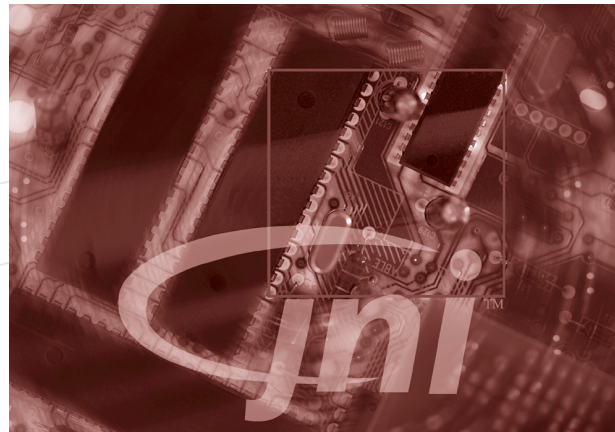


# Installation Guide

FibreStar™ FCI-1063 Host Bus Adapter

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**FCC COMPLIANCE STATEMENT**

**WARNING:** Changes or modifications to this unit not expressly approved by the party responsible for compliance, could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television equipment reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Use a shielded and properly grounded I/O cable and power cable to ensure compliance of this unit to the specified limits of the rules.

This device complies with Part 15 of the FCC rules. Operations is subject to the following two conditions:

- 1) this device may not cause harmful interference, and
- 2) this device must accept any interference received, including interference that may cause undesired operation.

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## 1. HARDWARE INSTALLATION OF THE JNI PCI TO FIBRE CHANNEL HOST BUS ADAPTER



**WARNING:** Electrostatic Discharge (ESD) sensitive material. High voltage may exist inside the PCI platform.

Only persons trained to avoid static discharge should install this card. Be sure that the power cord is disconnected from the machine before removing the cover and installing the card. Installation should be performed with precautions to prevent damage to static-sensitive components. Do not force the card into the PCI slot.

For Customer Service, please contact your distributor.

For PCI card installation, follow the instructions corresponding to your server.

### 1.1 Installing the Adapter

#### *Ultra 30*

1. Turn off computer.
2. Unplug power cord to computer.
3. Remove computer cover according to manufacturer's manual.
4. Locate an empty PCI slot. There are four PCI slots on the Ultra 30. The first slot (closest to top) is a 3.3 volt slot. The other three are 5 volt PCI slots. **The JNI Fibre Channel adapter card will only fit in the bottom three 5- volt slots.**
5. Unscrew and take off PCI Bus backplate. Retain screws.
6. Position adapter card with Fibre Channel connector facing toward open PCI slot.
7. Hold adapter card evenly, pushing down into PCI slot.
8. After pushing **PCI** card into slot, replace screws and tighten. **(This step ensures a reliable connection between adapter contacts and PCI connector.)**
9. Replace the computer cover.

#### *Ultra Enterprise 3000-6000*

1. Remove PCI tray from the server.
2. Remove slot cover. Retain screws.
3. Insert JNI adapter card and plug into PCI connector.
4. Using the retained screws, tighten adapter card to rear plate. **(This step ensures a reliable connection between adapter contacts and PCI connector.)**
5. Reinstall tray into server

*Ultra Enterprise 10000*

1. Remove PCI system board from the server. Remove cover from the system board.
2. Remove slot cover. Retain screws.
3. Insert JNI adapter card into open PCI connector.
4. Using the retained screws, tighten adapter card to rear plate. **(This step ensures a reliable connection between adapter contacts and PCI connector.)**
5. Replace the PCI system board cover and reinstall screws. Reinstall into server.

**1.2 Connection**

After plugging the adapter card into the PCI chassis, the optical or copper fiber may be attached. If a copper adapter is used, the cable should be plugged into the 9 pin connector (Figure 1). If an optical adapter is used, the optical cables should be plugged into the two-port keyed optical SC Fibre Channel (FC) connector. The receiver port is marked RX, and the transmitter port is marked TX (see Figure 2). The orientation depends on the card type.

Figure 1

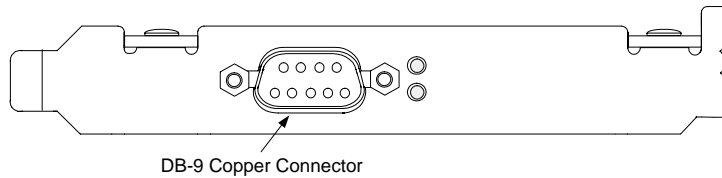
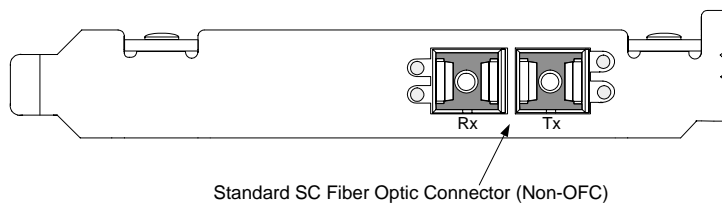


Figure 2



### ***1.2.1 Loopback***

For stand-alone installation in loopback testing mode, connect the card's transmitter port to its receiver port.

### ***1.2.2 Arbitrated Loop (AL)***

The Fibre Channel arbitrated loop topology allows you to attach up to 127 nodes without hubs and switches. FC-AL is a time-shared, full-bandwidth, distributed topology where each port includes the minimum necessary connection function. Depending on the distance requirements, workstations or servers can be connected to a single disk or a disk loop with either optical fiber or copper media.

### ***1.2.3 Fabric***

In the fabric topology, N\_Ports (Node Ports) are connected to F\_Ports (Fabric ports) on a FC switch. This allows for a large number of devices to be connected together, and provides high throughput, low latency and high availability. Depending on switch vendor support, fabric switches may be interconnected to support up to 16 million-plus N\_Ports on a single network.

**Note:** The `fca-pci` driver loads by default as an NL\_Port. To connect to a fabric, you must set the `fca_nport =1` in the `fca-pci.conf` file.

In Solaris, edit the `fca-pci.conf` file in the `/kernel/drv` directory.

Configuration flag `fca_nport` is a Boolean Type value. The default is 0 (false). If false (0), `fca` initializes on a loop. If true (1), `fca` initializes as an N\_Port and fabric operation is enabled. The parameter looks like this:

```
fca_nport=1;
```





## 2. COMBINED SCSI-IP HOST BUS ADAPTER DRIVER

This section describes the installation and verification of the combined SCSI-IP Host Bus Adapter driver for the JNI PCI-to-Fibre Channel Adapter. The name of this driver is `fca-pci`.

### 2.1 Installation

Install the adapter card according to the Hardware Installation instructions in section 1.1.

Reboot the workstation. Login as `root`.

The presence of the PCI card may either be verified by typing

```
prtconf -v | grep pci1242
```

or

```
prtconf -v | grep fibre
```

The response is either

```
pci1242,4643      instance # (this number will vary by adapter)
```

or

```
fibre-channel,  instance #
```

### 2.2 Software Installation

This package installs a combined SCSI and IP driver. Any existing driver with the same name must be removed with `pkgrm` (see section 2.5 – software removal) and the system must be rebooted before adding any of these drivers. To determine whether a previous version of the driver has been installed, type

```
pkginfo | grep JNI
```

Add the software package from the CD-ROM. Login as `root`. Use the following command:

```
/usr/sbin/pkgadd -d /cdrom/jni/Solaris/PCI/combined/fca-pci.pkg
```

Driver updates may be obtained from our web site. With web-based driver updates, copy the `fca-pci.pkg` to any directory (`~/dir`) and execute:

```
/usr/sbin/pkgadd -d ~/dir/fca-pci.pkg
```

Verify the package installation with the command:

```
/usr/sbin/pkginfo | grep JNI
```

### 2.3 SCSI Operation

At this point the operating system recognizes the JNI adapter card, but not the target drives. To configure the Fibre Channel drive, use the commands:

```
drvconfig  
disks
```

Verify the presence of the adapter card as a controller, and the attached disks with the `format` command:

```
format
```

Response should be:

```
AVAILABLE DISK SELECTIONS:  
c0t3d0 < SUN ..... etc  
c1t1d0 <SEAGATE ... etc  
(choose 1, then quit from the format menu).
```

If the drives are not present, it may be necessary to halt and perform a `boot -r`.

**Note:** Only targets which were present in the file `/kernel/drv/sd.conf` during boot will be found. If you need to add targets and/or LUNs which are not in this file, you must edit `/kernel/drv/sd.conf`, then halt and `boot -r`.

All UNIX commands for disk drives are now available for the adapter card and attached SCSI disk. To create a file system on the Fibre Channel drive use the `newfs` command:

```
newfs /dev/rdisk/cWtXdYsZ  
(W = Controller, X=target, Y=lun, Z=slice)
```

To mount the disk as a file system, use the following commands  
(as root in the / **directory**):

```
mkdir dirname  
mount -F ufs /dev/dsk/cWtXdYsZ /dirname
```

verify with:

```
df -k
```

## 2.4 IP Operation

To create a Fibre Channel network you must configure a network interface on each host and define the network nodes. For the purpose of demonstration, we will name ours “mars” and “pluto”.

### 2.4.1 Configure The Interface

On the workstation **mars** create a file in the **/etc** directory named

```
hostname.fca-pci0
```

The file contains the host name associated with the Fibre Channel network:

```
fibermars
```

Add an entry to the **/etc/hosts** file for the host name with an appropriate IP address. The network will be configured when the workstation is rebooted (See section 2.4.2 “Define the network” below). It can be interactively configured using the following command:

```
/usr/sbin/ifconfig fca-pci0 plumb fibermars up
```

Similarly on workstation **pluto** create **/etc/hostname.fca-pci0** which contains the name

```
fiberpluto
```

Reboot the workstation, or issue the **ifconfig** commands (see above).

### ***2.4.2 Define the Network***

Modify the `/etc/hosts` file by adding entries for the Fibre Channel network. As an example, assume the current ethernet network consists of two workstations named **mars** and **pluto**. The `/etc/hosts` files on both workstations contain the following entries:

```
199.40.25.01 mars
199.40.25.02 pluto
```

Create the Fibre Channel network by adding two new entries in the `/etc/host` file on both workstations (choose IP address which will designate a different subnet for the Fibre Channel interface):

```
199.40.65.01 fibermars
199.40.65.02 fiberpluto
```

### ***2.5 Software Removal***

The software may be removed with the `pkgrm` command:

```
/usr/sbin/pkgrm JNIfcaPCI
```

The driver will not be removed until the system is halted. An error message from `pkgrm` will be:

```
Device busy
Cannot unload module: fca-pci
Will be unloaded upon reboot.
```

### 3 TROUBLESHOOTING / FAQ

*The drives were not added*

Perform `drvconfig` and `disks` command.

Check the file `/kernel/drv/sd.conf`. This file determines the targets and LUNs the target drive will probe for. If the targets/LUNs you are attaching do not appear, edit the file and add them. Perform a `boot-r`.

*When I install the JNI PCI adapter, I cannot see it with the `show-sbus` or `show-devs` command.*

Verify that the adapter is properly seated, then turn power on.

Check the probe-list by typing in the command `printenv` and look for the OpenBoot parameters `pci-probe-list`.

Two columns should appear. The first column displays the slots on the computer that are being probed. The second column displays all possible slots to be probed. Compare the two columns and locate the slot that is not being probed. Enter slot into the probe list. Use the command:

```
setenv pci-probe-list = (NNNN)
```

to reset the probe list to include the slot. “NNNN” represents all slots to be probed.

Make sure the PCI adapter is in the correct slot. It must be 33MHz, 5volt and 2.1 PCI compliant.

*When I perform the `pkgadd -d JNINNN.pkg` command, the installation fails.*

Possible reasons:

PCI slot is not in the probe-list ( see above example of adding slot to probe list).

A reconfiguration boot is required. Make sure you halt the system and type in the command `boot -r`.

Make sure you have a stable loopback to the adapter.

*I get an error that the driver fails to initialize.*

Check `fca-pci.conf` for `fca_nport`.

In Solaris view the `fca-pci.conf`. The file is found in the `/kernel/drv` directory.

Type in `more fca-pci.conf`. Verify that the parameter `fca_nport` is correctly set. Remember configuration flag `fca_nport` is a Boolean Type value. The default is 0 (false). If false (0), `fca` initializes on a loop. If true (1), `fca` initializes as an N\_Port and fabric operation is enabled. The parameter looks like this:

```
fca_nport = 0;
```

Drives are not attached or the cables are faulty. You may also receive continuous *Elastic Store* errors from the driver.

*I do not see all my targets and LUNs.*

You must have all targets and LUNs in the `sd.conf` for Solaris to recognize them. The `sd.conf` is found in the `/kernel/drv`. By default you will have targets 0-6 and 7-15 with one LUN under each target. Here is an example of how each line should look:

```
name="sd" class="scsi" target=N lun=0;
```

where N is the target number. The first step is to obtain the target ID (or loop ID) from the array vendor. Enter this number into `sd.conf` with the appropriate number of LUNs. RAIDs are usually configured as one target with multiple

LUNs, and a JBOD (Just a Bunch Of Disks) is typically configured with multiple targets (the number of disks in the JBOD equals the number of available targets). There should be one LUN under each target.

A reconfiguration boot is required after editing the `sd.conf` file before the device is recognized by Solaris.

Link was down when the driver attached to the adapter. In this case verify that you have a proper link (you will receive link down errors if you do not). Type in the Solaris command `drvconfig`. This command goes out and looks for new devices attached to the JNI adapter card(s) (remember that the targets and LUNs must be configured in the `sd.conf` before trying this command). After the `drvconfig` command, you will receive a new prompt. At this prompt, type in the command `disks` and press **Enter**. Verify the presence of the new targets by typing the `format` command.

Disk problems can also affect device recognition.

*After I install the driver and the computer reboots, I receive Target\_Queue full error. What does this mean? How can I fix it?*

The `sd_max_throttle` variable refers to the maximum number of commands the SCSI `sd` driver will attempt to queue to the HBA driver (`fca-pci`). The default value is 256. This variable should be set to a value less than, or equal to the maximum queue depth of each LUN connected to each instance of the `sd` driver (consult your array vendor and ask them “what is the queue depth of this product?”). If `sd_max_throttle` is set at its default you will receive the following error:

```
fca-pci0: fca_highintr: Target Queue Full. Packet Rejected!
```

If you are using version 2.4 of the driver or later, then `sd_max_throttle` need not be reduced. The target driver (`fca-pci`) will respond by single-threading all subsequent I/O, which has a negative impact on performance (when Solaris overloads the target with commands, the target will reject subsequent SCSI commands because its internal queues will register as full. The Solaris response will be to only send one command at a time — which in turn lowers performance). The variable is set in the `/etc/system` file as:

```
set  sd:sd_max_throttle = nnn    (NNN being the Queue depth or  
the target)
```

There are a couple of ways to fix this problem:

- 1) Consult the storage hardware vendor and ask “what is the maximum Queue depth of this product?” Enter this value into the /etc/system file.
- 2) Download the latest JNI driver 2.4. This driver fixes the Queue Full error condition.

*I cannot see my targets over a switch.*

Check to make sure the cables are correctly plugged in and that there is a link on the switch.

Make sure in the configuration file (**fca-pci.conf**) the parameter **fca\_nport** is set to 1.

Example

```
# Configuration flag fca_nport
# Type: Boolean; default: 0 (false)
# If false (0), then fca initializes on a loop
# If true (1), then fca initializes as an N_Port
#   and fabric operation is enabled
fca_nport = 1;
```

*Which driver do I use with the card?*

**fca-pci.pkg** is the SCSI driver package used in Solaris with the JNI 32-Bit PCI adapter



*How do I select the JNI adapter card?*

You cannot select the JNI adapter card because the adapter contains no firmware. To view the adapter's properties, type in a `show-devs` command to determine the location of your adapter (remember you are looking for 1242,4643 or Fibre Channel). Next you'll need to `cd` to the directory where the JNI adapter card is located. Once you `cd` to the directory, type in the command `.properties`. Make sure you set the OpenBoot parameter `auto-boot` to **false**. Remember that you must be connected to a device or have a loopback plugged into the adapter before you can view the adapter properties. Here is an example of setting the parameter:

```
setenv auto-boot? False (After setting the parameter you must power
cycle the computer.)
```

\*Remember that you must be connected to a device or have a loopback plugged into the adapter before you will be able to select the adapter.

After setting this parameter, power cycle the computer. After the computer boots into the OpenBoot, select the JNI adapter you want. Example:

```
/pci/pci@1/fibre-channel/@1,3
```

This is the hardware address to the device, `printenv` will give you the address.

\*If you are unable to select the adapter you may have to issue the reset command.

*What basic test can I run before installing the driver?*

```
show-devs –determines if the Open Boot can recognize the JNI adapter card.
```

*How do I improve performance with the JNI adapter?*

To improve performance with the JNI adapter, you will need to edit the system file. The system file is located in the `/etc` directory. The two parameters you need to edit are the `sd_max_throttle` and the `maxphys`.

**maxphys**

The system variable **maxphys** determines the maximum number of bytes that can be transferred per SCSI transaction. This variable is set in the `/etc/system` file as

```
set      maxphys = nnn
```

The default value is 126976. If a request size exceeds this, the read or write will be broken up into more than one request - each not exceeding the default. To achieve maximum bandwidth,

```
set maxphys to 8 Meg (8388608).
```

**sd\_max\_throttle**

The **sd\_max\_throttle** variable is the maximum number of commands that the SCSI sd driver will attempt to queue to the HBA driver (fca-pci). The default value is 256. This variable should be set to a value less than or equal to the maximum queue depth of each LUN connected to each instance of the **sd driver**. If this is not done, then commands may be rejected because of a full queue condition. The variable is set in the `/etc/system` file as

```
set      sd:sd_max_throttle = nnn
```

#### **4. STANDARD WARRANTY**

JNI Corporation (JNIC) FibreStar™ Fibre Channel adapter cards are warranted against defects in material and workmanship for a period of three (3) years from the date of shipment. FibreStar software (drivers, firmware, and utilities) is warranted against media defects for a period of ninety (90) days from shipment date. FibreStar products are warranted to operate in substantial conformance with their respective specifications. JNI will repair or replace, at its option, any FibreStar product if notification of such failure is received within the stated warranty period. This warranty shall not apply to defects resulting from unauthorized modifications, abuse, misuse, or accident, or operation outside environmental specifications. This warranty shall be voided in the event of any attempted repair by an unauthorized repair center.



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