SCSI port 0

B   SCSI port 1

C   SCSI port 0

E   SCSI port 1

Note: Each SCSI bus (0 or 1) can either be internal (on systems that support internal SCSI devices or backplane attachments) or external, but not both.

PCI-X DDR dual-channel Ultra320 SCSI RAID Adapter specifications

Item   **Description**

FRU number

> FC 5737 or 5776 is 42R4855[*] or 39J5024[**]
>
> [*] 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.

Operating system or partition requirements

> AIX Version 5.2 with the 5200-07 Technology Level, or later
>
> AIX 5L Version 5.3 with the 5300-03 Technology Level, or later
>
> Red Hat Enterprise Linux version 4, Update 2 or newer
>
> SUSE Linux Enterprise Server 9 Service Pack 2 or newer
>
> IBM i V5R3 or later
>
> If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Required software or drivers

> AIX - devices.pci.1410be02 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)

Tools   None

Cables

Attachment cables are shipped with the attaching subsystem or device.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Using and maintaining the adapter

For information about replacing the cache battery, see "Replacing the cache battery pack on the 571B adapter" on page 261.

For information about using and maintaining the adapter, see the *PCI-X SCSI RAID controller reference guide for AIX* or *PCI-X SCSI RAID controller reference guide for Linux*. The guides can be found in the Reference information topic collection.

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCI-X Quad-Channel Ultra320 SCSI RAID Adapter (FC 5582, 5583, 5738, 5777; CCIN 571E)

Learn about the features and specifications for the PCI-X Quad-Channel Ultra320 SCSI RAID Adapter.

Feature codes

- 571E is the custom card identification number (CCIN) on the adapter.
- 5738 is the IOP-based feature code for the adapter for the IBM i operating system.
- 5777 is the IOPless feature code for the adapter for the IBM i operating system.
- The 5582 includes an IOP-based 5738 PCI-X Quad-Channel Ultra320 SCSI RAID Adapter and a CCIN 574F auxiliary-write cache IOA.
- The 5583 includes an IOPless, 5777 PCI-X Quad-Channel Ultra320 SCSI RAID Adapter and a CCIN 574F auxiliary-write cache IOA

Adapter features

- 64 bit, 3.3 volt
- Address support for up to 60, 16-bit SCSI physical disk drives on 4 independent internal SCSI buses. (The actual number of drives is limited by physical device placement limitations.)
- Four internal (only) U320 SCSI ports. Internally attached Ultra320 devices are designed to run at a data rate of up to 320 MB per second on systems that have internal backplanes that are capable of supporting Ultra320 speeds.
- Utilizes Low Voltage Differential (LVD) drivers and receivers. It can support single ended (SE) and LVD devices on SCSI bus 1, but LVD devices only on other SCSI busses.
- Up to 1.5 GB of compressed write cache, and up to 1.6 GB of compressed read cache
  - 390 MB/1.5 GB compressed write cache.
  - 415 MB/1.6 GB compressed read cache.

- Removable cache card with a concurrently maintainable battery. The removable transportable cache card can be used by service providers for cache data recovery procedures.
- Peripheral Component Interconnect-X (PCI-X) support
- RAID capability:
  - Supports RAID and non-RAID DASD, tape, and optical devices.
  - 0649 provides RAID 0, 10, 5, 6 capability.
  - 5582 and 5583 provide RAID 5 or RAID 6 capability.
    - A minimum of 3 disk drives is required for RAID 5.
    - A minimum of 4 disk drives is required for RAID 6.
    - 574F Auxiliary Cache IOA is required for either RAID level.

      For information about using an auxiliary-write cache IOA, see http://publib.boulder.ibm.com/infocenter/powersys/v3r1m5/topic/p7hcd/fc574f.htm.

Specifications

Item	Description
Adapter FRU number	42R5130
Cache battery FRU number	39J5554
Cables	Attachment cables are included with the attaching subsystem or device.
I/O bus architecture	PCI-X compliant
Slot requirement	One available 3.3 volt PCI or PCI-X slot when the disk controller adapter is used by itself. Two available 3.3 volt PCI or PCI-X slot when the disk controller adapter is used with an auxiliary-write cache adapter.
Maximum number	For the maximum adapters supported, see the PCI adapter placement topic collection for your system.

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

This adapter is supported for the following versions of operating systems:
- AIX
  - AIX 5L Version 5.2 with the 5200-10 Technology Level, or later
  - AIX 5L Version 5.3 with the 5300-06 Technology Level, or later
- Linux
  - AIX 5L Version 5.2 with the 5200-10 Technology Level, or later
  - AIX 5L Version 5.3 with the 5300-06 Technology Level, or later
  - See the Linux Alert site for the support details.
- IBM i
  - IBM i V5R3 and V5R3m5
  - IBM i V5R4 with PTFs

Adapter side view, end view, and SCSI connectors

Figure 76. Adapter side view and end view
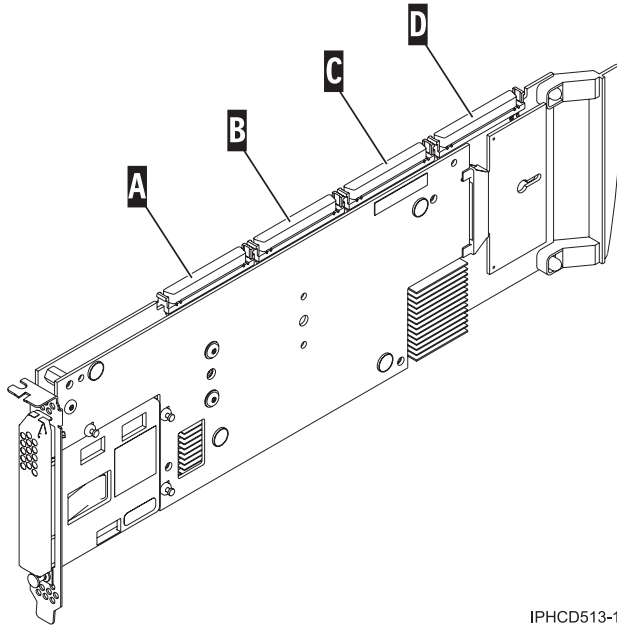
Figure 77. Adapter SCSI connectors

A   SCSI connector 1 = bus 0

B   SCSI connector 2 = bus 1

C   SCSI connector 3 = bus 2

D   SCSI connector 4 = bus 3

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

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

Learn about the features, specifications and installation notes for the PCI-X Double-Wide, Quad-Channel Ultra320 SCSI RAID Controllers.

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

- "Features"
- "Specifications"
- "Placement information" on page 233
- "Logical partitioning" on page 233
- "Installing the adapter in a cassette" on page 233
- "Power LED" on page 234
- "Concurrent maintenance procedure" on page 234

Features

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

Figure 78. Adapter

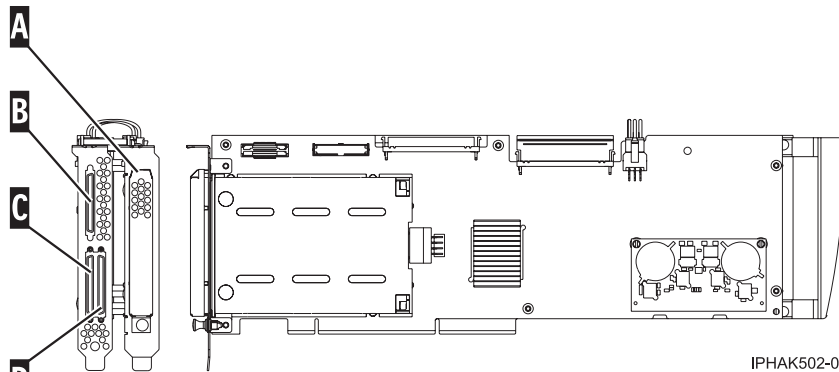| **A** | Battery cover |
B	SCSI port 2
C	SCSI port 0
D	SCSI port 1

Specifications

Item	Description
Adapter FRU number	42R6578
Cache battery FRU number	42R3965

Item	Description
Unit description	• 64 bit, 133 MHz, 3.3 V • Peripheral Component Interconnect-X (PCI-X) 2.0 compliant • Double-wide adapter, requires 2, adjacent, long slots. The SCSI controller side of the adapter pair requires a 64-bit slot. (The controller side is the side with the external SCSI connectors.) • The auxiliary-write cache adapter contains a dual, concurrently maintainable, cache-battery pack, which maintains cache memory on both adapters in the event of an abnormal termination.
Maximum number	For adapter placement information, see PCI adapter placement topic relevant to your system.

Operating system or partition requirements

This adapter is supported for the following versions of the operating systems:
• AIX:
  – AIX 5.3, or later
• Linux:
  – SUSE Linux Enterprise Server 10, or later
  – Red Hat Enterprise Linux Version 6.1, or later
  – See the Linux Alert site for the support details.
• IBM i:
  – IBM i Version 5, or later

Placement information

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

Logical partitioning

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

Installing the adapter in a cassette

To install this adapter in a cassette, first remove the adapter handle (**B**), and the two plastic covers from the SCSI jumper cable (**A**), as shown in the following figure.
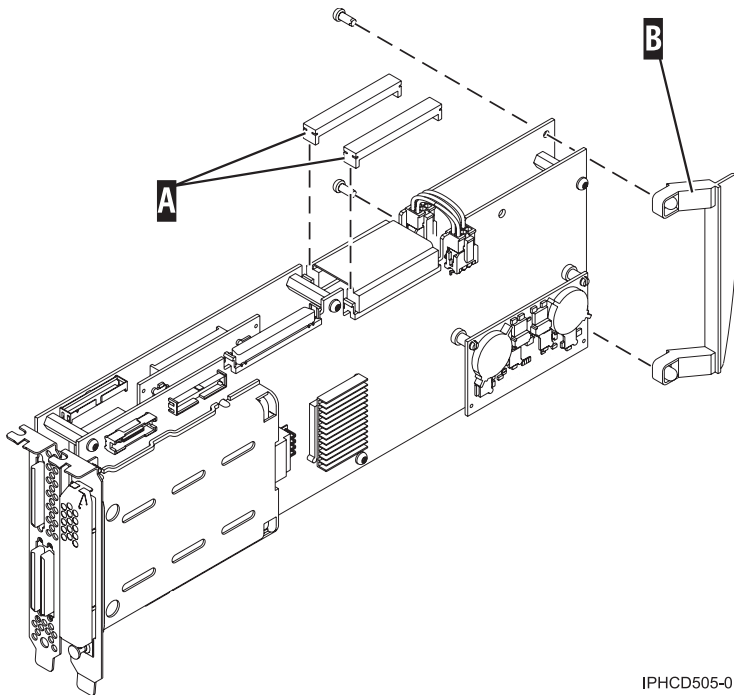
Figure 79. Preparing the adapter for placement in a cassette

Power LED

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

Concurrent maintenance procedure

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

Important:
* Both PCI slots must be powered off when installing or removing this adapter with the system power on.
* If this adapter is the load source IOA, or under the load source IOP, or any other storage IOA/IOP with critical DASD attached for the system, the system may temporarily hang until this procedure is completed (the slots are powered back on and the adapter has become operational again). In this configuration, this concurrent maintenance procedure must be done by a qualified service provider. At step 12 on page 235, the HSM directs you to use the control panel functions 68 and 69 to turn off the power or turn on the power on the domain.

Follow this procedure:
1. Start an IBM i operating system session for the system or logical partition that contains the adapter, and sign on to the system or logical partition.
2. Type **strsst** on the command line of the Main Menu and then press Enter.
3. Type your service tools user ID and service tools password on the System Service Tools (SST) Sign On display and press Enter.
4. Select **Start a service tool** from the System Service Tools (SST) display and press Enter.
5. Select **Hardware service manager** from the Start a Service Tools display and press Enter.

6. Select **Logical hardware resources (system, frames, cards)** from the Hardware Service Manager display and press Enter.

7. Select **System bus resources** and press Enter. The display changes to the Logical Hardware Resources on System Bus display.

8. Page down and locate **Combined Function IOP** that controls the IOA to be serviced.

9. Enter 9 in the Opt field for the **Combined Function IOP** to be serviced.

10. Locate the **Storage IOA** resource for the adapter to be serviced and enter 8 in the Opt field for that resource.

11. Enter 3 for **Concurrent maintenance** in the Opt field for the **Storage IOA** resource to be serviced. The display changes to the Hardware Resource Concurrent Maintenance display.

12. Press F9 to turn off the power to the domain.

13. Press Enter to confirm start turning off the power. The display changes to the Hardware Resource Concurrent Maintenance Status display, which shows the status of the turned off power.

    When the power is turned off completely, the display returns to the Hardware Resource Concurrent Maintenance display. The display shows that the **Power Status** is turned off for **Storage IOA**. Leave this display on the HSM while you remove and replace the adapter.

14. Check the slot power LED state for the slot in which the adapter resides to verify that power of the adapter is turned off.

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

15. Remove and replace the adapter. Removal and replacement procedures are covered in the customer-installable features publication.

16. After the replacement is complete, return to the Hardware Resource Concurrent Maintenance display on the HSM.

17. If you were previously instructed to use operator panel function 69 to power on the adapter, do so now from either the system operator panel or from the HMC operator panel functions for the owning partition. Then go to step 22, otherwise continue with next step.

18. Enter F10 to turn on the power to the adapter.

19. Press Enter to begin turning on the power.

20. If the Work with Controlling Resource display appears, enter 7 in the Opt field for the **Combined function IOP** to assign the IOA to.

    The Hardware Resource Concurrent Maintenance Status display shows the status of the power turned on.

21. When the power is turned on completely, the display returns to the Hardware Resource Concurrent Maintenance display. The display shows that the **Power Status** is turned on for the **Storage IOA**.

22. Check the LED status to verify that the adapter power is turned on.

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

23. Return to the procedure that sent you here.

Related tasks:

➦ Installing PCI adapters

Related reference:

➦ IBM Prerequisite Web page

➦ Parts information

➦ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe 2-Line WAN with Modem (FC 2893 (EN13), 2894 (EN14); CCIN 576C)

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

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

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

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

The FRU part numbers for the adapter are:
* FC 2893 and 2894: 44V5323

Adapter type
> Short, x4, PCIe

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

The adapter is supported on the following versions of the operating systems:
* Linux
  - Red Hat Enterprise Linux 5.6 for POWER, or later
  - SUSE Linux Enterprise Server 11 Service Pack 1, or later
* IBM i
  - IBM i 7.1, or later
  - IBM i 6.1, or later

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

IBM ARTIC960Hx 4-Port Selectable PCI Adapter (FC 2947)

Learn about the specifications for the IBM ARTIC960Hx 4-Port Selectable PCI Adapter.

Overview

The IBM ARTIC960Hx 4-Port Selectable PCI Adapter consists of an IBM ARTIC960Hx Base PCI Adapter, an IBM ARTIC960 4-Port Selectable PCI Mezzanine Card (PMC), and an 8MB DRAM Memory card.

The Base PCI Adapter provides high-function control of I/O operations and serves to off-load input/output tasks from the system microprocessor. It has a memory connector that supports 8 MB of extended-data output (EDO) dynamic random-access memory (DRAM).

The 4-Port Selectable PMC connects to the Base PCI adapter by two 64-pin connectors. The PMC card provides a high-function, application-specific interface that expands the capability of the base adapter.

The Base PCI Adapter and the attached 4-Port Selectable PMC occupy a single 32-bit expansion slot.

In addition to this topic, you can learn more about the adapter in the *IBM ARTIC960Hx 4-Port Selectable PCI Adapter, IBM ARTIC960Hx 4-Port T1/E1 PCI Adapter, IBM ARTIC960Hx DSP Resource PCI Adapter Installation and User's Guide* SA23-2577

Figure 80 shows a side view of the IBM ARTIC960Hx Base PCI Adapter.
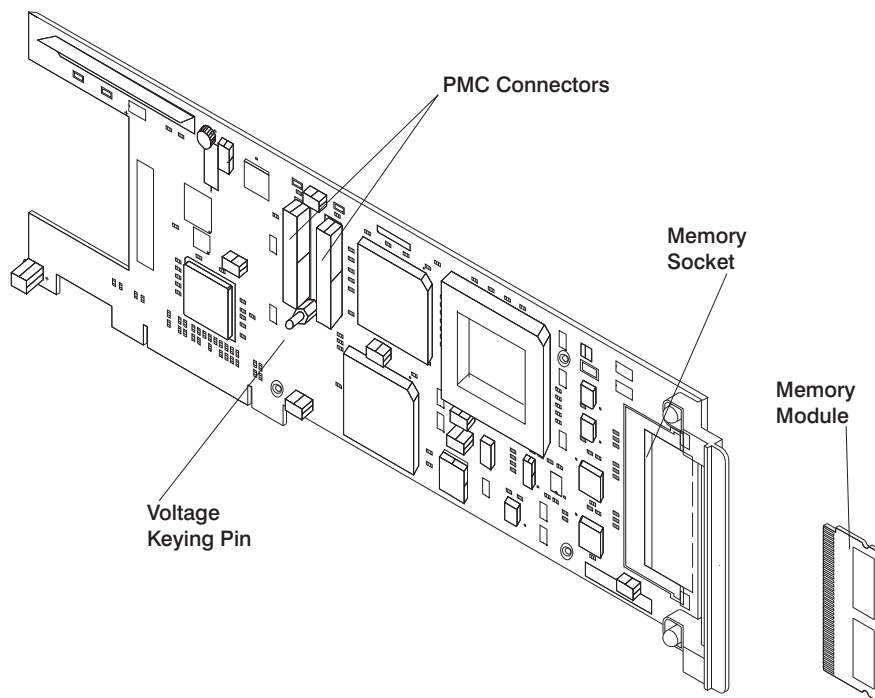
Figure 80. IBM ARTIC960Hx Base PCI Adapter

Figure 81 on page 238 shows a side view of the 4-Port Selectable PMC.

PMC Connectors
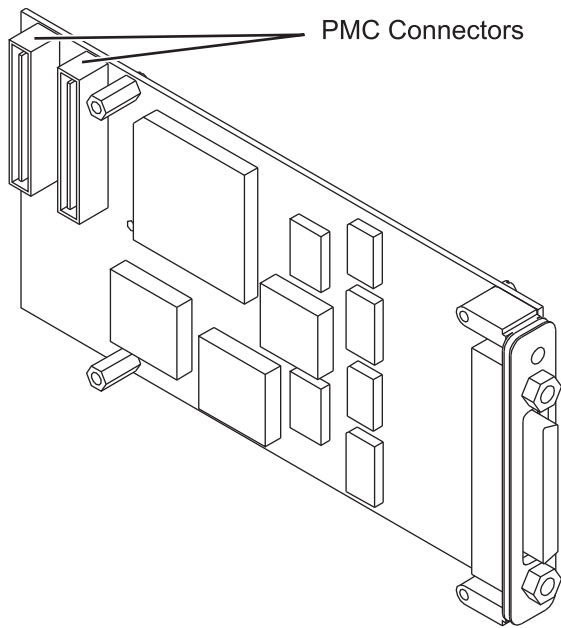
Figure 81. 4-Port Selectable PMC

Adapter specifications

Item   Description

FRU numbers
> Base adapter, 87H3427
>
> 8 MB memory module, 87H3621
>
> 4-Port selectable mezzanine card, 87H3413

I/O bus architecture
> PCI, 32-bit, 33-MHz
>
> The 2947 can be installed in supported 32-bit or 64-bit, 33-MHz, 66-MHz, 133-MHz, and 266-MHz PCI and PCI-X bus slots.

Busmaster
> Yes

Bus size
> 32-bit

Wrap plugs
> See "Wrap plugs" on page 239

Cables
> EIA-232 (ISO 2110) cable
>
> EIA-530 (ISO 2110) cable
>
> V.35 DTE (ISO 2593) cable
>
> RS 449 (ISO 4902) cable
>
> X.21 (ISO 4903) cable

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

Wrap plugs

FRU number	Description of wrap plug
87H3311	120-pin connector
87H3439	25-pin wrap plug (EIA-232 (ISO 2110) or EIA-530 (ISO 2110))
87H3442	34-pin wrap plug (V.35 DTE (ISO 2593) 34-pin male block)
87H3440	37-pin wrap plug (RS-449 (ISO 4902))
53G0638	15-pin wrap plug (X.21 (ISO 4903))

Port speeds

When clocks are supplied by an external device (all interfaces except EIA-232), the 4-Port Selectable PMC supports four ports running simultaneously at a maximum data rate of 2.048 Mbps, duplex, and synchronous. The following table shows the maximum speed supported for each electrical interface.

Electrical interface	Maximum speed per port
EIA-232 (ISO 2110)	38.4 Kbps (U.S. only) 19.2 Kbps (EMEA only)
EIA-530 (ISO 2110)	2.048 Mbps
V.35 DTE (ISO 2593)	2.048 Kbps (US only) 64 Kbps (EMEA only)
RS 449 (ISO 4902)	2.048 Mbps
X.21 (ISO 4903)	2.048 Mbps

Clocks supplied by a Dual Universal Serial Communications Controller (DUSCC) on the 4-Port Selectable PMC provide synchronous data rates up to 230.4 Kbps, duplex. In addition, an on-card clock generator can provide data rates of either 1.544 Mbps or 2.048 Mbps for each port. Selection of the clock frequency is programmable.

4-Port Selectable PMC 120-pin connector

The individual signals for all ports connect to the 4-Port Selectable PMC through the 120-pin connector at the rear of the card. Each cable has a single 120-pin, male, D-shell connector that branches into four individual cables, each of which provides access to one of four independent ports. The 120-pin D-shell connector is shown in the following illustration.
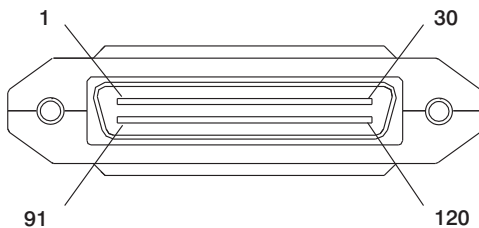
Related tasks:

➥ Installing PCI adapters

Related reference:

➥ IBM Prerequisite Web page

➥ Parts information

➥ PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCI 2-Line WAN IOA (FC 6805; CCIN 2742)

Learn about the feature code (FC) 6805 PCI 2-Line WAN IO adapter.

Features 6805 and 0613 are physically the same adapter but have different feature numbers that denote to IBM configuration tools whether an IOP is required. Feature 0613 is a direct attach for use with Linux. Feature 6805 is for use without an IOP.

FRU number
39J2298 (Designed to comply with RoHS requirement.)

Adapter type
Short, 32-bit, 66 MHz

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

The adapter is supported on the following versions of the operating systems:
- Linux
  - Red Hat Enterprise Linux Version 5.6, or later
  - SUSE Linux Enterprise Server 11 with Service Pack 1, or later
- IBM i
  - IBM i Version 7.1, or later
  - IBM i Version 6.1, or later

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCI 2-Line WAN with Modem (FC 6833, 6834)

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

Feature 6833 is a 2-line per port WAN with modem adapter. This feature is the non-CIM (Complex Impedance Matching) version offered in all countries and regions except Australia and New Zealand. 6833 is physically the same card as 2793, but 6833 indicates to IBM configurator tools that the IOA is being used by the operating system in an IOPless mode.

6834 is a 2-line/port WAN w/modem adapter. This feature is the CIM (Complex Impedance Matching) version which is offered only in Australia and New Zealand. 6834 is functionally equivalent to 2794, but 6834 indicates to IBM configurator tools that the IOA is being used by the operating system in an IOPless mode.

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

FRU numbers
> 6833 = 039J2282[*]
>
> 6834 = 039J2286[*]
>
> [*]Designed to comply with RoHS requirement.

Adapter type
> Short, 32-bit, 66 MHz

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

For details about slot priorities and placement rules, see the PCI adapter placement topic collection for your system.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether there are any prerequisites for this feature and attaching devices. To check for the prerequisites, see IBM Prerequisite website (www-912.ibm.com/e_dir/eServerPrereq.nsf).

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

Related tasks:

Installing PCI adapters

Related reference:

IBM Prerequisite Web page

Parts information

PCI adapter placement

"Backplane daughter cards and RAID enablement cards" on page 2
Find links to topics that cover Backplane daughter cards and RAID enablement cards.

PCIe2 3.1GB Cache Integrated SAS RAID Adapter (CCIN 57C3) included in FC EDR1

Learn about the specifications and operating system requirements for the PCIe2 3.1GB Cache Integrated SAS RAID adapter that is integrated with the EXP30 Ultra SSD I/O Drawer (feature code EDR1 PCIe storage enclosure). The adapters reports as PCIe2 3.1GB Cache RAID SAS Enclosure 6Gb x8.

Overview

The PCIe2 3.1GB Cache Integrated SAS RAID adapter is an internal PCI Express generation-2 (PCIe2), serial-attached SCSI (SAS) Random Array of Independent Disks (RAID) adapter integrated into the EDR1 PCIe storage enclosure. The adapter contains the SAS RAID controller and SAS Expander. The internal adapter with the SAS RAID controller and SAS Expander is called as the enclosure RAID module (ERM). This adapter supports the attachment of the 1.8 inch SAS solid-state drive feature ES02 internal to the PCIe storage enclosure, as well as hard disk drives installed in an optional attached 5887 disk drawer. The EDR1 PCIe storage enclosure connects to the server via a PCIe x8 cable at its PCIe x8 cable port. The PCIe cable is connected to the GX ++ PCIe2 adapter in the server.

The FC EDR1 PCIe storage enclosure is always supplied with two PCIe2 internal SAS RAID adapters preinstalled. These must be used in a high availability, multi-initiator RAID configuration with the two adapters in dual-controller mode (Dual Storage IOA configuration).

The optional 5887 disk drawers can be connected to the EDR1 PCIe storage enclosure using SAS EX cables installed at the ERM1 high density SAS connectors (C1-T1 or C1-T2) and ERM2 high density SAS connectors (C2-T1 or C2-T2). Each 5887 disk drawer must be connected to the T1 ports on both ERMs or to the T2 ports on both expanders. The attached 5887 disk drawers must be configured in mode 1 only.

Each of the two high performance, integrated SAS controllers physically provide 3.1 GB write-cache. Working as a pair, they provide additional performance and adapter redundancy with mirrored write-cache data and mirrored RAID parity footprints between the adapters. The cache contents are designed to be protected by integrated flash memory with capacitors in case of power failure without the need for batteries as were used with previous large cache adapters. If the pairing is broken, write-cache is disabled after existing cache content is written out to the drives and performance may be degraded until the controller pairing is reestablished.

Both controllers can support a minimum of 6 SSD and a maximum of 30 SSD. The SAS SSD bays are always physically one set of drives, even though there may be multiple RAID arrays in this one set. With two or more RAID arrays, each RAID array can be optimized to either of the integrated SAS controllers to take advantage of Active/Active performance improvements via the R/W bandwidth of both adapters.

The location codes for the PCIe connector on the PCIe2 3.1GB Cache Integrated SAS RAID adapter are:

1. Internal adapter ERM 1: C1-T3
2. Internal adapter ERM 2: C2-T3

See Figure 82 on page 243 for the location codes for the PCIe2 3.1GB Cache Integrated SAS RAID adapter in the EDR1 PCIe storage enclosure.
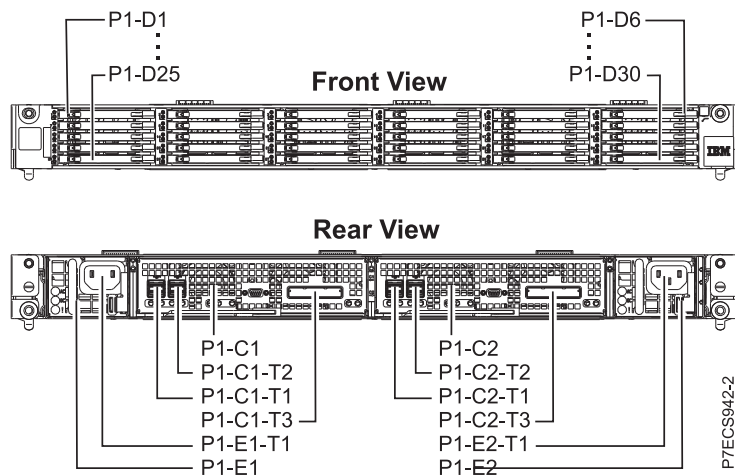
Figure 82. Location codes of the PCIe2 3.1GB Cache Integrated SAS RAID adapter

Servers running the AIX or Linux operating system support both adapters RAID controllers owned by the same or different partitions. The controllers provide RAID 0, RAID 5, RAID 6, and RAID 10 configurations for servers running the AIX or Linux operating system, and supported by VIOS. AIX, Linux, or VIOS also provide mirroring (logical volume manager (LVM)) capabilities.

For the EDR1 feature, these adapters can be maintained concurrently, along with most other components in the EDR1 PCIe storage enclosure.

See figure that shows the ERM.
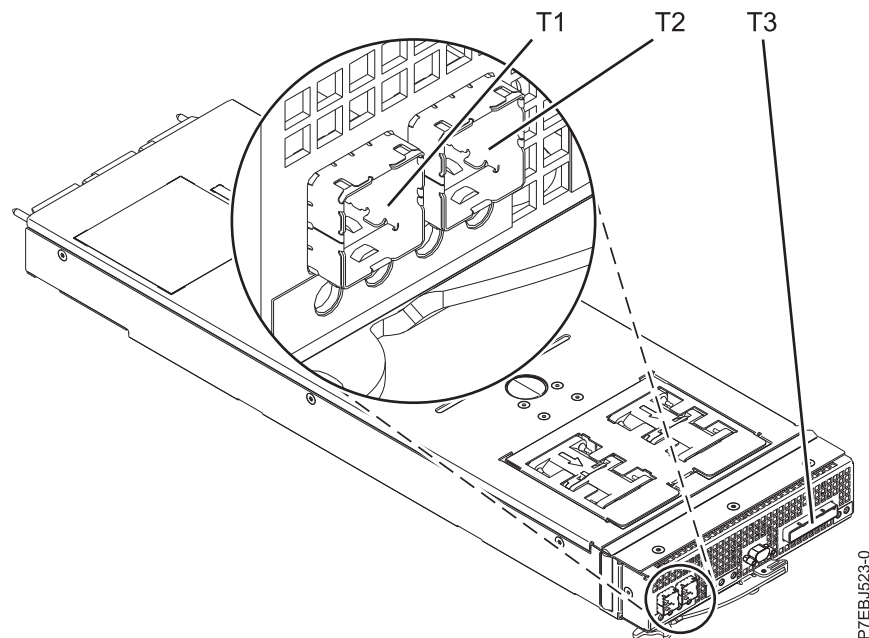
Figure 83. CCIN 57C3 PCIe2 3.1GB Cache RAID SAS Enclosure 6Gb x8

Specifications

Item   Description
Adapter CCIN number
        57C3

I/O bus architecture
> PCIe2 x8

Cables
> PCIe cables FC EN05 and FC EN07.

Voltage
> 3.3 V

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 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)
  - SUSE Linux Enterprise Server 10, Service Pack 4, or later
  - For support details, see the Linux Alert website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.htm)
- VIOS
  - VIOS support requires VIOS 2.2.1.4, or later

IBM Flash Adapter 90 (PCIe2 0.9TB) (FC ES09; CCIN 578A)

Find information about the specifications, operating system requirements, and drivers for the IBM PCIe Flash adapter. You can also find information about installing, formatting, and troubleshooting the IBM PCIe Flash adapter.

Overview and specifications of the IBM Flash Adapter 90 (PCIe2 0.9TB) (FC ES09; CCIN 578A)

Find information about the overview, specifications, and operating system requirements for the feature code (FC) ES09 adapters.

Overview

The IBM Flash Adapter 90 (PCIe2 0.9TB) is a PCIe enabled high-performance enterprise multi-level cell (eMLC) Flash storage adapter that provides 900 GB of usable storage capacity. It is a single-wide, full-height, half-width, generation-2 PCIe adapter. The adapter capable of providing a read bandwidth of 1.3 gigabyte per second (GBps) and a 4K-read input/output operations per second (IOPS) of 325,000. The adapter increases the performance of applications that require larger and faster data buffer areas.

As the device does not contain an internal RAID, you can mirror the FC ES09 at the adapter level to provide enhanced data integrity. Install the adapter in pairs to enable mirroring.

The FC ES09 adapter provides the following features:
- 32 nm Toshiba eMLC NAND Flash
- Capacitive emergency power loss protection
- Minimal host processor and RAM requirements
- Native block size of 4096

- 512 byte access support

Figure 84 shows the IBM Flash Adapter 90 (PCIe2 0.9TB).
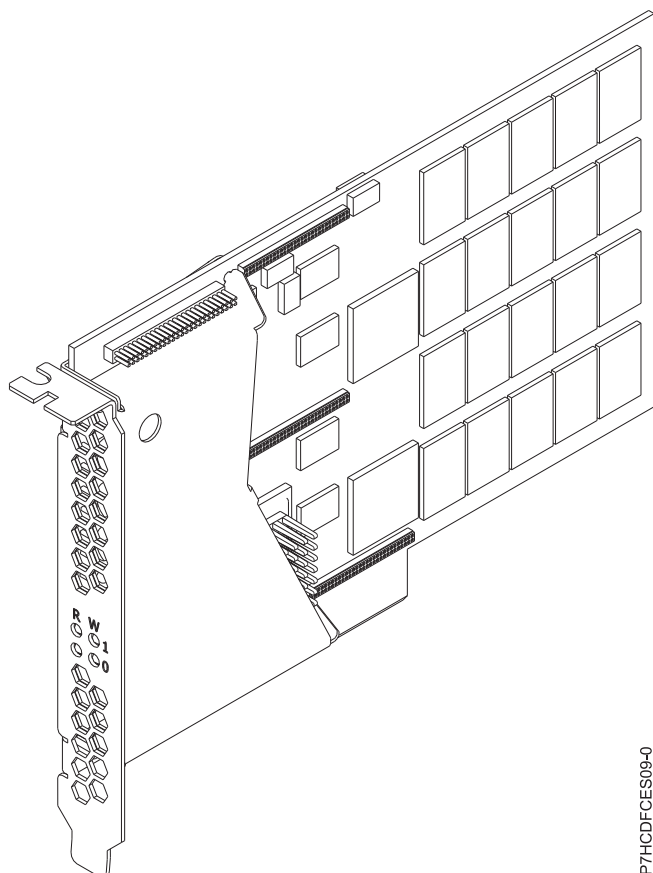
Figure 84. IBM Flash Adapter 90 (PCIe2 0.9TB)

Find the following information about the IBM Flash Adapter 90 (PCIe2 0.9TB):
- "Specifications"
- "Operating system or partition requirements" on page 246
- "Device drivers" on page 246
- "Installing the IBM Flash Adapter 90 (PCIe2 0.9TB)" on page 246
- "Installing the device driver for the IBM Flash Adapter 90 (PCIe2 0.9TB)" on page 248
- "Verifying the storage device availability" on page 249
- "Formatting the IBM Flash Adapter 90 (PCIe2 0.9TB)" on page 250
- "Using the IBM Flash Adapter 90 (PCIe2 0.9TB)" on page 249
- "The **rs_info** Utility for the IBM Flash adapter 90 (PCIe2 0.9TB)" on page 251

Specifications

Item   Description
Adapter FRU number
　　　00AF045 (Designed to comply with RoHS requirement).
I/O bus architecture
　　　PCIe 2.0, x8.

Slot requirement
>One PCIe x8 slot.

Cables
>No cables are required.

Voltage
>3.3 V

Form factor
>Full-height, half-width.

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

Storage
>900 GB.

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 9, or later.
  - AIX Version 7.1 with the 7100-02 Technology Level and Service Pack 4, or later.
  - AIX Version 6.1 with the 6100-07 Technology Level, and Service Pack 9, or later.
  - AIX Version 6.1 with the 6100-08 Technology Level, and Service Pack 4 or later.
- Linux
  - Red Hat Enterprise Linux Version 6.5, or later.

Device drivers

The adapter requires the following drivers:

- AIX operating system requires *rsxx* device driver Rational® Portfolio Manager (RPM).

  For instructions to install the device driver, see "Installing the device driver in an AIX system or logical partition" on page 248.
- Linux operating systems:
  - The *rsxx* device driver is automatically installed in Red Hat Enterprise Linux 6.5, or later versions.

    For instructions to install the device driver, see "Installing the device driver in a Linux VM" on page 248.

Installing the IBM Flash Adapter 90 (PCIe2 0.9TB)

Find information about installing the IBM Flash Adapter 90 (PCIe2 0.9TB) and verifying the installation in a system that is running the AIX or Linux operating system.

Important: Ensure that the IBM Flash Adapter 90 (PCIe2 0.9TB) is supported on your system.

1. To install the IBM Flash Adapter 90 (PCIe2 0.9TB) in your system, go to Installing PCI adapters and complete the installation procedure for the system you are working with.
2. After you complete installing the adapter, verify the adapter installation.
   - For instructions to verify installation in an AIX logical partition, see "Verifying the IBM Flash Adapter 90 (PCIe2 0.9TB) installation in an AIX logical partition" on page 247.
   - For instructions to verify installation in a Linux virtual machine (VM), see "Verifying the IBM Flash Adapter 90 (PCIe2 0.9TB) installation in a Linux VM" on page 247.

Verifying the IBM Flash Adapter 90 (PCIe2 0.9TB) installation in an AIX logical partition:

Learn to verify the adapter installation in the system or logical partition that is running the AIX operating system.

1. Use the HMC to verify the adapter installation. For instructions, see Verifying the installed part.
2. Verify that the physical adapter is partitioned to the logical partition that you wanted the adapter to be available in.

   Note: Ensure that the adapter is detected in the partition.

3. To detect the installed adapter in the system or logical partition that is running the AIX operating system, run the following command:

   cfgmgr

   Note: The following message is displayed if you are installing the IBM Flash Adapter 90 (PCIe2 0.9TB) for the first time in the system or logical partition.
   The following screen is displayed indicating that the adapter is installed and detected in the VM.

   ```
   0514-621 WARNING: The following device packages are required for

                device support but are not currently installed.

                devices.pciex.flash:devices.pciex.pciex1014.4aa.1014.70.3:

                devices.pciex.1410aa0414107000:devices.pciex.14107000:

                devices.pciex.pciex1014.4aa.3:devices.pciex.1410aa04:

                devices.pciex.pciexclass.050100:

                devices.pciex.pciexclass.000501
   ```

4. If the IBM Flash Adapter 90 (PCIe2 0.9TB) is already listed as available, no further installation steps are required.
5. Verify if whether the Flash adapter is available by running the following command:

   -bash-4.2# lsdev -Cc disk

   The following screen is displayed:

   ```
                hdisk0 Available 00-00-00 Other SAS Disk Drive



                hdisk1 Available 07-00-01 IBM Flash Adapter Disk
   ```

Next, you can install the device driver. For instructions to install the device driver in system or logical partition that is running the AIX operating system, see "Installing the device driver in an AIX system or logical partition" on page 248.

Verifying the IBM Flash Adapter 90 (PCIe2 0.9TB) installation in a Linux VM:

Learn how to verify the Flash storage adapter installation in a Linux virtual machine (VM).

1. Use the HMC to verify the adapter installation. For instructions, see Verifying the installed part.
2. Verify if whether the physical adapter is partitioned to the logical partition that you wanted the adapter to be available in.

   Note: Ensure that the adapter is detected in the partition.

3. To detect the installed adapter in the system or VM that is running the Linux operating system, run the following command:

```
lspci | grep IBM
```
The following screen is displayed indicating that the adapter is installed and detected in the VM.

```
01:00.0 FLASH memory: IBM Device 04aa (rev 03)
```

Next, you can install the device driver. For instructions to install the device driver in a system or logical partition that is running the Linux operating system, see "Installing the device driver in a Linux VM."

Installing the device driver for the IBM Flash Adapter 90 (PCIe2 0.9TB)

Find information about installing the IBM Flash Adapter 90 (PCIe2 0.9TB) device driver in a system that is running the AIX or Linux operating system.

Important: Ensure that you have verified that the IBM Flash Adapter 90 (PCIe2 0.9TB) is installed in your system.

You can choose from the following options that are based on the operating system that controls the adapter:
- "Installing the device driver in an AIX system or logical partition"
- "Installing the device driver in a Linux VM"

Installing the device driver in an AIX system or logical partition:

Learn how to install the device driver for the IBM Flash Adapter 90 (PCIe2 0.9TB) in an AIX logical partition.

Important: You must install the device driver before you can use the installed IBM Flash Adapter 90 (PCIe2 0.9TB).

Complete the following steps to install the device driver in an AIX system or logical partition:
1. Download the device driver from Fix Central (www.ibm.com/support/fixcentral).
2. Install the rpm (as root or with root permissions) by using the following command:
   rpm -ihv xxx.x.x, where **xxx.x.x** is the rpm-name.
3. Run **cfgmgr**.

After the device driver is installed, verify that the Flash storage adapter is available. For instructions, see "Verifying the storage device availability in an AIX system or logical partition" on page 249.

Installing the device driver in a Linux VM:

Learn how to install the device driver for the IBM Flash Adapter 90 (PCIe2 0.9TB) in a Linux virtual machine (VM).

Note: Red Hat Enterprise Linux Version 6.5 uses the *rsxx* device driver to control the Flash storage adapter.
1. To download and install the *rsxx_utils* package, see the IBM Service and Productivity Tools website (http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html).
2. After the device driver is installed, verify that the Flash storage adapter is available. For instructions, see "Verifying the storage device availability in a Linux VM" on page 249.

Verifying the storage device availability

Find information about verifying the storage device (IBM Flash Adapter 90 (PCIe2 0.9TB)) availability after you have installed the device driver in a system that is running the AIX or Linux operating system.

Important: Ensure that you have installed the device driver for the IBM Flash Adapter 90 (PCIe2 0.9TB) for the operating system that the adapter is installed in.

To install the device driver in a system that is running the AIX operating system, see "Installing the device driver in an AIX system or logical partition" on page 248.

To install the device driver in a system that is running the Linux operating system, see "Installing the device driver in a Linux VM" on page 248.

You can choose from the following options that are based on the operating system that controls the adapter:
- "Verifying the storage device availability in an AIX system or logical partition"
- "Verifying the storage device availability in a Linux VM"

Verifying the storage device availability in an AIX system or logical partition:

Learn how to verify the IBM Flash Adapter 90 (PCIe2 0.9TB) availability as a storage device in a system that is running the AIX operating system.

1. To verify that the installed adapter is available in the system or logical partition that is running the AIX operating system, run the following command:

   `lsdev -Cc disk`

2. The following screen is displayed indicating that the adapter is installed and ready to use in the system or logical partition.

   ```
   hdisk0 Available 00-00-00 Other SAS Disk Drive

   hdisk1 Available 07-00-01 IBM Flash Adapter Disk

   ...
   ```

Verifying the storage device availability in a Linux VM:

Learn how to verify the IBM Flash Adapter 90 (PCIe2 0.9TB) availability as a storage device in a system or virtual machine (VM) that is running the Linux operating system.

1. To verify that the installed adapter in the system or VM that is running the Linux operating system is available, run the following command:

   `ls /dev/rsxx*`

2. The following screen is displayed indicating that the adapter is installed and ready to use in the VM.

   ```
   /dev/rsxx0

   ...
   ```

Using the IBM Flash Adapter 90 (PCIe2 0.9TB)

Find information about using the IBM Flash Adapter 90 (PCIe2 0.9TB) PCIe Flash storage device in a system that is running the AIX or Linux operating system.

After you verify that the installed IBM Flash Adapter 90 (PCIe2 0.9TB) is ready for use, you can use the device as a disk storage device.

You can find information about mirroring the FC ES09 adapters by using the Logical Volume Manager (LVM) in the AIX Logical Volume Manager mirrors configuration requirements topic.

Formatting the IBM Flash Adapter 90 (PCIe2 0.9TB)

Find information about formatting the IBM Flash Adapter 90 (PCIe2 0.9TB) in a system that is running the AIX or Linux operating system.

Use this procedure to format the installed or replaced IBM Flash Adapter 90 (PCIe2 0.9TB) PCIe storage device.

Choose one of the following options based on the operating system that controls the adapter:
- "Formatting the device in an AIX system or an AIX logical partition"
- "Formatting the device in a Linux VM"

Formatting the device in an AIX system or an AIX logical partition:

Learn how to format the IBM Flash Adapter 90 (PCIe2 0.9TB) device in an AIX system or an AIX logical partition.

Important: If you format the device, the data on the device will be destroyed. Ensure that you back up the data before you format the device.

To format the installed or replaced Flash storage adapter device by using the diagnostic command, complete the following steps:
1. Log in as root user.
2. At the command line, type `diag` and press Enter.
3. On the Diagnostic Operating Instructions display, press Enter to continue.
4. On the Function Selection display, select **Task Selection**.
5. Select **Format Media**.
6. Select **IBM Flash Adapter Disk**.

   A **+** should appear next to the disk.
7. Press **F7**.
8. Select **Format without Certify**.
9. Select **Yes**.

After the device driver is installed, verify that the Flash storage adapter is available in the system. For instructions, see "Verifying the storage device availability in an AIX system or logical partition" on page 249.

Formatting the device in a Linux VM:

Learn how to format the IBM Flash Adapter 90 (PCIe2 0.9TB) device in a Linux virtual machine (VM).

Important: If you format the device, the data on the device will be destroyed. Ensure that you back up the data before you format the device.

To format the installed or replaced Flash adapter by using the **rs_format** utility, complete the following steps:
1. Log in as root user.
2. On the command line of the Linux session, type `rs_format`, and then press Enter.

   The following screen is displayed:

```
# rs_format


     Operating on device: /dev/rsxx0


    * WARNING *


            This utility is data destructive. Backup all data before proceeding.

            Are you sure you want to continue? Enter 'Yes' to confirm: Yes
```

3. Type Yes, and then press Enter.

   The following screen is displayed after the device is formatted:

```
Operating on device: /dev/rsxx0


    * WARNING *


            This utility is data destructive. Backup all data before proceeding.

            Are you sure you want to continue? Enter 'Yes' to confirm: Yes



   Formatting DONE

   Format successful
```

After the device driver is installed, verify that the Flash storage adapter is available in the system. For instructions, see "Verifying the storage device availability in a Linux VM" on page 249.

The `rs_info` Utility for the IBM Flash adapter 90 (PCIe2 0.9TB)

Learn how to install and use the **rs_info** utility to get information about the state and condition of the IBM Flash Adapter 90 (PCIe2 0.9TB).

The **rs_info** utility provides information about the state and condition of the IBM Flash adapter.

Choose from the following options that are based on the operating system that controls the adapter:
- "Verifying whether the **rs_info** utility is installed in an AIX system or an AIX logical partition" on page 252
- "Verifying whether the **rs_info** utility is installed in a Linux system or Linux virtual machine" on page 252
- "Installing the **rs_info** utility in an AIX system or an AIX logical partition" on page 252
- "Installing the **rs_info** utility in a Linux system or Linux virtual machine" on page 253
- "Running the **rs_info** utility in an AIX system or an AIX logical partition" on page 254
- "Running the **rs_info** utility in a Linux system or Linux virtual machine" on page 257
- "The **rs_info** utility fields" on page 259

Verifying whether the rs_info utility is installed in an AIX system or an AIX logical partition:

Learn to verify whether the **rs_info** utility is installed in an AIX system or an AIX logical partition.

1. Log in as root user.
2. Run the following command:

   which /usr/lpp/diagnostics/bin/rs_info

   - If the **rs_info** utility is installed, the following screen is displayed:

   ```
   # which /usr/lpp/diagnostics/bin/rs_info

   /usr/lpp/diagnostics/bin/rs_info
   ```

   - If the **rs_info** utility is not installed, the following screen is displayed:

   ```
   # which /usr/lpp/diagnostics/bin/rs_info

   which: 0652-140 Cannot find /usr/lpp/diagnostics/bin/rs_info
   ```

Next, you can choose to do one of the following actions:

- If the **rs_info** utility is installed, you can run the **rs_info** utility. For instructions, see "Running the **rs_info** utility in an AIX system or an AIX logical partition" on page 254.
- If the **rs_info** utility is not installed, you can install the **rs_info** utility. For instructions, see "Installing the **rs_info** utility in an AIX system or an AIX logical partition."

Verifying whether the rs_info utility is installed in a Linux system or Linux virtual machine:

Learn to verify whether the **rs_info** utility is installed in a Linux virtual machine (VM).

1. Log in as root user.
2. On the command line of the Linux session, type which /usr/bin/rs_info, and then press Enter.
   - If the **rs_info** utility is installed, the following screen is displayed:

   ```
   ## which /usr/bin/rs_info

   /usr/bin/rs_info
   ```

   - If the **rs_info** utility is not installed, the following screen is displayed:

   ```
   # which /usr/bin/rs_info

   /usr/bin/which: no rs_info in (/usr/bin)
   ```

Next, you can choose to do one of the following actions:

- If the **rs_info** utility is installed, you can run the **rs_info** utility. For instructions, see "Running the **rs_info** utility in a Linux system or Linux virtual machine" on page 257.
- If the **rs_info** utility is not installed, you can install the **rs_info** utility. For instructions, see "Installing the **rs_info** utility in a Linux system or Linux virtual machine" on page 253.

Installing the rs_info utility in an AIX system or an AIX logical partition:

Learn how to install the **rs_info** utility in an AIX system or an AIX logical partition.

The **rs_info** utility is installed by using the Rational Portfolio Manager (RPM) device driver. For instructions to install the device driver in an AIX system or an AIX logical partition, see "Installing the device driver in an AIX system or logical partition" on page 248.

Installing the `rs_info` utility in a Linux system or Linux virtual machine:

Learn to install the **`rs_info`** utility in a Linux virtual machine (VM).

The **`rs_info`** is installed by using the **`rsxx-utils`** package from the Yum repository.

To install the **`rsxx-utils`** package, complete the following steps:
1. Log in as root user.
2. On the command line of the Linux session, type `yum install rsxx-utils` and then press Enter.
   The following screen is displayed:

```
Loaded plugins: refresh-packagekit, security

Setting up Install Process

Resolving Dependencies

--> Running transaction check

 ---> Package rsxx-utils.ppc64 0:4.0.2.2487-1.el6 will be installed

--> Finished Dependency Resolution


Dependencies Resolved


================================================================================

Package          Arch      Version             Repository        Size

================================================================================

Installing:

rsxx-utils       ppc64     4.0.2.2487-1.el6    IBM_Power_Tools   330 k


Transaction Summary

================================================================================

Install      1 Package(s)


Total download size: 330 k

Installed size: 741 k

Is this ok [y/N]:
```

3. Press Y, and then press Enter.
   The following screen is displayed, which indicates that the installation of the **`rsxx-utils`** package is complete:

```
Is this ok [y/N]: y

Downloading Packages:

rsxx-utils-4.0.2.2487-1.el6.ppc64.rpm                    | 330 kB    00:00

Running rpm_check_debug

Running Transaction Test

Transaction Test Succeeded

Running Transaction

Installing : rsxx-utils-4.0.2.2487-1.el6.ppc64                      1/1

Verifying  : rsxx-utils-4.0.2.2487-1.el6.ppc64                      1/1


Installed:

rsxx-utils.ppc64 0:4.0.2.2487-1.el6


Complete!
```

Next, you can verify whether the **rs_info** utility has installed correctly. For instructions, see "Verifying whether the **rs_info** utility is installed in a Linux system or Linux virtual machine" on page 252.

You can also run the **rs_info** command to view the details of the IBM Flash adapters that are available in the system. For instructions, see "Running the **rs_info** utility in a Linux system or Linux virtual machine" on page 257.

Running the rs_info utility in an AIX system or an AIX logical partition:

Learn to run the **rs_info** utility in an AIX system or an AIX logical partition and understand the output.

The **rs_info** utility can be run on the PCIe Flash Storage adapters that are available in an AIX system or an AIX logical partition, but do not work on defined storage adapters.

To identify the available storage adapters and then run the **rs_info** utility, complete the following steps:
1. Run the following command to determine the available storage adapters:

   lsdev -Cc disk | grep "Flash Adapter"

   An output similar to the following screen is displayed, which shows the available disks:

   ```
   # lsdev -Cc disk | grep "Flash Adapter"

   hdisk1 Defined    07-00-01 IBM Flash Adapter Disk

   hdisk2 Available 07-00-01 IBM Flash Adapter Disk

   hdisk3 Defined    08-00-01 IBM Flash Adapter Disk
   ```

   Where, hdisk2 is the only available IBM Flash Adapter.
2. To run the **rs_info** utility on the available storage adapter, run the following command:

   /usr/lpp/diagnostics/bin/rs_info

   An output similar to the following screen is displayed, which shows the available disks:

```
# /opt/freeware/bin/rs_info

Please choose from the following or 'all':

1) /dev/hdisk1

2) /dev/hdisk2

3) /dev/hdisk3

?
```

Where, `hdisk2` is the only available IBM Flash adapter.

3. Select the number that is associated with the disk for which you want to run the **rs_info** utility, or enter `all` if you want to select all the IBM Flash Adapters that are available to the system. If you select 2 an output similar to the following screen is displayed:

```
/dev/rsxx0

Device File: /dev/rsxx0

Part Number: 00AF044

FRU Number: 00AF045

CCIN: 578A

EC: H48566L

Firmware Level: 07_08768

Serial: YL10WP0R1EE4

Aux Serial: N/A

Card State: Good

Presented Capacity: 901939986432 Bytes

Physical Capacity: 1374389534720 Bytes

Board Temperature: 41.5 *C

Board Current: 01.555A

Board Voltage: 12.350V

Board Power: 19.204W

Capacitor Voltage: 09.229V

Powerloss Protection: True

Total Board Runtime: 216:10:11:20

Flash Type: Toshiba eMLC 256 Gb

Flash Page Size: 8192 Bytes

Flash Sector Size: 4096 Bytes

Flash Health State: Good

Flash Health %: 98%

Flash Wear Health: 100%

Bad Planes FPGA 0: 0

Bad Planes FPGA 1: 0

Bad Planes FPGA 2: 0

Bad Planes FPGA 3: 0

Factory Bad Blocks: 2222

Runtime Bad Blocks: 843

Total Bad Blocks: 3065

Flash User Writes (4k): 9730409781

Flash Moves (4k): 4629735275

Flash Total Writes (4k): 15955716728
```

For information about the fields that are displayed in the output, see "The **rs_info** utility fields" on page 259.

Running the rs_info utility in a Linux system or Linux virtual machine:

Learn to run the **rs_info** utility in a Linux system or Linux virtual machine and understand the output.

The **rs_info** utility can be run on the PCIe Flash Storage adapters that are available in the Linux operating system or Linux logical partition, but do not work on defined storage adapters.

To identify the available storage adapters and then run the **rs_info** utility, complete the following steps:

1. Log in as root user.
2. Run the following command:

   /usr/bin/rs_info

   An output similar to the following screen is displayed:

   ```
   # /usr/bin/rs_info

   Please choose from the following or 'all':

   1) /dev/rsxx0

   2) /dev/rsxx1

   ?
   ```

3. Select the number that is associated with the disk for which you want to run the **rs_info** utility, or enter all if you want to select all the IBM Flash Adapters that are available to the system. An output similar to the following screen is displayed:

```
/dev/rsxx0

Device File: /dev/rsxx0

Part Number: 00AF044

FRU Number: 00AF045

CCIN: 578A

EC: H48566L

Firmware Level: 07_08768

Serial: YL10WP0R1EE4

Aux Serial: N/A

Card State: Good

Presented Capacity: 901939986432 Bytes

Physical Capacity: 1374389534720 Bytes

Board Temperature: 41.5 *C

Board Current: 01.555A

Board Voltage: 12.350V

Board Power: 19.204W

Capacitor Voltage: 09.229V

Powerloss Protection: True

Total Board Runtime: 216:10:11:20

Flash Type: Toshiba eMLC 256 Gb

Flash Page Size: 8192 Bytes

Flash Sector Size: 4096 Bytes

Flash Health State: Good

Flash Health %: 98%

Flash Wear Health: 100%

Bad Planes FPGA 0: 0

Bad Planes FPGA 1: 0

Bad Planes FPGA 2: 0

Bad Planes FPGA 3: 0

Factory Bad Blocks: 2222

Runtime Bad Blocks: 843

Total Bad Blocks: 3065

Flash User Writes (4k): 9730409781

Flash Moves (4k): 4629735275

Flash Total Writes (4k): 15955716728
```

For information about the fields that are displayed in the output, see "The **rs_info** utility fields."

The rs_info utility fields:

Find the description and details about the fields that are displayed in the **rs_info** output when the **rs_info** utility is run for the IBM Flash Adapter 90 (PCIe2 0.9TB) installed in the system or virtual machine.

Table 53 provides the description and details of the fields in the **rs_info** utility output.

*Table 53. The **rs_info** utility fields*

Field	Description
Device File	The device file that is assigned by the operating system in which the IBM Flash Adapter is installed.
Part Number	The part number of the IBM Flash Adapters.
FRU Number	The FRU number of the IBM Flash Adapters.
CCIN	The CCIN number of the IBM Flash Adapters.
EC	The EC number of the IBM Flash Adapter.
Firmware Level	The current firmware version that is running on the card.
Serial	The serial number of the IBM Flash Adapter.
Aux Serial	The serial number of the auxiliary boards that are located in the IBM Flash Adapter. There are no auxiliary boards that are located in the IBM Flash Adapter. Therefore, this field is displayed as N/A.
Card State	The state of the card. The different states follow: • Shutdown • Starting • Formatting • Uninitialized • Good • Shutting Down • Fault • Read Only Fault • dStroying • Unknown
Presented Capacity	The capacity as viewed by the operating system.
Physical Capacity	The full capacity of the flash on the IBM Flash Adapter, that is 1.2 Terabyte (TB). The extra 300 GB is used by the Flash adapter when bad flash blocks form in the flash storage, or during Redundant Array of Independent Disks (RAID) protection.
Board Temperature	The temperature on the card.
Board Current®	The current drawn by the card.
Board Voltage	The voltage across the card.
Board Power	The amount of power used on the card.
Capacitor Voltage	The voltage across the capacitors that are located on the card.
Powerloss Protection	Displays True if capacitors are located on the card, and displays as False if capacitors are not located on the card.
Total Board Runtime	The total time for which the card is powered on through out the life of the card.
Flash Type	The specific type of flash that is used on the IBM Flash Adapter.

Table 53. The `rs_info` *utility fields (continued)*

Field	Description
Flash Page Size	The size of each individual page in the flash.
Flash Sector Size	The size of each sector in the flash.
Flash Health State	The represents the health of the flash. The states follow: • Good • Warn
Flash Health %	The reported total health, in percentage, of the flash on the card.
Flash Wear Health	The health of the flash on the card displayed as a percentage.
Bad Planes FPGA X	The number of reported bad planes on field-programmable gate array (FPGA) X.
Factory Bad Blocks	The number of bad blocks that are detected during manufacturing.
Runtime Bad Blocks	The number of bad blocks that occurred during the use of the card.
Total Bad Blocks	The sum of the factory bad blocks and the runtime bad blocks.
Flash User Writes (4k)	The number of writes that are issued from the host.
Flash Moves (4k)	The number of moves (writes) during flashcard garbage-collection.
Flash Total Writes (4k)	The total number of writes to the adapter, including host writes, garbage-collection, moves, and RAID protection.

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.

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

The following list provides references to information about maintaining the rechargeable battery on the SAS adapters for systems or logical partition that run on the AIX, IBM i, or Linux operating systems:

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

• For information about maintaining the rechargeable battery for systems that run on the IBM i 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.

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* in the IBM(r) AIX Information Center.

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*. This guide is available from the SCSI PCI Adapters web page.

To replace the cache battery pack on the 571B adapter using the IBM i operating system, complete the following steps:

Note: To complete this procedure using i, you do not need to power off the system.

1. Ensure that the cache battery pack is in an error state before replacing it. This action will prevent possible data loss by ensuring that all cache data is written to disk before battery replacement. To force the cache battery pack into an error state, do the following steps on the system or partition that is using the 571B:

   a. Be sure that you are signed on to the system with at least service level authority.

   b. On the command line, type `strsst` and press Enter.

   c. On the System Service Tools (SST) Sign On display, type your service tools user ID and service tools password. Press Enter.

   d. On the System Service Tools (SST) display, select **Start a Service Tool**. Press Enter.

   e. On the Start a Service Tool display, select **Hardware Service Manager**. Press Enter.

   f. On the hardware Service Manager display, select **Work with resources containing cache battery packs**. Press Enter.

   g. On the Work with Resources containing Cache Battery Packs display, select **Force battery pack into error state** for the I/O card. Press Enter.

   h. On the Force Battery Packs Into Error State display, verify that the correct I/O adapter has been selected, and press the function key that confirms your choice.

   i. Return to the Work with Resources containing Cache Battery Packs display and select **Display battery information**. Then verify that the **Battery pack can be safely replaced** field indicates yes. If it does not indicate yes, contact your next level of support before continuing this procedure.

2. Remove the 571B from its PCI slot:

3. Replace the cache battery pack by performing the following steps:

CAUTION:
The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C007)

Attention:

- Attach a wrist strap to an unpainted metal surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
- When using a wrist strap, follow all electrical safety procedures. A wrist strap is for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
- If you do not have a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds.

a. Unplug the battery connector **B** from its connector in the adapter. Squeeze the retaining latch while gently pulling on the plug. The plug connects to the board in only one way so that it cannot be inserted incorrectly during the replacement procedure.

b. 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 installed inside of the rivets.

IPHBR502-2
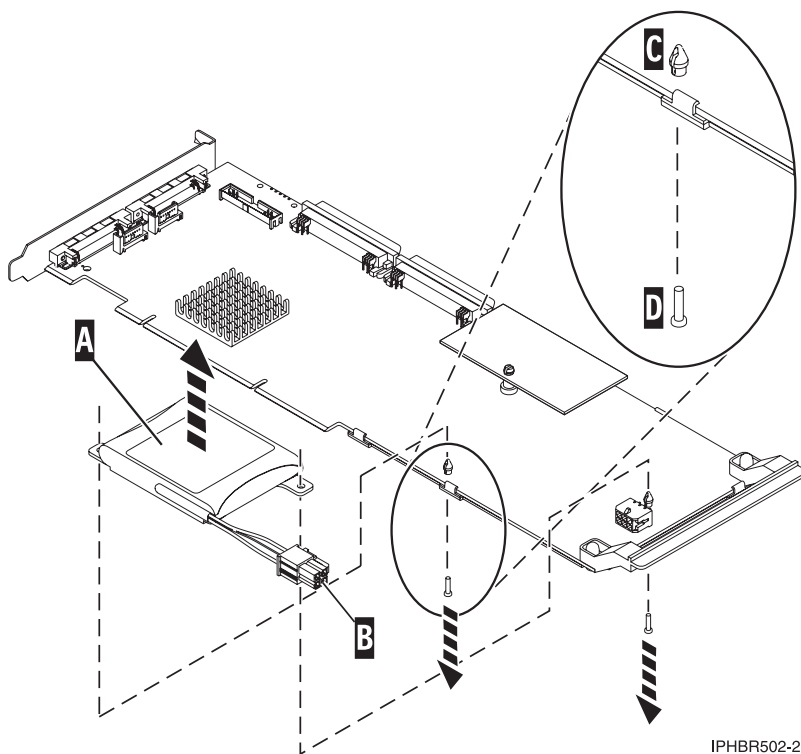
4. Release the push rivets **C** that secure the battery assembly to the adapter, and push the rivets through the back of the adapter. Remove the battery pack **A** from the adapter. If the rivets **C** cannot be pushed through the back of the adapter, go to step 4a.

**Note:** Ensure that the cache battery pack is disconnected for at least 60 seconds before connecting the new battery. This is the minimum amount of time needed for the card to recognize that the battery has been replaced.

If the rivets **C** cannot be pushed through the back of the adapter, follow these steps to push the rivets out 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 the pen (or equivalent) will go around the tip of the rivet, but small enough that it does not slide over the rivet and make contact with the battery assembly bracket.

    b. Slide the card off the edge of the work area just enough so rivet **C** can be pushed 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 push straight down until rivet **C** pushes out.

    d. Repeat Steps 4b and 4c for the other rivet **C**.

    e. Remove the cache battery pack **A** from the adapter.

    f. Turn the adapter over and push the rivets **C** back into the adapter.

5. Install the new battery pack **A** onto the push rivets **C** of the adapter.

6. Reinsert the pins **D** into the rivets on the back of the card.

IPHBR503-2
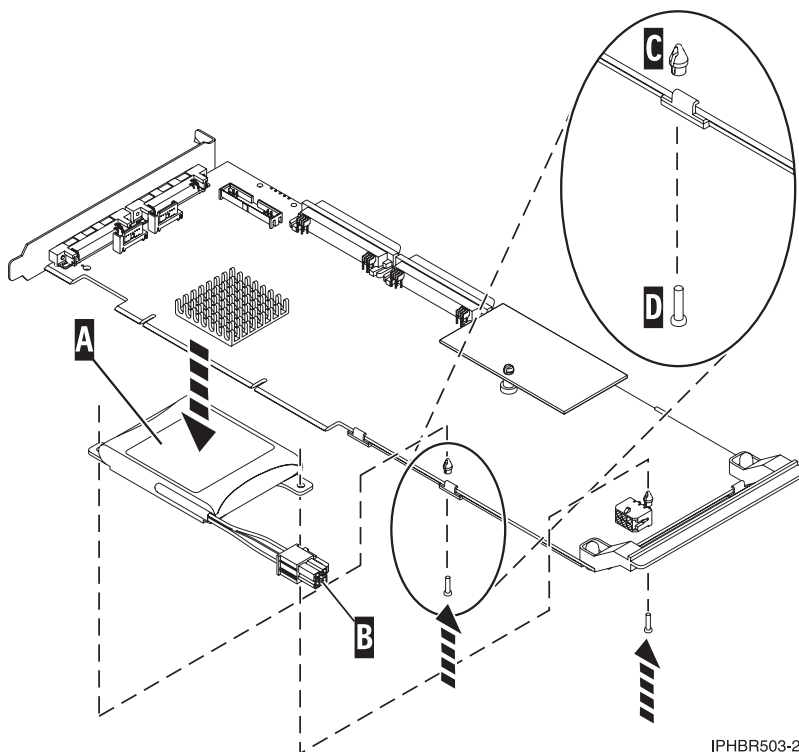
7. Connect the cache battery pack connector **B** to the adapter. The plug connects to the adapter in only one way, so it cannot be inserted incorrectly.

8. Reinstall the adapter.

9. Verify that the part is correctly installed.

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.

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* in the IBM(r) AIX Information Center.

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*. This guide is available from the SCSI PCI Adapters web page.

To replace the 571F adapter or 575B cache battery pack using the IBM i operating system, complete the following procedure:

Note: To complete these procedures, *do not* power off the adapter or power off the system or partition. The cache battery on these adapters is designed to be replaced concurrently.

1. Ensure that the cache battery pack is in an error state before replacing it. This action will prevent possible data loss by ensuring that all cache data is written to disk before battery replacement. To force the cache battery pack into an error state, do the following steps on the system or partition that is using the adapter:

   a. Be sure that you are signed on to the system with at least service level authority.

   b. On the command line, type strsst. Press Enter.

   c. On the System Service Tools (SST) Sign On display, type your service tools user ID and service tools password. Press Enter.

2. Does the system or partition have i Version 5 Release 4 or later?

   - **Yes:** Continue with the next step.

   - **No:** Go to step 4.

3. On the System Service Tools (SST) display, select **Start a Service Tool**. Press Enter.

   a. On the Start a Service Tool display, select **Hardware Service Manager**. Press Enter.

   b. On the hardware Service Manager display, select **Work with resources containing cache battery packs**. Press Enter.

   c. On the Work with Resources containing Cache Battery Packs display, select **Force battery pack into error state for the I/O card**. Press Enter.

d. On the Force Battery Packs Into Error State display, verify that the correct I/O adapter has been selected, and press the function key that confirms your choice.

e. Return to the Work with Resources containing Cache Battery Packs display and select **Display battery information** and verify that the **Battery pack can be safely replaced** field indicates yes. If it does not indicate yes, contact your next level of support before continuing this procedure.

f. Continue with step 5.

4. On the System Service Tools (SST) display, select **Start a Service Tool**. Press Enter.

a. Select **Display/Alter/Dump**.

b. Select **Display/Alter storage**.

c. Select **Licensed Internal Code (LIC) data**.

d. Select **Advanced Analysis**.

e. Select the **BATTERY INFO** command.

f. On the Specify Advanced Analysis Options display, type `-LIST` in the **Options** field. Press Enter.

g. Find and note the resource name of the card you are working with.

   Note: You can safely replace the cache battery pack when the display lists *yes* next to **Battery pack can be safely replaced**.

h. Return to the Specify Advanced Analysis Options display. Type `-Force -IOA` *xxxx* where *xxxx* is the card resource name that you are working with and noted in the previous step. Press Enter.

i. Follow the directions on the display to confirm forcing the cache battery pack into an error state.

j. Return to the Specify Advanced Analysis Options display. Type `-LIST -IOA` *xxxx*, where *xxxx* is the card resource name that you are working with. Press Enter. The **Can be Safely Replaced** field should indicate yes.

5. Replace the cache battery pack by performing the following steps:

   CAUTION:
   The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C007)

   Attention:
   - Attach a wrist strap to an unpainted metal surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
   - When using a wrist strap, follow all electrical safety procedures. A wrist strap is for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
   - If you do not have a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds.

a. Identify the correct adapter.

b. Locate the metal cover **A** that contains the cache battery pack. Pull out the push rivet **B** to release the metal cover **A**.
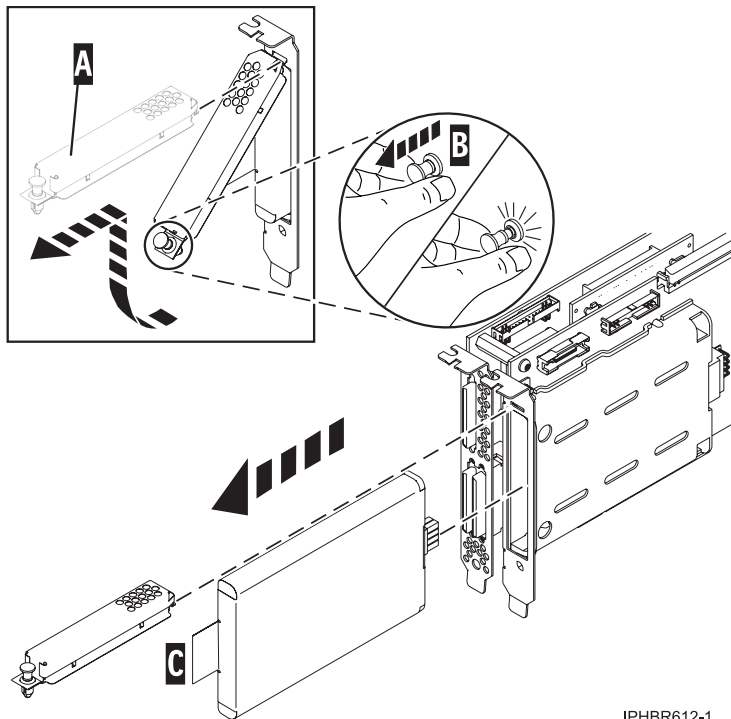
IPHBR612-1

6. Remove the cache battery pack by grasping the tab **C** and removing the battery from the adapter.

7. Install the new cache battery pack into the adapter, ensuring that the cache battery pack is seated correctly in its socket.

8. Replace metal cover **A** and push in on the push rivet **B** to secure the cover.

9. Does the system or partition have IBM i Version 5 Release 4, or later?
   - **Yes:** Continue with the next step.
   - **No:** Go to step 12.

10. Return to the Work with Resources containing Cache Battery Packs display and select the **Start IOA cache**. Press Enter.

11. Verify the `Cache was started` message is received. This ends the procedure.

12. Return to the Specify Advanced Analysis Options display and type `-START -IOA` *xxxx* where *xxxx* is the card resource name that you are working with.

13. Ensure that you get the message `Cache started on IOA`.

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

Learn how to replace the cache battery pack.

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

Feature	CCIN	Description
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.

Notes:
- The 0649 is not supported by the IBM i operating system.
- The 5708 is not supported by the IBM i operating system.

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* in the IBM(r) AIX Information Center.

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*. This guide is available from the SCSI PCI Adapters web page.

Note: To complete these procedures, do not power off the adapter or power off the system or partition. The cache battery on these adapters is designed to be replaced concurrently.
To replace the cache battery pack using the IBM i operating system, complete the following procedure:
1. Ensure that the cache battery pack is in an error state before replacing it. This action will prevent possible data loss by ensuring that all cache data is written to disk before battery replacement. To force the cache battery pack into an error state, do the following steps on the system or partition that is using the adapters:
   a. Be sure that you are signed on to the system with at least service level authority.
   b. On the command line, type strsst. Press Enter.
   c. Type your service tools user ID and service tools password on the System Service Tools (SST) Sign On display. Press Enter.
2. Is the system or partition running have i Version 5 Release 4, or later?
   - **Yes:** Continue with the next step.
   - **No:** Go to step 4.
3. On the System Service Tools (SST) display, select **Start a Service Tool**. Press Enter.
   a. On the Start a Service Tool display, select **Hardware Service Manager**. Press Enter.
   b. On the hardware Service Manager display, select **Work with resources containing cache battery packs**. Press Enter.

c. On the Work with Resources containing Cache Battery Packs display, select **Force battery pack into error state for the I/O card**. Press Enter.

d. On the Force Battery Packs Into Error State display, verify that the correct I/O adapter has been selected and press the function key that confirms your choice.

e. Return to the Work with Resources containing Cache Battery Packs display and select **Display battery information**. Verify that the **Battery pack can be safely replaced** field indicates yes. If it does not indicate yes, contact your next level of support before continuing this procedure.

f. Continue with step 5.

4. On the System Service Tools (SST) display, select **Start a Service Tool**. Press Enter.

a. Select **Display/Alter/Dump**.

b. Select **Display/Alter storage**.

c. Select **Licensed Internal Code (LIC) data**.

d. Select **Advanced Analysis**.

e. Select the **BATTERY INFO** command.

f. On the Specify Advanced Analysis Options display, type -LIST in the **Options** field. Press Enter.

g. Find and note the resource name of the adapter you are working with.

   Note: You can safely replace the cache battery pack when the display lists *yes* next to **Battery pack can be safely replaced**.

h. Return to the Specify Advanced Analysis Options display. Type -Force -IOA *xxxx* where *xxxx* is the card resource name that you are working with and noted in the previous step. Press Enter.

i. Follow the directions on the display to confirm forcing the cache battery pack into an error state.

j. Return to the Specify Advanced Analysis Options display. Type -LIST -IOA *xxxx*, where *xxxx* is the card resource name that you are working with. Press Enter. The **Battery pack can be safely replaced** field indicates yes.

5. Replace the cache battery pack by performing the following steps:

   CAUTION:
   The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C007)

   Attention:

   - Attach a wrist strap to an unpainted metal surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.

   - When using a wrist strap, follow all electrical safety procedures. A wrist strap is for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.

   - If you do not have a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds.

   a. Identify the correct adapter.

   b. Locate the metal cover **A** that contains the battery pack. Pull out the push rivet to release the metal cover **A**.
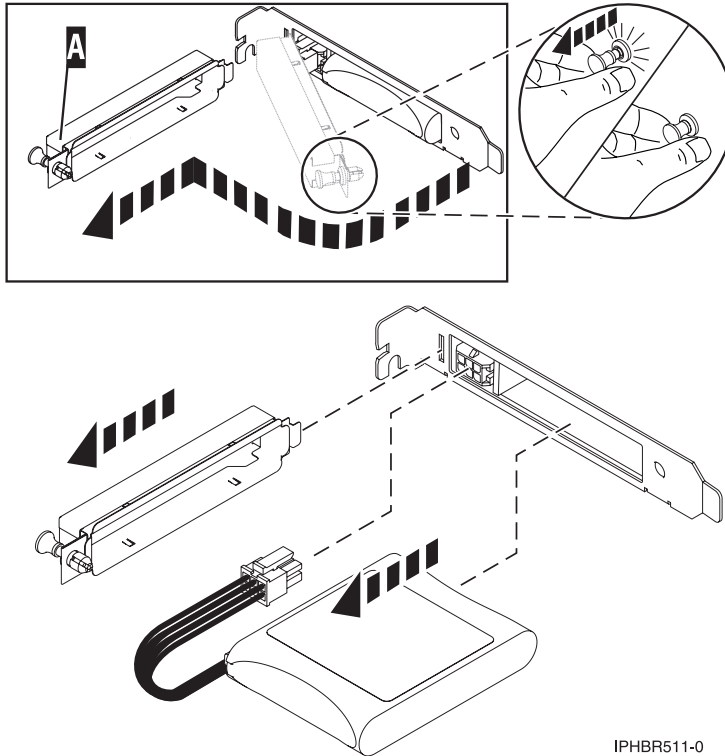
IPHBR511-0

6. Disconnect the plug that connects the cache battery pack and the adapter. Squeeze 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.

7. Remove the cache battery pack by gently pulling it out of the adapter.

8. Install the new cache battery pack.

9. Connect the cache battery pack plug to the card. The plug connects to the card in only one way so that it cannot be inserted incorrectly during the replacement procedure.

10. Replace metal cover **A** and push in the push rivet to secure the cover to the adapter.

11. Does the system or partition have i Version 5 Release 4 or later?
    - **Yes:** Continue with the next step.
    - **No:** Go to step 14.

12. Return to the Work with Resources containing Cache Battery Packs display and select the **Start IOA cache**. Press Enter.

13. Verify the `Cache was started` message is received. This step ends the procedure.

14. Return to the Specify Advanced Analysis Options display and type `-START -IOA` *xxxx* where *xxxx* is the card resource name that you are working with.

15. Ensure that the `Cache started on IOA` message is received.

Replacing a battery pack

Follow these guidelines before you replace the battery pack.

Note: When replacing the cache battery pack, the battery must be disconnected for at least 60 seconds before you connect the new battery. This duration is the minimum amount of time that is needed for the card to recognize that the battery has been replaced.

Note: The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United

States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call.

Attention: To prevent data loss, if the cache battery pack is not already in the error state, follow the steps described in Forcing a rechargeable battery error before proceeding. If the cache data present LED is flashing, do not replace the cache battery pack or data will be lost. See the feature descriptions and the figures in the following sections to determine if your adapter has a cache data present LED and the location of the LED.

Attention: Static electricity can damage this device and your system unit. To avoid damage, keep this device in its antistatic protective bag until you are ready to install it. To reduce the possibility of electrostatic discharge, read the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its antistatic package, touch it to an unpainted metal part of the system unit for at least 2 seconds. (This duration drains static electricity from the package and from your body.)
- Remove the device from its package and install it directly into your system unit without setting it down. If it is necessary to set the device down, place it on its static-protective package. (If your device is a controller, place it component-side up.) Do not place the device on your system unit cover or on a metal table.
- Take additional care when handling devices during cold weather, as heating reduces indoor humidity and increases static electricity.

## Replacing a 572B nonconcurrent maintainable battery pack

Use this procedure to replace the nonconcurrent maintainable battery pack on adapter type CCIN 572B.

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

To replace a nonconcurrent maintainable battery pack, complete the following steps:

1. Remove the controller from the system. See your system documentation for instructions.
2. Place the controller on a surface that is electrostatic-discharge protected.
3. Unplug the battery connector **(B)** from its connector on the adapter, squeezing the retaining latch while gently pulling on the plug. The plug connects to the board in only one way, so it cannot be inserted incorrectly during the replacement procedure.

   Note: Ensure that the cache battery pack is disconnected for at least 60 seconds before connecting the new battery. This duration is the minimum amount of time needed for the adapter to recognize that the battery has been replaced.

AREBJ524-0
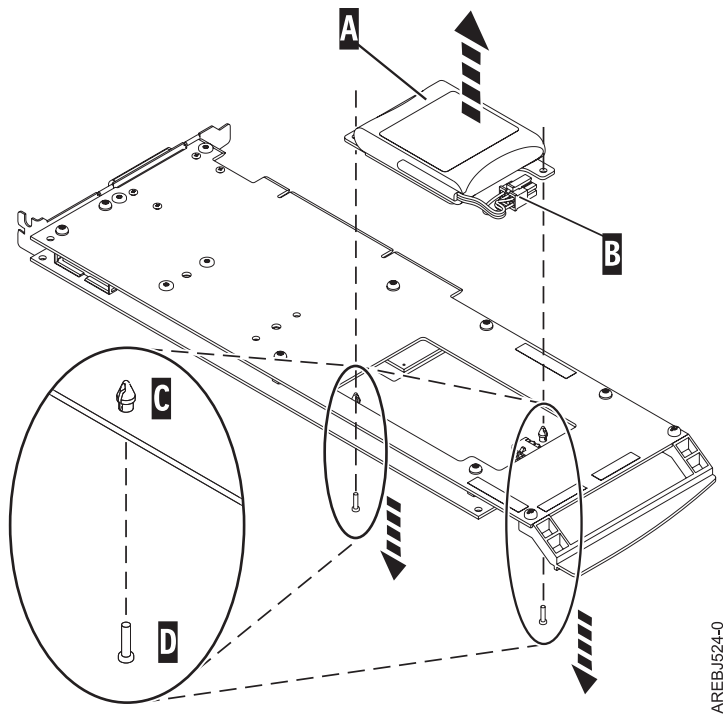
(A) Cache battery pack

(B) Battery connector

(C) Plastic rivet

(D) Plastic pin

Figure 85. Removing the cache battery

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.

Attention: Before you continue 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 260. 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 the cache data is lost. See the feature comparison tables for PCIe and PCI-X cards for the LED details and its location.

To replace a 572F/575C concurrent maintainable battery pack, complete the following steps:

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)**.

(A) Metal cover

(B) Push-rivet

(C) Tab
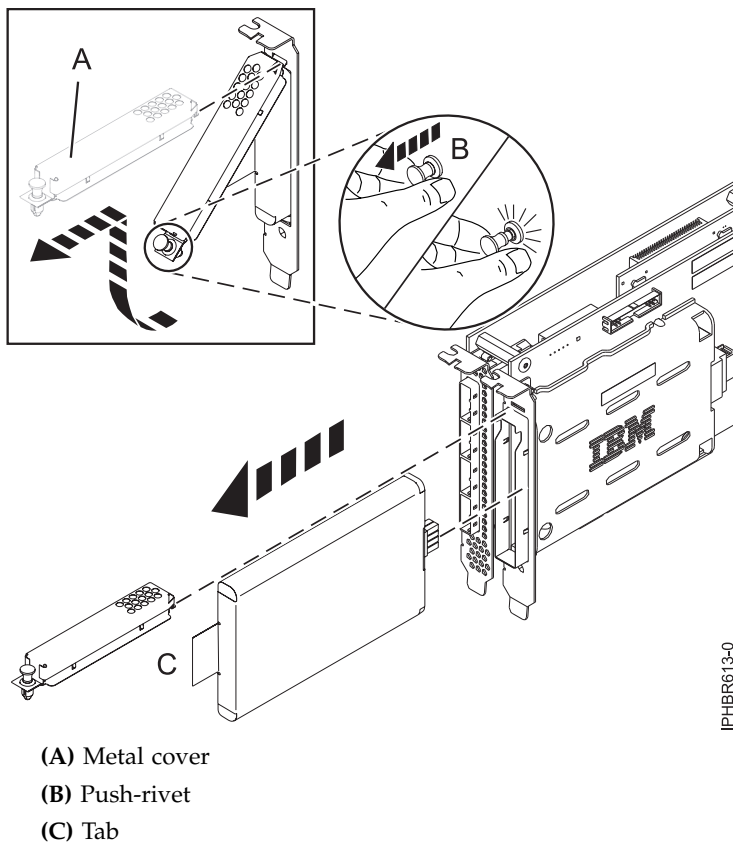
Figure 86. Replacing the 572F/575C cache battery

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 you connect the new battery. This duration is the minimum amount of time that is 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 write cache of the adapter by completing the following steps:

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.

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 260. 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 the cache data is 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.

To replace a 57B7 concurrent maintainable battery pack, complete the following steps:

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 "Maintaining the rechargeable battery on the 57B7, 57CF, 574E, and 572F/575C SAS adapters" on page 260.
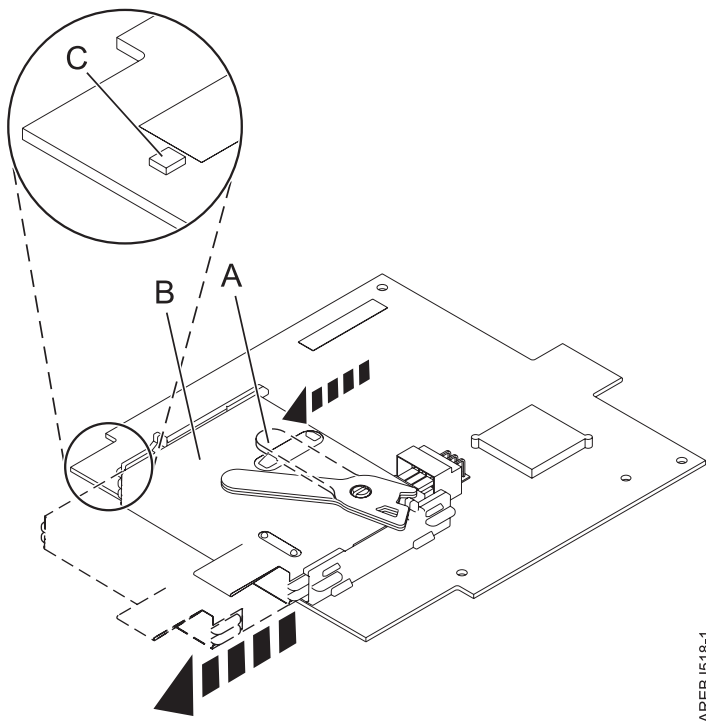
(A) Cache battery lever
(B) Cache battery pack
(C) Cache present LED

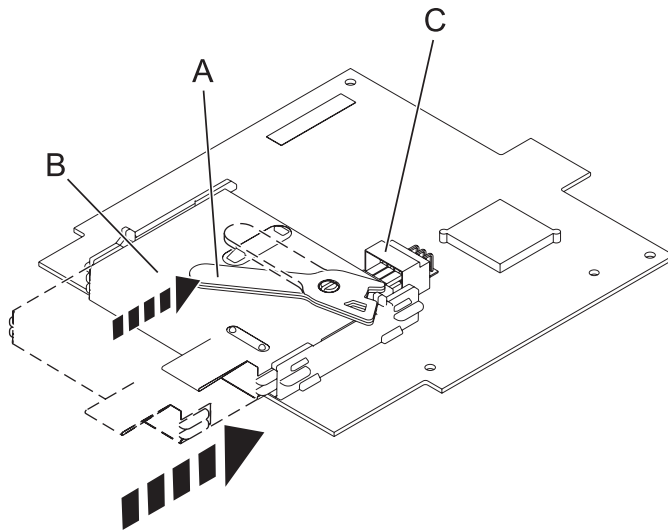*Figure 87. Removing the 57B7 cache battery*

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 you use 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 you connect the new battery. This duration is the minimum amount of time that is 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).

   (A) Cache battery lever
   (B) Cache battery pack
   (C) Cache battery connector

Figure 88. Replacing the 57B7 cache battery

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 write cache of the adapter by completing the following steps:
   a. Navigate to the **IBM SAS Disk Array Manager** by using the steps in Using the Disk Array Manager.
   b. Select **Diagnostics and Recovery** > **Controller Rechargeable Battery Maintenance** > **Start Adapter Cache** Option.
   c. Select the controller with the battery you just replaced and then press **Enter**.

Replacing a 57CF cache battery pack

Learn how to replace the 57CF cache battery pack.

To replace the 57CF cache battery pack, see Removing and replacing the 175 MB cache RAID - dual IOA enablement card cache battery packRemoving and replacing the 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.

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 260. 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.

To replace a 574E concurrent maintainable battery pack, complete the following steps:

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**.

(B) Cache battery pack
(C) Cache data present LED
(D) Cache battery tab
(E) Cache battery tab
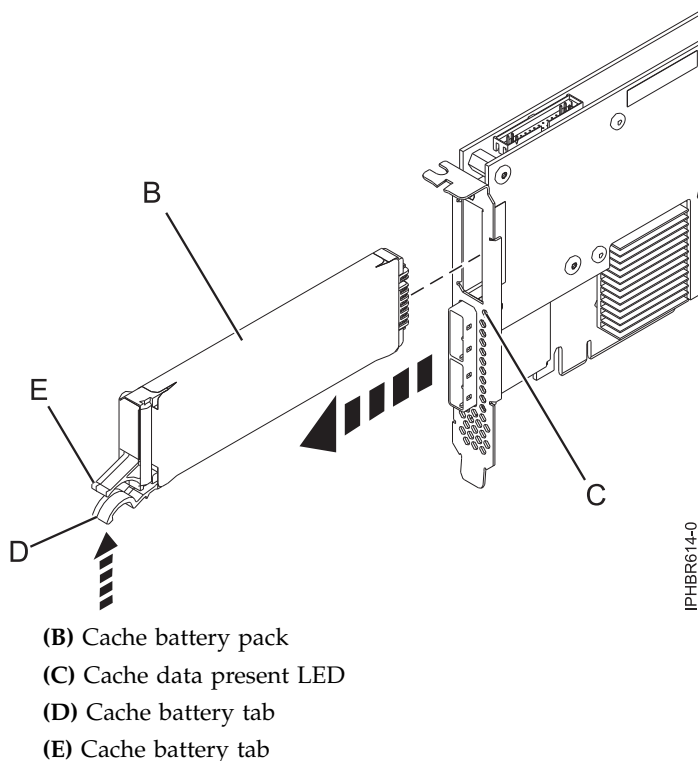
Figure 89. Replacing the 574E cache battery

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 you connect the new battery. This duration is the minimum amount of time that is 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 write cache of the adapter by completing the following steps:
   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.

The following list provide the procedures to display rechargeable battery information in the SAS RAID adapters for the system or logical partition that is running on the AIX, IBM i, or Linux 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 IBM i 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.

If you are installing the AIX operating system at this time, install the adapter before you install the operating system. When you install AIX, the adapter device driver is automatically installed and the following procedure does not apply to your situation.

If you are installing only the device driver for a PCI adapter, perform these steps:
1. Log in to the system unit as root user.
2. Insert the media containing the device driver software (for example, the CD) into the media device. If your system does not have a CD-ROM drive, refer to your system documentation for performing a Network Installation Management (NIM) installation.
3. Type the following System Management Interface Tool (SMIT) fast path command: `smit devinst`.
4. Press Enter. The Install Additional Device Software window highlights the `INPUT device / directory for software` option.
5. Type the name of the input device that you are using, or press F4 to select the input device from a list.
6. Press Enter. The Install Additional Device Software window highlights the `SOFTWARE to install` option.
7. Press F4 to select List.
8. Type / to display the Find window.
9. Type the device package name, and press Enter. The system finds and highlights this device driver software.
10. Press F7 to select the highlighted device driver software, and press Enter. The INSTALL ADDITIONAL DEVICE SOFTWARE window is displayed. The entry fields are automatically updated.
11. Press Enter to accept the information. The ARE YOU SURE window is displayed.
12. Press Enter to accept the information. The COMMAND STATUS window is displayed.
    - The message `RUNNING` is highlighted to indicate that the installation and configuration command is in progress.

- When `RUNNING` changes to `OK`, scroll to the bottom of the page and locate the installation summary.
- After a successful installation, `SUCCESS` displayed in the Result column of the installation summary at the bottom of the page.

13. Remove the installation media from the drive.
14. Press F10 to exit SMIT.

Verifying the AIX device driver software

Learn how to verify the AIX device driver is installed for a PCI adapter.

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

1. If necessary, log in as root user.
2. At the command line, type `lslpp -l devices.`*xxxxxxxxxx* where *xxxxxxxxx* is the device package name.
3. Press Enter.

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

File set	Level	State	Description
Path: /usr/lib/objrepos devices.*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:
IBM Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Tele: +49 7032 15 2941
email: lugi@de.ibm.com

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台灣IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
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Armonk, New York 10504
Tel: 914-499-1900

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IBM Deutschland GmbH
Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 7032 15 2941
email: lugi@de.ibm.com

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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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Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

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Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse B

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Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
IBM Deutschland GmbH
Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 7032 15 2941
email: lugi@de.ibm.com

Generelle Informationen:

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