

## 4 Port PCI SATA RAID Controller Adapter Card

PCISATA4R1



\*actual product may vary from photos

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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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# Introduction

Make the jump to Serial ATA performance with a four-port RAID card from StarTech.com. You get four RAID-ready internal Serial ATA ports for your high performance Serial ATA hard drives. Whether you need Striping (RAID 0), Mirroring (RAID 1), or both (RAID 0+1), this card has you covered.

The PCISATA4R1 also supports RAID 1+S (Mirrored-Sparing), which automatically replaces a failed hard drive and rebuilds the system if a booting hard drive fails.

It also includes a low profile bracket for adapting to slimline or small form factor system applications. Plus, guaranteed performance backed by our lifetime warranty and FREE lifetime tech support makes this the perfect upgrade for power users.

## Packaging Contents

- 1 x PCI SATA RAID controller card
- 1 x Low profile bracket
- 1 x Installation CD
- 1 x Instruction Manual

## System Requirements

- An available PCI or PCI-X slot
- Microsoft® Windows® 2000/ XP(32/64-bit)/ 2003 Server(32/64-bit)/ Vista(32/64-bit)/ Server 2008 R2/ 7(32/64-bit)
- An internal SATA cable for each hard drive

# Installation

## Hardware Installation

1. Turn your computer off and any peripherals connected to the computer (ie. Printers, external hard drives, etc.). Unplug the power cable from the rear of the power supply on the back of the computer.
2. Remove the cover from the computer case.
3. Locate an open PCI or PCI-X slot and remove the metal cover plate on the rear of the computer case.
4. Insert the card into the open PCI or PCI-X slot and screw the bracket to the rear of the case.
5. Place the cover back onto the computer.
6. Insert the power cable into the socket on the power supply.

## Driver Installation

### Windows 2000/XP

1. Windows will launch the Add New Hardware Wizard. Click Next.
2. Choose the Search for a suitable driver... option and click Next.
3. Check only the CD-ROM drives option. Ensure the installation CD is inserted in the CD-ROM or other optical drive. Click Next.
4. Windows will display a message stating that "Windows has found a driver for this device". Click Next. Choose Yes or Continue Anyway if you are warned that the driver file has not been digitally signed.
5. Windows will display a message that states "Windows has finished installing software for this device". Click Finish.
6. Windows will continue to detect and install any remaining new devices. If the Add New Hardware Wizard is launched again, repeat steps 1 through 5 from above.

### Windows Vista/7

1. When the Found New Hardware window appears on the screen, click on the "Locate and install drivers software (recommended)" option. If prompted to search online, select the "Don't search online" option.
2. When prompted to insert the disc, insert the Driver CD that came with the card, into your CD/DVD drive and Windows will automatically proceed to search the CD.
3. If a Windows Security dialog window appears, click the "Install this driver software anyway" option to proceed.
4. Once the driver is installed, click the Close button.

## Verifying Your Installation

### Windows 2000/XP to Windows 2000/XP/Vista/7

1. Go to Start > Settings > Control Panel.
2. Double click System.
3. Click the Hardware tab and choose Device Manager.
4. If the card does not appear with a red x or yellow exclamation point (!) next to it, Windows has not detected a problem with the installation and the card should function normally.

# Accessing the RAID BIOS Utility

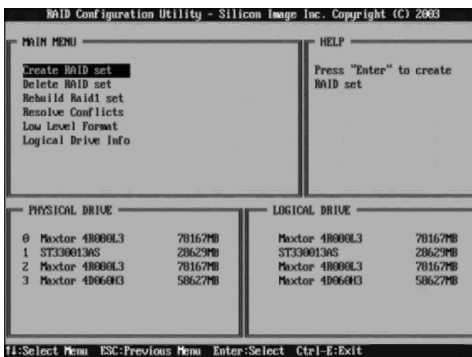
The PCISATA4R1 comes with an integrated BIOS-level configuration utility that allows you to configure the RAID setup, rebuild your array in the event of failure, and resolve conflicts with the arrays you have setup. Once you have installed the card according to the instructions and attached the SATA drives you wish to use with the card, you can then configure the type of array you would like to use.

To enter the configuration utility, press and hold [CTRL] and [S] at the same time (or press [F4]) when you see the following prompt:

```
SII 3114 SATA RAID BIOS Version 5.0.20
Copyright (C) 1997-2003 Silicon Image, Inc.

Press <Ctrl+S> or F4 to enter RAID utility
0 Maxtor 4R000L3 78167 MB
1 ST330013AS 28629 MB
2 Maxtor 4R000L3 78167 MB
3 Maxtor 4R000L3 78167 MB
```

**NOTE:** At least one SATA drive must be installed for you to access the RAID BIOS utility. Once you access the utility, you will be presented with the following menu:



The Main Menu option allows you to carry out various tasks related to configuring and maintaining your RAID. You can navigate the menu using the arrow keys on the keyboard and select an item by pressing [Enter]. The Main Menu options are described below:

#### **Create RAID set:**

Create a RAID for the first time, or change the configuration of an array after deleting a previous setup. For more details and an explanation of the RAID levels available with the card, please see page 6.

#### **Delete RAID set:**

Delete an existing RAID. Depending on your configuration, this may cause data loss or cause the computer to become unbootable. It is highly recommended that you have a complete, good backup available prior to using this option.

#### **Rebuild RAID1 set:**

If a drive has failed in a RAID1 configuration (mirroring), this option allows you to synchronize the data between the new replacement drive and the remaining good hard drive that contains a copy of the data.

#### **Resolve Conflicts:**

If you have installed a drive that was previously used in another array, this option will resolve any metadata conflicts that could cause your array not to function or produce erratic behavior.

#### **Low Level Format:**

This feature completely overwrites the data on the selected drive(s) with zeros; this is essentially a comprehensive deletion tool. This will destroy all data on the drive, including partition information. Ensure you have a complete, good backup before using this option.

#### **Logical Drive Info:**

This displays information on how the logical drive will appear to the computer and the operating system. In all RAID configurations, the drives in your array will appear to be a single physical drive. If you wish, you can partition the logical drive space into multiple partitions using your operating system. For further information, please consult the SATA RAID User's Manual located on the accompanying Drivers disk.

**IMPORTANT:** If you want your computer to boot from your RAID, you must configure your computer's BIOS to use the drives connected to the PCISATA4R1 in your boot sequence. Depending on the options available, you must set your boot sequence to include RAID or SCSI to use the RAID as the boot drive, particularly if you have ATA hard drives connected to the motherboard's IDE controller. Depending on the configuration of the computer, you may not need to make any changes to the BIOS if you do not have any ATA hard drives installed on the onboard IDE controller. Consult your computer or motherboard documentation for more details on including the RAID card in your boot sequence.

## Configuring an Array

When you choose Create a RAID set from the Main Menu of the RAID utility, you will be presented with the following menu:

For each option/RAID level are as follows:

**RAID0:** Also called "disk striping," where multiple physical drives are merged to create a single logical volume.

- **Minimum number of drives:** 2
- **Maximum number of drives:** 4
- **Fault tolerance:** None
- **Performance:** Excellent; improves both read and write performance
- **Other considerations:** None

**RAID1:** Also called "drive mirroring," where a drive has an exact duplicate copy of data maintained on another disk.

- **Minimum number of drives:** 2 (per array)
- **Maximum number of drives:** 2 (per array)
- **Fault tolerance:** Excellent; complete redundancy
- **Performance:** Good; some reduction in write performance
- **Other considerations:** 50% reduction in usable space as the drive containing the mirror is not available to the user; drives must be identical

**RAID10:** Also called RAID 0+1, this is a combination of disk striping (RAID 0) and mirroring (RAID 1). Two disks are striped together in a single volume, with a mirrored striped set for redundancy.

- **Minimum number of drives:** 4
- **Maximum number of drives:** 4
- **Fault tolerance:** Excellent; complete redundancy
- **Performance:** Good; some reduction in write performance
- **Other considerations:** 50% reduction in usable space as the drives containing the mirror is not available to the user; drives must be identical

**SPARE DRIVE:** This is used in conjunction with RAID 1 (mirroring) and allows the computer to keep running in the event of a drive failure without user intervention, even if it is the boot drive that has failed. Also referred to as RAID 1+S.

- **Minimum number of drives:** 1 (requires an associated RAID 1 array)
- **Maximum number of drives:** 1 (requires an associated RAID 1 array)
- **Fault tolerance:** Adds seamless disaster recovery to a RAID 1 configuration
- **Performance:** Not applicable
- **Other considerations:** Drive is not available to the user; drive must be identical to the models used in the associated RAID 1 array

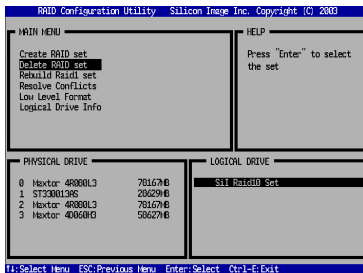


After you select which RAID level you wish to use, you will have to select drives to include in the array. Follow the on-screen prompts to complete the configuration. **Please note:** If you wish to use the RAID 1+S (“spare drive”) option, you must configure a RAID 1 array first.

Deciding which RAID solution to implement has some important implications for the performance of your system and the safety of your data. This is intended as a guide only, so you should investigate the wealth of information available on the Internet or consult with a computer system professional for further assistance in deciding which solution will best meet your needs.

## Deleting a RAID set

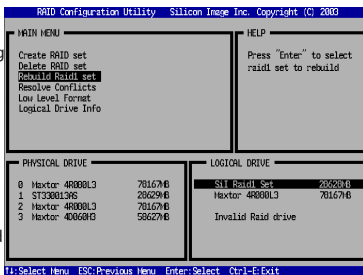
1. To remove one or more RAID sets, select “Delete RAID Set.”
2. Select the desired set and press Enter.
3. When asked “Are You Sure?”, Press ‘Y’.
4. The drives will be returned to the selection of logical drives from which a new RAID set can be created.



## Rebuilding a RAID 1 Set

This menu selection is used to initiate the copying of data from an existing drive to a replacement drive that has been installed in a RAID 1 set after the failure of one of the members.

1. Select “Rebuild RAID1 set.”
2. Select the desired set and press Enter.
3. Press “Y” when asked, “Are You Sure?”
4. The set will be rebuilt. The status of the rebuild is displayed in the MAIN MENU window.



## Resolving Conflicts

When a RAID set is created, the metadata written to the disk includes drive connection information including the channel on the host adapter to which it is connected. If after a disk failure the replacement disk was previously part of a RAID set or used in another system, it may have conflicting metadata, specifically in reference to the drive connection information. If so, this will prohibit the RAID set from being either created or rebuilt. In order for the RAID set to function properly, this old metadata must be first overwritten with the new metadata. To correct this, select "Resolve Conflict" and the correct metadata, including the correct drive connection information, will automatically be written to the replacement disk.

1. Select "Resolve Conflicts" and press Enter.
2. Select the "Conflict" entry in the Logical Drive Status window and press Enter.
3. Note that some conflict resolutions may result in the drive letter assignment changing; for example the RAID set may have been drive D: but after the conflict resolution, it may become drive E:. Be aware of this when performing a conflict resolution. To maintain the same drive lettering, the SATA cables connected to the drives may need to be swapped, or in the case of a SATA-based removable drive unit, the order of the drives within the chassis may need to be changed. Press "Y" to accept the change and resolve the conflict.
4. Once the conflict is resolved, the RAID Set will appear in the Logical Drive window.

## Low Level Formatting

The Low Level Format menu selection allows the complete erasure of data on a hard drive. This is not an action that typically needs to be performed, as formatting the drive under Windows is usually sufficient to prepare the drive for use.

## Logical Drive Information

This menu item allows the display of the assignment of physical drives within a logical set (RAID set, RAID 1 spare, or unassigned). It is a display-only function. Use the up and down arrow keys to scroll between the drives in the Logical Drive Properties window. Press the [ESC] key when done viewing logical drive information.

## Allocating Partitions

After the RAID set(s) have been created, the BIOS reports the new set(s) as a new drive attached to the system. This drive must have a partition defined on it, then the drive must be formatted in preparation for use under Windows. For further information regarding partition management from within your Operating System, please consult the accompanying documentation located on the Drivers CD in the folder entitled SATA Raid\_4Port\Sil3114\Win98\_me\_2000\_xp\_nt4.0\GUI.

# SATAraid GUI Overview

The SATAraid GUI Installation program configures the SATAraid GUI to automatically start when Windows is started. If the SATAraid GUI does not automatically start or is closed by the user, choose the JAVA SATAraid program from the Start Menu to launch the GUI. This section explains how to use the SATARAID5 Manager graphical user interface (GUI) to create and manage RAID groups. Please install the SATARAID5 Manager software as explained in the SATARAID5 Quick Installation Guide located on the accompanying drivers CD in the following path:

**SATAII\3Gbps\_Raid\_4Port\Sil3124\Win XP\_2000\_2003\_NT\GUI**

The SATAraid GUI monitors the system's RAID Set in the background, and runs minimized in the System Tray. To open the main window, click the icon located on the taskbar.

## Devices and Information Windows

The Devices window identifies the computer running SATAraid, SATA host adapters, SATA devices, and configured RAID sets. Selecting each component in the configuration tree displays data that is unique to that component in the Information window. Selecting a specific device channel will show that channel's information. Selecting a specific drive reports all pertinent information for that drive, including the drive's serial number, firmware version, ATA version and current mode as well as Configuration and Disk Identification information. Selecting Sets lists the Sets in the configuration tree and provides information on RIO Version.

Selecting a specific RAID set, such as Set 0, and the type of RAID set, the number of members and capacity will be displayed in the main (tabbed) window.

### Members

Reports the device identification (corresponding with the information in the BIOS) and the state of each device. The State of the "destination" drive that is being rebuilt may report as Rebuild for a long period of time depending on the size of the disk.

### Smart Configuration

Displays SMART and Configuration as well as a selection for automatically adding a hot spare and initiating a rebuild in the event of a fault on a RAID 1 set. Note that the spare drive must have previously been allocated in the RAID BIOS configuration screen.

### Identify Data

Displays data identification

## Event Viewer and Events Windows

The Event Viewer and Events Windows display SATA device-related events that occur while SATAraid is running. Selecting categories in the Event Viewer window applies a filter to the Events window so that only messages of the type selected are displayed. This allows only Warning or Error messages to be seen, for example.

## SATAraid Toolbar and Menu Commands



### 1 - RAID Management

This command allows the management of the RAID sets and drives on the SATA host adapter. It is available only under Windows 2000 and XP.

### 2 - System View

This command displays a graphical representation of the host adapter and RAID sets. Clicking on each of the components and then clicking the Details button will open a new window showing more information on the selected device.

### 3 - Configure SATAraid

This command allows the configuration of the SATAraid program to be viewed and changed. SATAraid configuration is documented in detail in the next section of this manual.

### 4 - Send Configuration

This command allows the SATAraid configuration file to be emailed to the address selected during configuration.

### 5 - Save Configuration

This command allows the SATAraid configuration to be saved.

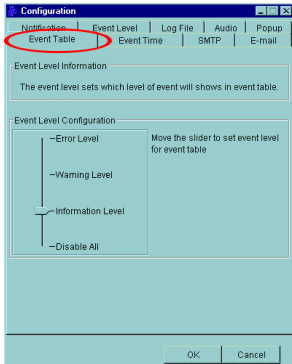
### 6 - Copy Configuration

This command allows the creation of a copy of the SATAraid configuration file.

### 7 - SATAraid Help

This command opens an interactive help dialog using the standard Windows help interface.

# SATAraid Configuration



SATAraid configuration options include customization of the settings for Event Notification, E-mail Notification, Log File, Audio, and Popup. The first tab displayed when SATAraid configuration is opened is for Event Table configuration. This setting determines which events are displayed in the Event Table.

The messages logged for the various settings are as follows:

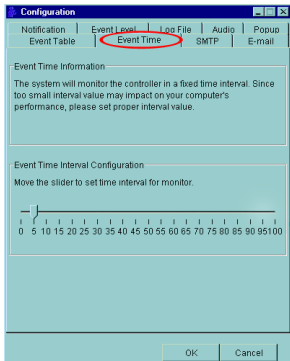
**Error Level** - Errors

**Warning Level** - Warnings, Errors

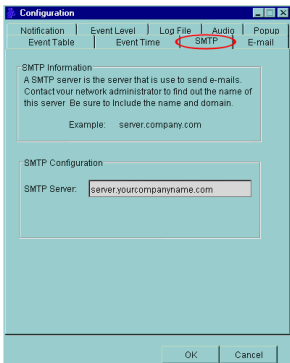
**Information Level** - Informational, Warnings, Errors

**Disable All** - No events will be logged.

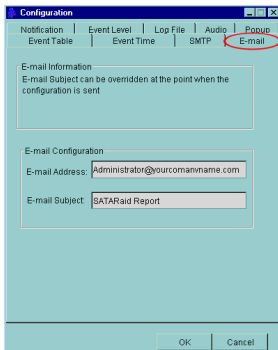
The Event Time tab is used to set the interval time in seconds for the program to poll the status of the host adapter and devices. Lower settings may have an impact on system performance. If the RAID sets are subject to heavy activity, the Event Time interval should be increased.



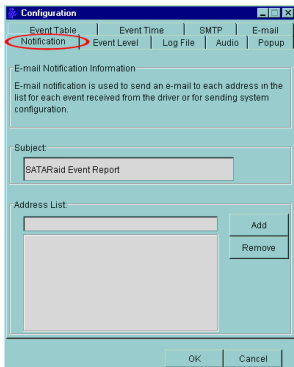
The SMTP tab allows the server name to be set for all SATARaid email-related functions. These include sending of configuration files and automatic notification. This entry must include the full name of the server and the top-level domain, for example mail.mycompany.com or smtp.mymailserver.com. Contact the System Administrator if the name of the SMTP server is not known.



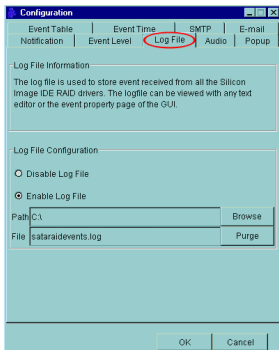
The current SATAraid configuration may be sent via e-mail. This feature is most often used when contacting the system administrator for technical support. Select the E-mail tab in the SATAraid Configuration Menu and enter the default e-mail address and subject line for the party receiving the configuration data. The default address and subject can be overridden prior to sending the email.



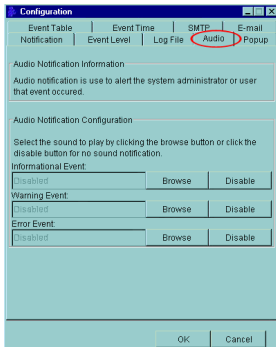
When different types of events occur, SATAraid can send notices to assigned individual e-mail addresses. Select the Notification tab and enter the e-mail addresses of all parties to whom the notices will be sent.



The log file is used to store event information received from all Silicon Image RAID drivers. The log file is a text file and can be viewed with any text viewer (such as Notepad) or with the Event Property page of SATARaid. Use the Log File tab to set location and the desired filename for the log file.



The Audio tab is used to select audio alerts in response to events. Each event can use a different audio alert, and each can be individually disabled.





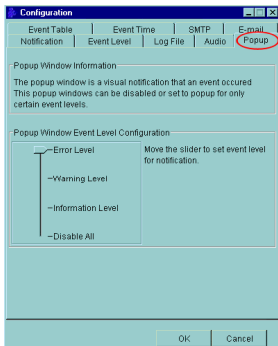
SATAraid can be configured to notify the user of events using messages in popup windows. These alerts can occur separately or in conjunction with audio alerts and email notification. Use the slider control to set the event level for popups to occur:

**Error Level** - The following events will trigger a popup window: Errors

**Warning Level** - The following events will trigger a popup window: Warnings, Errors

**Information Level** - The following events will trigger a popup window: Informational, Warnings, Errors

**Disable All** - No events will trigger a popup window.



# Specifications

<b>Bus Interface</b>	32-bit PCI v2.2 (3.3V/5 V) SATA rev 1.0
<b>Internal Connectors</b>	4 x 7-pin SATA
<b>Chipset</b>	Silicon Image Sil3114R
<b>RAID Modes</b>	RAID 0, 1, 0+1, JBOD
<b>Maximum Data Transfer Rate</b>	150 MBps
<b>LBA Support</b>	48-bit
<b>Compatible Operating Systems</b>	Windows 2000/ XP(32/64-bit)/ 2003 Server(32/64-bit)/ Vista(32/64-bit)/ Server 2008 R2/ 7(32/64-bit)

# Technical Support

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For the latest drivers/software, please visit [www.startech.com/downloads](http://www.startech.com/downloads)

## Warranty Information

This product is backed by a lifetime warranty.

In addition, StarTech.com warrants its products against defects in materials and workmanship for the periods noted, following the initial date of purchase. During this period, the products may be returned for repair, or replacement with equivalent products at our discretion. The warranty covers parts and labor costs only. StarTech.com does not warrant its products from defects or damages arising from misuse, abuse, alteration, or normal wear and tear.

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