

# Thunderbolt™ Product

**ARC-4320T2**

(Thunderbolt 2 to 6Gb/s SAS Adapter)

## **USER'S Manual**

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## **FCC Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

## **Manufacturer's Declaration for CE Certification**

We confirm ARC-4320T2 has been tested and found compliant with the requirements in the council directive relating to the EMC Directive 2004/108/EC. Regarding to the electromagnetic compatibility, the following standards were applied:

EN 55022: 2006, Class B  
EN 61000-3-2: 2006  
EN 61000-3-3: 1995+A1: 2001+A2: 2005

EN 55024:1998+A1:2001=A2:2003  
IEC61000-4-2: 2001  
IEC61000-4-3: 2006  
IEC61000-4-4: 2004  
IEC61000-4-5: 2005  
IEC61000-4-6: 2006  
IEC61000-4-8: 2001  
IEC61000-4-11: 2004

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# INTRODUCTION

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## 1. Introduction

This section presents a brief overview of the Thunderbolt 2 to 6Gb/s SAS expansion adapter, ARC-4320T2 that is combined with ARC-4050T2 and ARC-1320 SAS host adapter.

### 1.1 Overview

#### **Unleash Your Creativity Faster Than Ever**

Thunderbolt 2 is full backward compatibility to the same cables and connectors used with today's Thunderbolt. It pushes speed to 20Gb/s and enables 4K video file transfer and display simultaneously. ARC-4320T2 is equipped with dual Thunderbolt 2 ports for connecting to any Thunderbolt 2-enabled host such as the new Mac Pro, and offers an additional Thunderbolt 2 port for daisy-chaining other peripherals. The Thunderbolt daisy-chaining allows connection of up to six devices, so customers can connect ARC-4320T2 for massive amounts of video storage with a single Thunderbolt connection to their host computer. ARC-4320T2 can meet the demand of users when working with rich, ultra-high resolution media through Thunderbolt 2 interface.

#### **Enabling an Easy-to-Manage SAS Solution**

The ARC-4320T2 SAS expansion adapter is a PCIe 2.0 x8 lanes 6Gb/s SAS bus low profile host adapter inside. The adapters bring the fastest available connections to SAS/SATA storage on any computer, and workstation with Thunderbolt 2 interface. ARC-4320T2 expansion adapter provide a blazing-fast storage connectivity solution with enhanced reliability and performance to support any application and tiered storage solution.

ARC-4320T2 6Gb/s expansion adapter is ideal for large capacity external storage RAID and no-RAID enclosure. ARC-4320T2 6Gb/s SAS expansion adapter is able to connect to SATA and SAS hard disk drives, allowing for tiered storage that optimizes costs and performance. SAS drives are optimal when speed and reliability are of the utmost concern while SATA drives are appropriate when capacity and cost are more important. System integrators

can use the ARC-4320T2 to meet different storage infrastructure applications that support both SAS and SATA devices. API library for customer combines the ARC-4320T2 function code to its monitor utility. Device drivers are also supported for the major operating systems for compatibility with a full range of SAS peripherals including hard disk drives (HDDs), tape drives, tape autoloaders, solid state drives (SSDs) and removable media (DAS/JBOD).

## 1.2 Features

### **Hardware Specification**

- Enables SAS connectivity on systems with a Thunderbolt 2 port
- Support up to 8 SAS Ports
- Up to 6Gb/s transfer rates per SAS port
- Support 1.5, 3.0 and 6 Gb/s SAS and SATA link rates
- Support a maximum 128 SAS/SATA devices using SAS expander
- Dual 20Gbps Thunderbolt 2 ports with DisplayPort and device daisy-chain support
- Thunderbolt cable included
- RoHS compliant

### **Serial Attached SCSI (SAS) 6Gb/s**

- Serial Attached SCSI (SAS-2.0) compliant
- Supports Wide port (Any combination of x1, x2, and 4x)
- Supports Serial SCSI Protocol (SSP)
- Supports SAS Management Protocol (SMP)
- Supports Serial ATA Tunneling Protocol (STP)
- Hot-plug capability
- Staggered spin-up control

### **Easy Management**

- Supports Command Line Interface (CLI)
- API library for customer to write monitor utility
- Enclosure management for external port via SAS expander

# HARDWARE INSTALLATION

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## Product Features

Form Factor	Mini Box
Host Connection	Two 20 Gb/s Thunderbolt Technology Ports
External Ports	2 x 6Gb/s SAS SFF-8088 ports
OS Support	Mac OS X 10.8.5, 10.9 (Mavericks) and later & Windows 7/8
Enclosure Management	Thunderbolt Port
Cooling Fan	1 * noiseless cooling fan
Operating Temperature	0 ~ 35 °C
Operation Humidity	5% ~ 95 %, Non-condensing
Power Supply/In/out	65W / 100-240V AC
Dimension (W x H x D)	4.97 x 2.13 x 6.35 in (150 x 64.4 x 191.7 mm)
Weight	2.64 lbs / 1.2Kg

# HARDWARE INSTALLATION

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## 2. Hardware Installation

This section describes how to install the ARC-4320T2 Thunderbolt 2 to SAS host computer and disks.

### 2.1 Before You First Installing

Thanks for purchasing the ARC-4320T2 as your SAS expansion adapter. The following manual gives simple step-by-step instructions for installing and configuring the ARC-4320T2 SAS expansion adapter.

#### **Unpack**

Unpack and install the hardware in a static-free environment. ARC-4320T2 SAS expansion adapter is packed inside an anti-static bag between two sponge sheets. Remove it and inspect it for damage. If the ARC-4320T2 appears damaged, or if any items of the contents listed below are missing or damaged, please contact your dealer or distributor immediately.

#### **Checklist**

- 1 x ARC-4320T2 SAS expansion adapter
- 1 x Installation CD – containing driver, relative software, an electronic version of this manual and other related manual
- 1 x Thunderbolt cable (1m)
- 1 x Power cord

#### **System Requirements**

- Computer with Thunderbolt connector
- Mac OS X 10.8.5 or higher
- Windows 7&8

“For Windows PC: the Thunderbolt certified device driver must be installed before plugging in the device for it to function properly”

# HARDWARE INSTALLATION

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## 2.2 Summary of ARC-4320T2 Setup Steps

### ● For Mac OS X

Step 1. Physically Install the Hardware (Chapter 2.4.2)

1. Connect power cord.
2. Connect Thunderbolt cable.

Step 2. Install the ArcSAS Software Package (Chapter 2.4.2.1)

1. Download the install\_arcsas installer from the website at "[http://www.areca.com.tw/support/s\\_thunderbolt/4320T2.htm](http://www.areca.com.tw/support/s_thunderbolt/4320T2.htm)".
2. Double-click on the install\_arcsas zipped file.
3. Double-click on the install\_arcsas icon on the Finder.
4. Follow the installer on-screen steps to complete the installation.

Step 3. Format Devices (Chapter 2.4.2.2)

1. Mac OS X recognizes that a new disk is available.
2. Follow the Disk Utility on-screen steps to initialize and partition your unit.
3. Icons for each new partition show up on your desktop.
4. They are now ready to use.

### ● For Windows

Step 1. Physically Install the Hardware (Chapter 2.4.3)

1. Connect power cord.
2. Connect Thunderbolt cable.

Step 2. Install the ArcSAS Driver Package (Chapter 2.4.3.2)

1. Download the arcsas driver from the website at "[http://www.areca.com.tw/support/s\\_thunderbolt/4320T2.htm](http://www.areca.com.tw/support/s_thunderbolt/4320T2.htm)".
2. Follow the steps to complete the installation.

Step 3. Format Devices (Chapter 2.4.3.3)

1. Click "Start" ==> right-click "Computer" and select "Manage".

# HARDWARE INSTALLATION

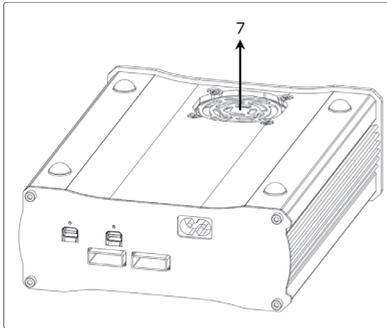
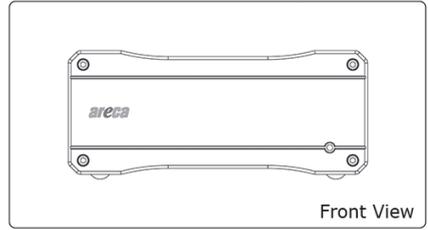
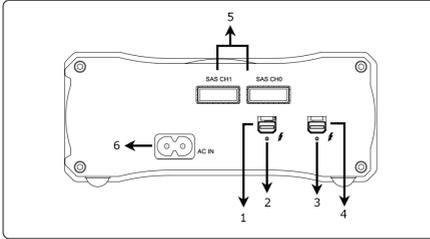
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2. Click "Disk Management" in the left pane.
3. Scroll down to the bottom of the middle pane. Windows will display a list of new drives attached to your system with a label such as "Disk 1" or "Disk 2", etc.
4. Right-click on the drive you want to partition and then again to format it.
5. Once it's formatted, Windows automatically assigns the next available drive letter to it and then it will appear in Windows Explorer.
6. They are now ready to use.

# HARDWARE INSTALLATION

## 2.3 SAS Expansion Adapter Box View

The following diagram is the SAS expansion adapter front view and rear view.



Rear View	
1.	Thunderbolt Port1
2.	Thunderbolt Port1 Link LED
3.	Thunderbolt Port2
4.	Thunderbolt Port2 Link LED
5.	6Gb/s SAS ports
6.	Power Connector
7.	System Fan

The following table describes the ARC-4320T2 SAS expansion adapter Thunderbolt port link LED behavior.

Thunderbolt Ports Link LED	Status
Green light	<ol style="list-style-type: none"> <li>1. Lit indicates SAS expansion adapter is powered and maintained the daisy chain with other Thunderbolt devices.</li> <li>2. Blinking (5 times/sec) that indicates SAS expansion adapter is in sleep mode.</li> <li>3. Blinking (1 time/sec) that indicates SAS expansion adapter is powered down and maintained the daisy chain with other Thunderbolt devices.</li> </ol>
Amber light	There is a proper DisplayPort connection on that Thunderbolt port.
Red light	There is a proper DisplayPort to DVI connection on that Thunderbolt port.

# HARDWARE INSTALLATION

## 2.4 Setting Up SAS Expansion Adapter

Setting up your ARC-4320T2 involves these main steps:

- Physically Install the ARC-4320T2 with JBOD or Drive Box
- Install the ArcSAS Software

Details about these steps are described in the following sections.

### 2.4.1 Physically Install ARC-4320T2 and Drives

Please follow the steps below in order they are given to ensure that your ARC-4320T2 connected on your Thunderbolt computer.

#### Step 1. Installing the JBOD or Drive Box

The following figure shows how to connect the external Mini SAS SFF-8088 cable from the 6Gb/s SAS expansion adapter that has external connectors to the external drive boxes or drive enclosures (please follow the user manual of drive box or enclosure to install disks and cables).

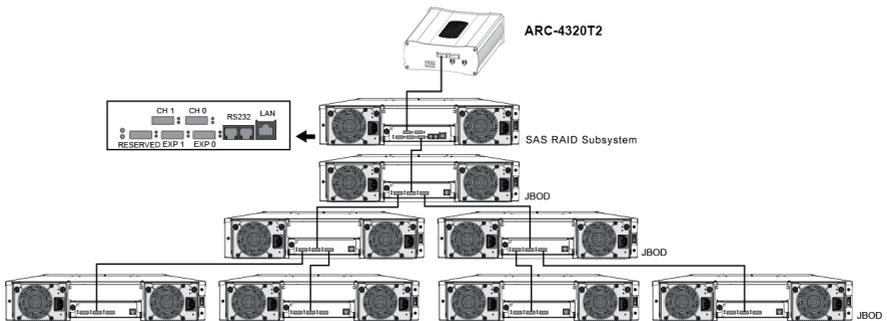


Figure 2-6, External connector to a drive box or drive enclosure

# HARDWARE INSTALLATION

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## Step 2. Connecting Thunderbolt Ports

Thunderbolt connectors are provided on the back of the ARC-4320T2 for connecting the array to Thunderbolt host and next Thunderbolt devices. There are two Thunderbolt connectors on the rear of ARC-4320T2. You can plug-in two host ports.

1. Direct connection to a Thunderbolt technology capable computer.
2. Daisy chaining Thunderbolt capable devices and displays.

### • Thunderbolt Computer Port Connection

By installing Thunderbolt technology capable computer and ARC-4320T2 Thunderbolt port using the Thunderbolt cable which is included in your Thunderbolt capable computer. Then connect ARC-4320T2 and Thunderbolt technology capable computer port as shown below:

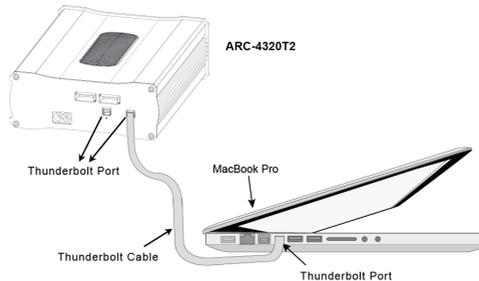


Figure 2-6, Connecting to Thunderbolt computer

### • Daisy Chain Topologies

A single Thunderbolt technology daisy chain can have seven devices, including the computer. Connect the cable to one of the interface ports on the back of your ARC-4320T2 and to your Thunderbolt capable computer. The additional port may be used to daisy chain compatible computer peripherals, such as hard drives, monitors, and much more. A single Thunderbolt port supports hubs as well as a daisy chain of up to seven Thunderbolt devices on, including the Thunderbolt capable computer.

# HARDWARE INSTALLATION

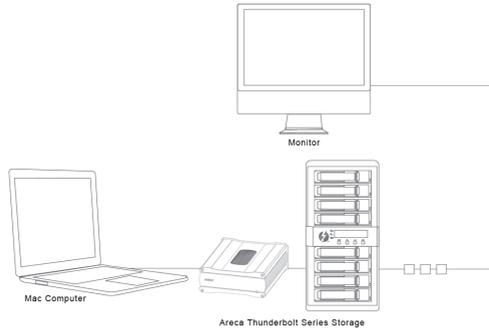


Figure 2-7, Thunderbolt Computer Daisy Chain

## Step 3. Connecting ARC-4320T2 Power

To power the ARC-4320 SAS expansion adapter:

1. Using the included power cord, connect this power cord to a grounded electrical outlet and to the ARC-4320T2.
2. ARC-4320T2 will automatically turn on when host computer power on status is received from the thunderbolt cable.

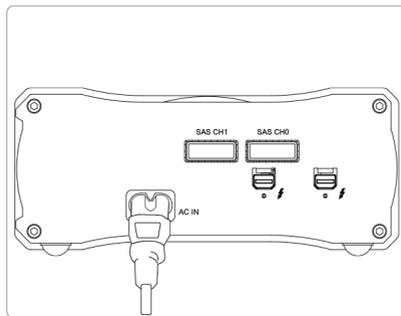


Figure 2-8, Connecting the Power to Adapter

3. ARC-4320T2 automatically turns off when the computer to which it is attached sleeps or is disconnected.

When you are finished installing the ARC-4320T2, you can set up the connected devices.

# HARDWARE INSTALLATION

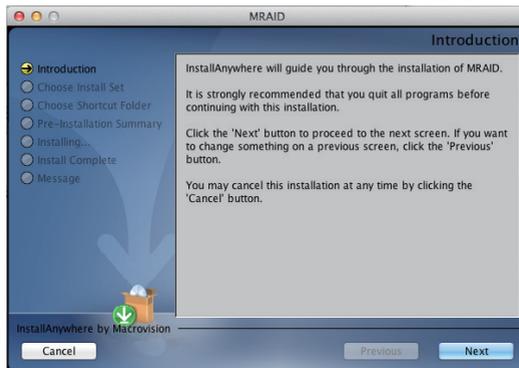
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## 2.4.2 Mac Users

### 2.4.2.1 Install the ArcSAS Software

This section describes detailed instructions for installing the Mac driver & utility for the ARC-4320T2 on your Apple Thunderbolt capable machine. You must have administrative level permissions to install Mac OS X driver & utility. This can be done in just a few steps!

1. Download the install\_arcscas installer from the website at "[http://www.areca.com.tw/support/s\\_thunderbolt/4320T2.htm](http://www.areca.com.tw/support/s_thunderbolt/4320T2.htm)", the file name begins with "install\_arcscas" followed by the version control or insert the ARC-4320T2 software CD in the CD-ROM drive.
2. Double-click on the zipped file that comes from the website or resides at <CDROM>\packages\MacOS to add the installer on the Finder.
3. Launch the installer by double-clicking the install\_arcscas on the Finder. The ArcSAS Installer opens. Click on the "**Next**" button to begin the installation.
4. The ArcSAS Installer opens. Click on the "**Next**" button to begin the installation.



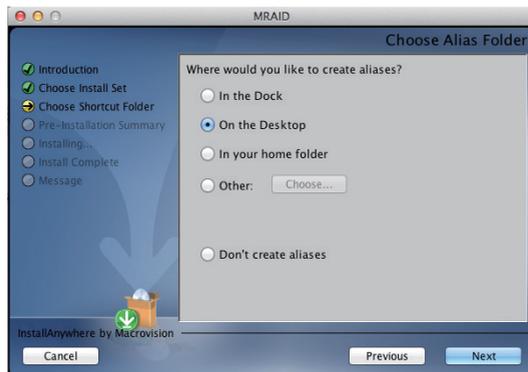
# HARDWARE INSTALLATION

5. On the Choose Install Set screen, click on an icon to install special components and click on the "**Next**" button to continue.



- **Driver** is required for the operating system to be able to interact with the ARC-4320T2 SAS expansion adapter.
- **CLI (Command Line Interface)** provides the functionality available in Host\_BIOS setup manager through a Command Line Interface. You can set up and manage SAS expansion adapter inline. CLI performs many tasks at the command line. For CLI function, please refer to Chapter 3 of the user manual.

6. On the Choose Alias Folder screen, click on an icon to choose where you like to create aliases and click on the "**Next**" button to continue.

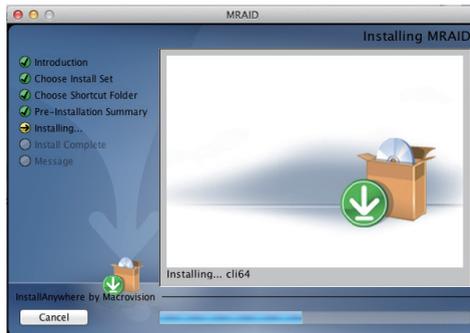


# HARDWARE INSTALLATION

7. On the Pre-Installation Summary screen, review your installation setting and click on the "**Install**" button to continue. If you want to change any of your installation setting, click on the "**Previous**" button.



8. A program bar appears that measures the progress of the driver installation.



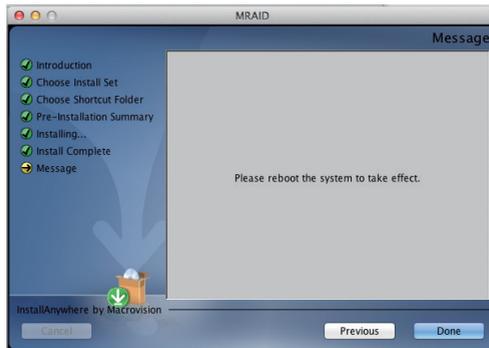
9. When this screen shows, you have completed the driver installation and click on the "**Next**" button to continue.



# HARDWARE INSTALLATION

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10. After installation is completed, click on the "**Done**" button to reboot your computer in order to complete installation.



11. A reboot is required to complete the installation.

There is one "ARCSAS" icon showing on your desktop. Double-click on the "ARCSAS" icon to locate your CLI program file folder.

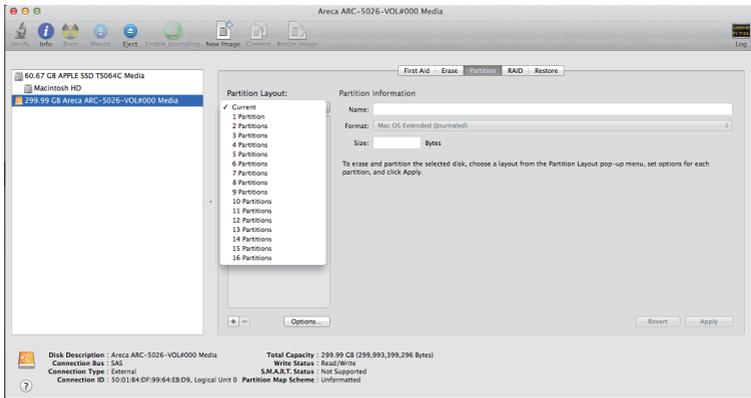
## 2.4.2.2 Format Devices

When you reboot the Mac machine, the Mac OS X recognizes that a new disk is avail, and displays a message asking what you next want to do. If the message does not show up, start the "Disk Utility" manually from the "Finder", use the "Go" menu and open the "Utilities" folder. Double-click on the "Disk Utility" program. Follow the on-screen prompts to create a volume set and to assign a disk drive letter.

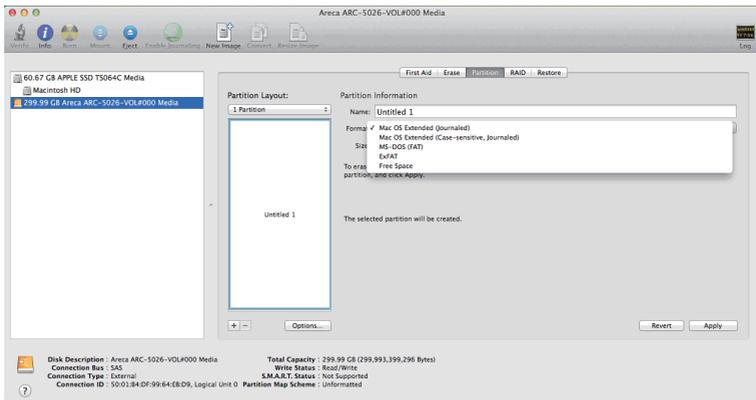
### To initialize and partition your unit

1. When the Disk Utility window opens, find and select the desired drive in the sidebar that represents your SAS host adapter and click on the "**Partition**" button.
2. In the Partition Layout column, click on the "**Current**" to show the drop-down menu and select the number of partitions that you want your SAS host adapter to have. Each partition will appear as a separate drive on your computer.

# HARDWARE INSTALLATION



3. Specify your Partition Information, Option setting and click on the **"Apply"** button.



If you're not sure which format to use, choose Mac OS X Extended (Journaled).

4. When a message asks you to confirm you want to partition the disk, click on the **"Partition"** button. This may take a couple of minutes, depending on the size of the drives in your SAS host adapter. When the partitioning is complete, icons for each new partition show up on your desktop. They are now ready to use.

# HARDWARE INSTALLATION

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## 2.4.3 Windows Users

This chapter describes how to install the ARC-4320T2 device driver to your Windows operation system. The installation procedures use the following terminology:

### **Installing SAS host adapter into an existing operating system**

The computer has an existing operating system installed and the ARC-4320T2 is being installed as a secondary controller.

Have all required system hardware and software components on hand before proceeding with the setup and installation.

Materials required:

- ARC-4320T2 software CD
- ARC-1320 series host adapters

### **2.4.3.1 Creating the Driver Diskettes**

The software CD disc shipped with the ARC-4320T2.

If you do not have the software CD disc with the package, contact your local dealers or you can also download the latest version drivers for Windows 8/Server 2012/7 and Mac Pro from the Areca web site at <http://www.areca.com.tw>

These driver diskettes are intended for use with new operating system installations. For Windows 8/Server 2012/7, you can copy the Windows driver file to USB device and installed from it. Determine the correct kernel version and identify which diskette images contain drivers for that kernel. If the driver file ends in .img, create the appropriate driver diskette using "dd" utility.

### **2.4.3.2 Installing Controller on an Existing Windows**

The ARC-4320T2 can be used with Microsoft Windows 8/Server 2012/7 with StorPort Drivers.

# DRIVER INSTALLATION

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In this scenario, you are installing the controller in an existing Windows system. To install the driver:

1. Follow the instructions in Chapter 2, the Hardware Installation Chapter, to install the controller and connect the disk drives or enclosure.
2. Boot Windows and the OS will recognize the SAS host adapter and launch the "Found New Hardware Wizard", this guides you in installing the SAS host adapter driver.
3. The Windows will pop-up and provide a choice of how to proceed. so that you can choose a specific driver.
4. When the next screen queries the user about utilizing the currently installed driver, click on the "**Have Disk**" button.
5. Insert the SAS host adapter driver media to locate the correct path. Click on the "**Next**" button.
6. Windows automatically copies the appropriate driver files and rebuilds its driver database.
7. The summary screen appears; click on the "**close**" button.
8. Restart the computer to load the new drivers.

After you finish installing device driver, the following steps show how to make any new independent disks accessible to Windows.

- (a). Click "**Start**" = => right-click "**Computer**" and select "**Manage**".
- (b). Click "**Disk Management**" in the left pane.
- (c). Scroll down to the bottom of the middle pane. Windows will display a list of new drives attached to your your system with a label such as "Disk 1" or "Disk 2", etc.
- (d). Right-click on the drive you want to partition and then again to format it.

# DRIVER INSTALLATION

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- (e). Once it's formatted, Windows automatically assigns the next available drive letter to it and then it will appear in Windows Explorer.

## 2.4.3.3 Uninstall Controller from Windows

To remove the SAS host adapter driver from the Windows system, follow the instructions below.

1. Ensure that you have closed all applications and are logged in with administrative rights.
2. Open "Control Panel" and start the "Add/Remove Program" icon and uninstall and software for the SAS host adapter.
3. Go to "Control Panel" and select "System". Select the "Hardware" tab and then click the "Device Manager" button. In device manager, expand the "Storage controllers" section. Right click on the "ARECA(X86-32-STORPORT) SAS 6G PCI Host Adapter" and select "Uninstall".
4. Click **Yes** to confirm removing the SAS host adapter driver. The prompt to restart the system will then be displayed.

# COMMAND LINE INTERFACE

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## 3. CLI Introduction

This Command Line Interface (CLI) is provided for you to configure and manage the Areca SAS host adapter components in Windows and Mac OS X environments. The CLI is useful in environments where a graphical user interface (GUI) is not available. Through the CLI, you perform most of the storage management tasks that you can perform with the Host-BIOS setup manager. With CLI, you can also use the CLI commands in both interactive and non-interactive (script) mode, providing higher level API functionalities. Before using this CLI, we assume that you have already installed your controller in your system. If you have not yet installed SAS host adapter, see chapter 2 Hardware Installation for instructions.

### 3.1 Supported Operating Systems

- Windows: Windows 8/Server 2012/7
- Mac OS X 10.5.5 or Higher

CLI supports both 32-bit and 64-bit versions. Be sure you are installing the correct version.

### 3.2. CLI Installation

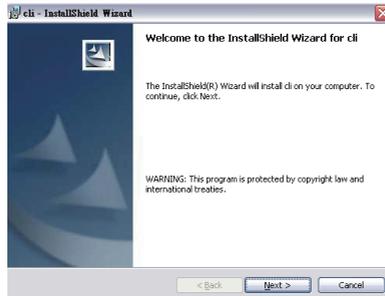
This section describes the procedures for installing Command Line Interface (CLI).

#### 3.2.1 For Windows

Below screen in this section are taken from a Windows/XP installation. If you are running other Windows, your installing screen may look different, but the CLI installation is essentially the same.

1. Insert the SAS host adapters CD in the CD-ROM drive. You also can download the CLI from the website: [www.areca.com.tw](http://www.areca.com.tw)
2. Run the setup.exe file that resides at: <CD-ROM>\CLI\windows\setup.exe on the CD-ROM.

# COMMAND LINE INTERFACE



3. Click on the "Setup" file then the Welcome screen appears. Follow the on-screen prompts to complete CLI installation.
4. A program bar appears that measures the progress of the CLI.



5. When this screen complete, you have completed the CLI software setup.
6. After a successful installation, the setup completed dialog box of the installation program is displayed.



Click the "Finish" button to complete the installation.

# COMMAND LINE INTERFACE

---

## 3.3 Accessing CLI

### 3.3.1 For Windows

This section discusses the methods for accessing the CLI in Windows.

To access the CLI:

1. Right-click on the "Start" menu and choose "Programs".  
Double-click on the "MRAID" program icon to start the CLI utility (From the Start menu, choose Programs > MRAID > CLI).
2. CLI screen appears.

The CLI prompt is displayed in a DOS console window.

### 3.3.2 For Mac

There is one "ARCSAS" icon showing on your desktop. Double click on the "ARCSAS" icon to locate your CLI program file folder. When the system displays the CLI> prompt, which indicates that you can start to use CLI commands.

## 3.4. CLI Command Line Configuration

### 3.4.1 Conventions

You can enter only valid CLI commands at the command line prompt.

All commands use the following syntax:

```
<CMD> [sub-command] [parameters]
```

The CLI syntax uses the following conventions for parameter:

<text> indicates items that you must specify.

[text] the text item within brackets is optional.

< | > indicates an 'or' situation where the user has a choice between more than one option, but only one can be specified.

# COMMAND LINE INTERFACE

---

- < ~ > indicates a range values where the user has a choice between these two values, but only one can be specified.
- < , > comma, indicates a separation between integer value.

## 3.4.2 Working Mode

You can also use the CLI commands in both interactive and non-interactive (script) mode.

- Interactive mode: Entering CLI commands at the main prompt
- Non-interactive mode: As a series of single commands or creating a script file (a multiple commands input)

### 3.4.2.1 Interactive Mode

You can run CLI in interactive mode, entering commands at the main prompt and observing the results on the screen. The examples shown in this CLI manual reflect this interactive mode. To run the CLI in the interactive mode:

1. To enter interactive mode, type CLI and press **Enter**. The main prompt (CLI>) is displayed. This indicates that the CLI program is waiting for a command input.
2. At the CLI prompt, you can input the commands.

Syntax

Set <curctrl=xx>

Parameters

curctrl=xx

Example: CLI > set curctrl=1 [Enter]

Use this command to select the controller 1 on which to perform an action.

### 3.4.2.2 Non-interactive Mode

To run the CLI in a single command, you can use CLI with syntax and parameters, processing a single command at a time. To process it, simply enter the command with syntax and parameters.

# COMMAND LINE INTERFACE

---

Syntax

CLI <command line with syntax and parameters>

CLI set <curctrl=xx>

Example: CLI set curctrl=1

Use this command to select the controller 1 on which to perform an action.

## To run the CLI using automated script

This part describes how to write batch files and CLI command scripts to perform the controller details task. You can run CLI scripts by executing a batch file. The batch file is a text file containing a valid list of CLI commands which you have included in the file. A carriage return linefeed follows each command. You can use the CLI commands alone in CLI command scripts or in DOS batch files. You should already understand how to write DOS batch files and be familiar with Windows-related backup commands.

To execute a CLI command script, type the file name that contains the CLI commands.

Syntax

<filename>

Where <filename> is the name of the text file you want to execute.

Creating an automated script example.

In its simplest example form, a text file contains two valid CLI commands. A carriage return linefeed follows each command.

The setsys is the file included the following two commands:

CLI set curctrl=1

CLI sys info

To run the automated script, enter: setsys

## 3.4.3 Command Categories

This chapter provides detailed information about the SAS host adapter CLI commands. From a functional point of view, command can be grouped into the following functional categories. This list may vary depending upon the installed features.

# COMMAND LINE INTERFACE

---

The following table is the CLI command summary:

<b>CMD</b>	<b>Description</b>
main	Show command categories
set	Open the controller to accept the CLI. It includes the controller assignment.
sys	Perform the SAS host adapter system function
disk	Perform individual disk function
pm	Show SAS controller port multiplier function on the SAS host adapter
enc	Access the enclosure function
exp	Access the expander function
event	System events records or clears all system events in the buffer
hw	Hardware monitor information shows all system environment status
exit	Exit CLI

## **Main Command**

Main command in this category allows you to display main command in the SAS host adapter. For details, see "Main Command" on section 3.2.1.

## **Set Commands**

To prepare a SAS host adapter to receive a CLI command, you first need to select the controller. The set commands select controller and prepare it to receive more CLI Commands. For details, see "Set Commands" on section 3.2.2.

## **Sys Commands**

The sys commands perform the BIOS updating and information on SAS host adapter. For details, see "Sys Commands" on section 3.2.3.

## **Disk Commands**

The disk commands perform all pass-through operations on the drives connect to the SAS host adapter. Typical operations included: identify selected drive, refresh all drives, SMART function, cache mode, speed mode, update drive firmware and view disk information from the SAS host adapter. For details, see "Disk Function" on section 3.2.4.

# COMMAND LINE INTERFACE

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## **Pm Commands**

The pm commands allows you to display the SAS controller port multiplier function. For details, see "Pm Commands" on section 3.2.5.

## **Enc Commands**

The enc command allows you to display all enclosure information which connect on the selected SAS host adapter. It can also support the identify the enclosure physically position. For details, see "Enc Commands" on section 3.2.6.

## **Exp Commands**

The exp command allows you to display all expander information which connect on the selected SAS host adapter. It can also support the in-band SES expander firmware update function. For details, see "Exp Commands" on section 3.2.7.

## **Event Commands**

The event command allows you to display system and clear event notification that have been generated events by the SAS host adapter. Typical operations include: clear and view system information from the SAS host adapter. For details, see "Event Function" on section 3.2.8.

## **Hw Commands**

The hw command allows you to display hardware information that have been collected by SAS host adapters. For details, see "Hardware Monitor Function" on section 3.2.9.

## **Exit Command**

To close the currently selected controller and exit the CLI, use the exit command.

Syntax

exit

# COMMAND LINE INTERFACE

## 3.4.3.1 Help Command

This command provides an on-line table of contents, providing brief descriptions of the help sub-commands. You can use the <CMD> -h or -help to get detail information about the sub-command.

Syntax

<CMD> -h or -help

CMD: main, set, sys, disk, pm, enc, exp, event or hw.

## 3.4.3.2 Main Command

Main command in this category allows you to display main command in the SAS host adapters. The main command shows the currently selected host adapter and all host adapters installed in the system. This command provides a table of contents, providing brief descriptions of the commands and controller installed in the system. You can use the following command to get the **main** command function and description.

Syntax

CLI> main [Enter]

```
CLI> main
Copyright (c) 2004-2015 Areca, Inc. All Rights Reserved.
Areca CLI, Version: 1.14.7, Arclib: 350, Date: May 19 2015< Windows >

S # Name Type Interface
=====
[*] 1 ARC-1320 SAS Adapter PCI
=====

CMD Description
=====
main Show Command Categories.
set General Settings.
sys System Functions.
disk Physical Drive Functions.
pm Port Multiplier Functions.
enc Enclosure Functions.
exp Expander Functions.
event Event Functions.
hw Hardware Monitor Functions.
exit Exit CLI.
=====
Command Format: <CMD> [Sub-Command] [Parameters].
Note: Use <CMD> -h or -help to get details.

CLI>
```

# COMMAND LINE INTERFACE

---

## 3.4.3.3 Set Commands

If there is more than one SAS host adapters in the system (up to 64 are supported), use this command to select the appropriate controller on which to perform an action. All actions or commands will be performed only on the currently selected host adapter. You can use the following command to get the **set** command function and description.

CLI > set -help [Enter]

Typical output looks like:

```
CLI> set -help
Sub-Command & Parameters Of [ set ]
Sub-Command Description
=====
None.      Parameter: <curctrl=xx>
           Fn: Set the controller# of currently using.
           Ex: Set the controller 1 to use.
           Command: set curctrl=1 [Enter]
=====
CLI>
```

To prepare a SAS host adapter to receive a CLI command, you first need to select the host adapter. To select the adapter and prepare it to receive CLI commands.

### Syntax

set <curctrl=xx >

### Parameters

<curctrl=xx>

### Description:

To prepare a SAS host adapter to receive a CLI command, you firstly need to select the adapter. You can select one SAS host adapter at any time. To select host adapter and prepare it to receive more CLI Commands.

### Example:

CLI >set curctrl=1 [Enter]

Select the controller 1 to receive the CLI command.

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## 3.4.3.4 Sys Commands

Choose this option to display the host adapter system information properties. You can use the following command to get the sys command function and description.

```
CLI > sys -help [Enter]
```

Typical output looks like:

```
CLI> sys -help
Sub-Command & Parameters Of [ sys ]
Sub-Command Description
=====
ncqmode      Parameter: <p=<0(disabled)>!1(enabled)>>
             Fn: Set NCQ Mode.
             Ex: Set NCQ Mode To Enabled.
             Command: sys ncqmode p=1[Enter]
smartmode    Parameter: <p=<0(disabled)>!1(enabled)>>
             Fn: Set S.M.A.R.T Status Polling Mode.
             Ex: Set S.M.A.R.T Status Polling Mode To Enabled.
             Command: sys smartmode p=1[Enter]
cachemode    Parameter: <p=<0(disabled)>!1(enabled)>>
             Fn: Set Write Cache Mode.
             Ex: Set Write Cache Mode To Enabled.
             Command: sys cachemode p=1[Enter]
speedmode    Parameter: <p=<0(Auto)>!1(1.5G)!2(3.0G)!3(6.0G)>>
             Fn: Set PHY Link Rate.
             Ex: Set PHY Link Rate To 3.0G.
             Command: sys speedmode p=2[Enter]
cmdxfrlen    Parameter: <p=<0(1M)!1(4M)>>
             Fn: Set Max Command Transfer Length.
             Ex: Set Max Command Transfer Length To 4M.
             Command: sys cmdxfrlen p=1[Enter]
rediscover   Parameter: None.
             Fn: Re-Discover Devices.
             Ex: Re-Discover Devices.
             Command: sys rediscover [Enter]
updatebios   Parameter: <path=<PATH_OF_BIOS_FILE>>
             Fn: BIOS Updating.
             Ex: Update BIOS And File Path Is In [C:\FW\I13_1300.BIN].
             Command: sys updatebios path=c:\fw\I13_1300.BIN [Enter]
info         Parameter: None.
             Fn: Display System Info.
             Command: sys info [Enter]
=====
CLI>
```

### 3.4.3.4.1 Set NCQ Mode

The controller supports both SAS and SATA disk drives. The NCQ allows SATA multiple commands to be outstanding within a drive at the same time. Drives that support NCQ have an internal queue where outstanding commands can be dynamically rescheduled or re-ordered, along with the necessary tracking mechanisms for outstanding and completed portions of the workload.

Syntax

```
sys ncqmode <p=<0<disabled>:1<enabled>>>
```

# COMMAND LINE INTERFACE

---

## Parameters

<p=<0<disabled>:1<enabled>>>

## Description:

The SAS host adapter allows the user to select the SATA NCQ support: "Enabled" or "Disabled".

## Example:

CLI >sys ncqmode=1 [Enter]

Set all SATA HDDs connected on the SAS adapter NCQ enabled.

### 3.4.3.4.2 Set Smart Status Polling Mode

Use this command to change SAS host adapter SMART status polling mode, follow the procedure below:

## Syntax

sys smartmode <p=<0<disabled>:1<enabled>>>

## Parameter

<p=<0<disabled>:1<enabled>>>

## Description:

A SATA HDD "SMART Status Polling" function was added to enable scanning of all SATA HDDs SMART information function on the device driver. It is necessary to enable "SMART Status Polling" function before the selected SATA drive SMART information is accessible. This function is used to control the ability of the device driver function. It is disabled by default.

## Example:

CLI >sys smartmode p=0 [Enter]

Set the SATA HDD "SMART Status Polling" function on SAS host adapter at disabled mode.

### 3.4.3.4.3 Set Write Cache Mode

User can set the disk "Write Cache Mode" to Enabled, or Disabled. "Enabled" increases speed, "Disabled" increases reliability.

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---

## Syntax

sys cachemode <p=<0<disabled>:1<enabled>>>

## Parameters

<p=<0<disabled>:1<enabled>>>

## Description:

The SAS host adapter allows the user to change the HDD write cache support mode: "Enabled" or "Disabled".

## Example:

CLI >sys cachemode=1 [Enter]

Set all HDDs connected on the SAS adapter write cache mode enabled.

### 3.4.3.4.4 Set PHY Link Rate

A SAS device is required to support all link rate between and including the specified Max. and Min. hardware link rate. The initiator determines the negotiated physical PHY link rate along all pathways by querring all of the relevant PHYs during discovery. If there is problem on the SAS speed negotiation sequence, you can use this function to adjust the PHY link rate.

## Syntax

sys speedmode <p=<0<auto>:1<1.5G>:2<3.0G>:3<6.0G>>>

## Parameter

<p=<0<auto>:1<1.5G>:2<3.0G>:3<6.0G>>>

## Description:

When you choose this option, the max PHY link rate on the same expander or a different expander within the topology will set this value.

## Example:

CLI >sys speedmode p=2 [Enter]

Set the max PHY link rate is 3Gb/s as a default link rate for the SAS host adapter.

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---

## 3.4.3.4.5 Set Max Command Transfer Length

The largest amount of data that can be transferred by a single SAS command is often a concern. The SAS host adapter could have transfer size limits as could the transport and finally the SAS/SATA device itself. Use this command to set a "best" IO size for the SAS host adapter.

Syntax

```
sys cmdxfrlen <p=<0<1M>:1<4M>>>
```

Parameter

```
<p=<0<1M>:1<4M>>>
```

Description:

When you choose this option, the max setting in the device driver is the maximum number of IO size allowed in a single SAS command's scatter gather lists (for data transfers).

Example:

```
CLI >sys cmdxfrlen p=1 [Enter]
```

Set the max command transfer length is 4MB as a "best" IO size for the SAS host adapter.

## 3.4.3.4.6 Rediscover Device

When you physically insert disk drives into the SAS host adapter while the system is running, you can use this option to reflect the change. To update new add devices to the system, follow the procedure below:

Syntax

```
sys rediscover
```

Description:

It is used to rediscover devices and to dynamically update the device list.

# COMMAND LINE INTERFACE

---

Example:

```
CLI>sys rediscover [Enter]
```

Update the selected SAS host adapter device list on the system.

## 3.4.3.4.7 Update Adapter BIOS

To update SAS host adapter BIOS, follow the procedure below:

Syntax

```
sys updatebios <path=<PATH_OF_BIOS_FILE>>
```

Parameter

```
<path=<PATH_OF_BIOS_FILE>>
```

Description:

Since the SAS host adapter features flash BIOS, it is not necessary to change the hardware flash chip in order to upgrade the SAS host adapter BIOS. The user can simply re-program the old BIOS through this command. New releases of the BIOS are available in the form of a DOS file at shipping CD, website or FTP.

Example:

```
CLI >sys updatebios path=c:\fw\I13_1320.BIN [Enter]
```

Update BIOS and file path is [C:\fw\I13\_1320.BIN] to the currently selected SAS host adapter.

## 3.4.3.4.8 View System Information

After installing all host adapters, use this command to display controller system properties about the selected SAS host adapter. To view the system information, please follow the procedure below:

Syntax

```
sys info
```

Description:

The selected SAS host adapter system properties will be shown as following.

# COMMAND LINE INTERFACE

Example:

```
CLI>sys info
```

Display the selected SAS host adapter system detail information.

## 3.4.3.5 Disk Commands

Use the disk commands to manage disks connected to the SAS host adapter. The CLI enables you to inquiry and modify the individual disk characteristics. The number of direct-connected disk drives is limited to the number of 8 phys supported by the SAS host adapter. Some backplanes support daisy-chain expansion to other backplanes. For example, you can daisy-chain up to eight enclosures with a maximum 128 SAS/SATA device to a single SAS host adapter in a host system.

SAS host adapters assign target IDs to enclosure SES and disks. When you are using enclosures, each disk has a "target ID." These are the IDs that are used by the SAS host bus adapters to identify the disks and that the adapter presents to the BIOS and OS.

The help command `disk -h` provides a table of contents, providing brief descriptions of the sub-commands. Typical output looks like:

```
CLI> disk -help
Sub-Command & Parameters Of [ disk ]
Sub-Command Description
-----
Ident          Parameter: <no>xx>
              Fn: Identify Selected Drive.
              Ex: Identify Disk#5.
              Command: disk ident no=5 [Enter]
              Note: no=# To End Identification.
refresh       Parameter: None.
              Fn: Refresh All Drives.
              Ex: Refresh All Drives.
              Command: disk refresh [Enter]
smartdata     Parameter: <no>xx>
              Fn: Display Disk S.M.A.R.T Data.
              Ex: Display Disk#1 S.M.A.R.T Data.
              Command: disk smartdata no=1 [Enter]
smartnode     Parameter: <no>xx> <p=<0(disabled)>1(enabled)>>
              Fn: Set Disk S.M.A.R.T Mode.
              Ex: Set Disk#1 S.M.A.R.T Mode To Enabled.
              Command: disk smartnode no=1 p=1[Enter]
cachemode     Parameter: <no>xx> <p=<0(disabled)>1(enabled)>>
              Fn: Set Disk Cache Mode.
              Ex: Set Disk#1 Cache Mode To Enabled.
              Command: disk cachemode no=1 p=1[Enter]
speedmode     Parameter: <no>xx> <p=<0(1.5G)1(3.0G)12(6.0G)>>
              Fn: Set Disk Speed.
              Ex: Set Disk#1 Speed To 3.0G.
              Command: disk speedmode no=1 p=1[Enter]
chid          Parameter: <no>xx> <p=<xx>>
              Fn: Set Disk SCSI ID.
              Ex: Set Disk#2's SCSI ID To 3.
              Command: disk chid no=2 p=3[Enter]
updatefw      Parameter: <no>xx> <path=<PATH_OF_FIRMWARE_FILE>>
              Fn: Disk Firmware Updating.
              Ex: Update Disk Firmware And File Path Is In
              I:\>disk_firm.bin.
              Note: Disk Have To Support ATA-8 Specification
              Command: disk updatefw no=1 path=c:\fw\disk_firm.bin [Enter]
info          Parameter: <no>xx>.
              Fn: Display Disk Info.
              Command: disk info [Enter]
              Ex: Display Disk#1 Info.
              Command: disk info no=1 [Enter]
-----
CLI> _
```

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---

A SAS host adapter is responsible for traversing the device tree connected to it, assigning No. to each of the devices, and presenting the CLI with a list of devices it's attached to. When you have a SAS host bus adapter, the No. (number) is determined by the total "enclosure slot mapping". This occurs automatically and means that the location of a disk is determined by the disk bay it is in. The No. is indicated the total "enclosure slot mapping" in order number (from 1 to the end).

## 3.4.3.5.1 Identify Selected Drive

You can use the "Identify Selected Drive" feature to prevent removing the wrong drive, the selected No. (number) drive fault LED will be blank.

Syntax

```
disk ident <no=xx>
```

Parameters :

```
<no=xx>
```

Description:

There is one LED per port. When lit, each LED indicates the corresponding drive has identified. Use this option to prevent removing the wrong No. drive.

## 3.4.3.5.2 Refresh All Drives

When a device is moved from one expander Phy to a different expander Phy (of the same expander or a different expander within the topology), the expander shall always assign it to originally target ID. This command can use to reassign all disks target ID number based on the enclosure order. This can help user to keep the disk drive target ID in order number (from 0 to 127).

Syntax

```
disk refresh
```

Description:

Use this option to reassign the target ID number (from 0 to

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---

127) based on the enclosure order.

## **3.4.3.5.3 Display Disk SMART Data**

Use this command to show the No. SATA HDD SMART information.

Syntax

```
disk smartsata <no=xx>
```

Parameter

```
<no=xx>
```

Description:

When you choose this option, the specify physical disks connected to the SAS host adapter SMART informations are listed.

Example:

```
CLI >disk smartdata no=1 [Enter]
```

Display No.=1 disk drive SATA SMART information, which belong to the currently selected SAS host adapter.

## **3.4.3.5.4 Set Disk SMART Mode**

Use this command to enable or disable the No. of SATA HDD SMART status mode, follow the procedure below:

Syntax

```
disk smartmode <no=xx><p=<0<disabled>:1<enabled>>>
```

Parameter

```
<no=xx>
```

```
<p=<0<disabled>:1<enabled>>>
```

Description:

A disk SMART mode is added to enable scanning of the specify SATA HDD SMART data function on the device driver. It is necessary to enable "Disk SMART Mode" function before the selected drive SMART data is accessible. This function is disabled by default.

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---

Example:

```
CLI >disk smartmode no=1 p=0 [Enter]
```

Set the SAS host adapter No. =1 disk drive works at SMART disabled mode.

## 3.4.3.5.5 Set Disk Cache Mode

Use this command to program the No. disk drive write cache mode.

Syntax

```
disk cachemode <no=xx> <p=<0<disabled>:1<enable>>>
```

Parameter

```
<no=xx>
```

```
<p=<p=<0<disabled>:1<enable>>>
```

Description:

User can set the "Disk Write Cache Mode" to Enabled, or Disabled. "Enabled" increases speed, "Disabled" increases reliability for the selected No. disk drive.

Example:

```
CLI >disk cachemode no=1 p=0 [Enter]
```

Set the No.=1 disk drive works at enable mode.

## 3.4.3.5.6 Set Disk Speed

To change the max speed of the specify SATA HDD on the selected SAS host adapter following the procedure below:

Syntax

```
disk speedmode <no=xx>
```

```
<p=<0<1.5G>:1<3.0G>:2<6.0G>>>
```

Parameter

```
<no=xx>
```

```
<p=<0<1.5G>:1<3.0G>:2<6.0G>>>
```

Description:

The "Speed Mode" function item is used to control the specify HDD speed. Select speedmode to change the speed mode tem-

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---

porarily. The default speed will still activate on the next event. The SAS host adapter allows the user to choose the speed Mode: 1.5Gb/s, 3.0Gb/s and 6Gb/s for the specify HDD.

Example:

```
CLI >disk speedmode no=1 p=2 [Enter]
```

To change the max speed of the No.=1 HDD on the selected SAS host adapter to run on 6Gb/s speed.

## 3.4.3.5.7 Set Disk Target ID

To change SAS host adapter device target ID, follow the procedure below:

Syntax

```
disk chid <no=xx> <p=xx>
```

Parameter

```
<no=xx> <p=xx>
```

Description:

User can assign the disk slot number to a fixed target ID number.

Example:

```
CLI >disk chid no=2 p=3 [Enter]
```

Set the No.=2 of disk slot drive target ID=3.

## 3.4.3.5.8 Disk Firmware Update

Areca has supported the ATA-8 spec for microcode download, allowing customer using the Areca's entire family PCI express-series of high performance SAS host adapters and need of a way to perform an system level update SATA HDD's firmware without having to remove each drive single and upgrade. To update firmware following the procedure below:

Syntax

```
disk updatefw <no=xx> <path=<PATH_OF_FIRMWARE_FILE>>
```

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---

Parameter

<no=xx>

<path=<PATH\_OF\_FIRMWARE\_FILE>>

Description:

The currently way to upgrade the HDD microcode is pull out the drivers from the SAS host adapter and insert the drive into a PC with pure SATA port. Either running under windows 2003, or maybe booting up with a DOS bootable CD to upgrade all the drives one by one while drives are in the unit. It takes much time to update the all SAS host adapter drives firmware. Areca has supported the ATA-8 microcode download to perform as a system level update without having to remove each drive single and upgrade.

If the system has the same mode HDDs, it will update all same modes HDD Microcode one time. Areca has provided one utility for customer to make the SATA HDD firmware for readable by Areca firmware.

Example:

```
CLI >disk updatefw no=1 path=c:\fw\disk_firm.bin [Enter]
Update NO.=1 of disk drive firmware and file path is [C:\FW\
disk_firm.bin] to the currently selected SAS host adapter.
```

## 3.4.3.5.9 Display Disks Information

A SAS host adapter is responsible for traversing the device tree connected to it, assigning target IDs to each of the disks, No. of sisk slots, and presenting the host with a list of devices it's attached to.

After connecting all disks, use this command to display drive information about the selected SAS host adapter. The disk information screen presents a view of the adapter's SAS hierarchy.

To view all disks information, please follow the procedure below:

Syntax  
disk info

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Description:

When you choose this option, the physical disks connected to the SAS host adapters are listed.

Example:

CLI> disk info [Enter]

You can connect the SAS/SATA drives to the controller through direct cable and backplane solutions. In the direct connection, drives are directly connected to SAS host adapter PHY port. Enclosure #9 is the virtual No. for the SAS controller ports. The virtual No. emulate a host adapter SAS controller, which can support up to eight devices if there is no any expander existed.

```
CLI> disk info
The Disk Information
-----
No Id:Locn Location Model Serial Rev Capacity
-----
<< Enclosure#1 : ARC-8016--B0.00.Areca b000 >>
 1 0:0 SLOT 01 SEAGATE ST3500620SS 9QM328MU 0001 465.8GB
 2 1:0 SLOT 02 FUJITSU MAX3036RC DQLP7700L1J 0104 34.2GB
 3 2:0 SLOT 03 FUJITSU MAX3036RC DQLP7700L4A 0104 34.2GB
 4 3:0 SLOT 04 FUJITSU MAX3036RC DQLP7700L5R 0104 34.2GB
 5 4:0 SLOT 05 FUJITSU MAX3036RC DQLP7500L1E 0104 34.2GB
 6 5:0 SLOT 06 FUJITSU MAX3036RC DQLP7500R04 0104 34.2GB
 7 6:0 SLOT 07 FUJITSU MAX3036RC DQLP7500JVB 0104 34.2GB
 8 7:0 SLOT 08 SEAGATE ST373455SS 3LQ0X1D6 S513 60.4GB
 9 8:0 SLOT 09 FUJITSU MAX3036RC DQLP7500JVB 0104 34.2GB
10 9:0 SLOT 10 FUJITSU MAX3036RC DQLP7700L51 0104 34.2GB
11 10:0 SLOT 11 FUJITSU MAX3036RC DQLP7500JVN 0104 34.2GB
12 11:0 SLOT 12 HITACHI HUS151436ULS300 J3M09F6J 0600 34.2GB
13 12:0 SLOT 13 HITACHI HUS151436ULS300 JB00R7TJ 0540 34.2GB
14 13:0 SLOT 14 HITACHI HUS151436ULS300 JB00JVTJ 0540 34.2GB
15 14:0 SLOT 15 HITACHI HUS151436ULS300 J3K6U52J 0600 34.2GB
16 15:0 SLOT 16 HITACHI HUS151436ULS300 JB0685KK 0420 34.2GB
<< Enclosure#9 : Virtual SES Areca 0123 >>
17 SLOT 01 N.A. N.A. N.A. 0.0GB
18 SLOT 02 N.A. N.A. N.A. 0.0GB
19 SLOT 03 N.A. N.A. N.A. 0.0GB
20 SLOT 04 N.A. N.A. N.A. 0.0GB
21 SLOT 05 N.A. N.A. N.A. 0.0GB
22 SLOT 06 N.A. N.A. N.A. 0.0GB
23 SLOT 07 N.A. N.A. N.A. 0.0GB
24 SLOT 08 N.A. N.A. N.A. 0.0GB
-----
GuiErrMsg<0x00>: Success.
```

Syntax

disk info <no=xx>

Parameter

<no=xx>

Description:

The selected disk information will be shown as following.

Example:

CLI>disk info no=1 [Enter]

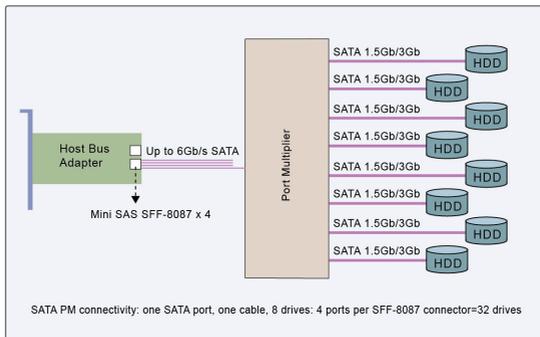
Display the No.=1 of disk drive detail information.

# COMMAND LINE INTERFACE

```
CLI> disk info no=1
The Disk Information
=====
Target ID<ID:LUN>           : 0-0
Model Name                  : WDC WD1500HLFS-01G6U0
Serial Number               : WD-VXJ608A11538
Firmware Rev.              : 04.04U01
Parent                      : Port Multiplier 110B:4140
Location                   : SLOT 00
SAS Address                 : 50-01-B4-D8-00-00-00-40
Type                       : SATA H.D.D
Capacity                   : 139.7GB(146523384K)
Write Cache Capability      : Supported
S.M.A.R.T Capability       : Supported
NCQ Capability              : Supported
48 Bits LBA Capability     : Supported
Supported Speed            : 1.5Gb/s 3.0Gb/s
Write Cache                 : Enabled
S.M.A.R.T                  : Disabled
Current Speed              : 3.0Gb/s
Rotation Rate              : 10000
=====
GuiErrMsg<0x00>: Success.
```

## 3.4.3.6 Pm Commands

Port multipliers are devices that allow a single Serial ATA port to communicate with multiple drives. The port multiplier is transparent to the drives, but the host is aware that it is communicating with multiple drives. Port multipliers typically reside on an enclosure's backplane and support all standard SATA drives.



Typically, Serial ATA (SATA) connectivity consists of a single drive connected to a single controller port via a single cable. The maximum number of drives in an array is predicated on the controller's port count. The SATA Port Multiplier (SATA PM) permits a change to that point-to-point relationship via port multiplication technology. Port multipliers allow easy, cost-effective storage expansion and enable the aggregation of the performance of multiple drives as well.

# COMMAND LINE INTERFACE

The following disk information is shown on one port multiplier which connects on one of the SAS host port.

```
CLI> disk info
The Disk Information
-----
No Id:lan Location Model Serial Rev Capacity
-----
<< Port Multiplier#1 : 0x110B:0x4140 >>
 1 0:0 SLOT 00 WDC WD1500HLFS-01G6U0 UD-WR1608AT1538 04_04U01 139.7GB
 2 1:0 SLOT 01 ST3750640NS 50D1BRJ8 3_0EG 498.6GB
 3 2:0 SLOT 02 WDC WD2002FPFS-01U1B0 UD-1CAU10398323 04_05004 1863.0GB
 4 3:0 SLOT 03 WDC WD1001FALS-00J7B0 UD-1MA1U0169046 05_00K05 931.5GB
<< Enclosure#9 : Virtual SES Areca 0123 >>
 5 SLOT 01 N.A. N.A. N.A. 0.0GB
 6 SLOT 02 N.A. N.A. N.A. 0.0GB
 7 SLOT 03 N.A. N.A. N.A. 0.0GB
 8 SLOT 04 N.A. N.A. N.A. 0.0GB
 9 SLOT 05 N.A. N.A. N.A. 0.0GB
10 SLOT 06 N.A. N.A. N.A. 0.0GB
11 SLOT 07 N.A. N.A. N.A. 0.0GB
12 SLOT 08 N.A. N.A. N.A. 0.0GB
-----
GuiErrMsg(0x00): Success.
```

The `pm -h` command can view the sub-command and parameters of the `pm` function. You can use the following command to get the **pm** command function and description.

```
CLI > pm -help [Enter]
```

Typical output looks like:

```
CLI> pm -help
Sub-Command & Parameters Of [ pm ]
Sub-Command Description
-----
info          None.
              Fn: Display Port Multiplier Info.
              Command: pm info [Enter]
-----
CLI>
```

### 3.4.3.6.1 Display Port Multiplier Information

After connecting all port multiplier enclosure, use this command to display port multiplier information.

To view all port multiplier enclosure information, please follow the procedure below:

```
Syntax
pm info
```

# COMMAND LINE INTERFACE

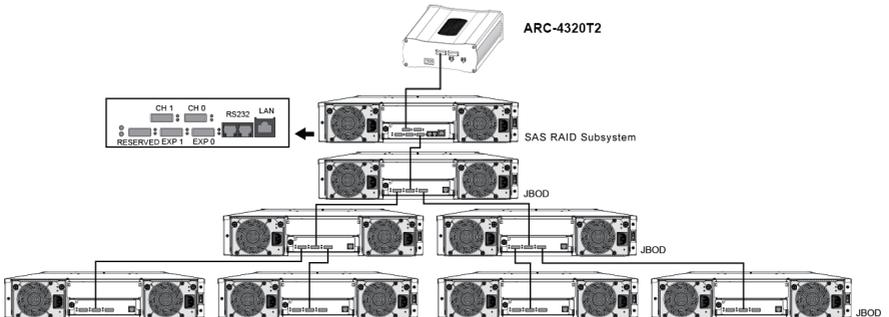
## Description:

When you choose this option, the physical port multiplier enclosure connected to the SAS host adapters are listed.

```
CLI> pm info
The PortMultiplier Information
=====
No  VendorID  DeviceID  Product-Rev  PM-Rev  PortNumber
=====
1  11AB      4140      C1           C       5
2  N.A.      N.A.      N.A.         N.A.    N.A.
3  N.A.      N.A.      N.A.         N.A.    N.A.
4  N.A.      N.A.      N.A.         N.A.    N.A.
=====
GuiErrMsg(0x00): Success.
```

### 3.4.3.7 Enc Commands

Use the enc commands to manage enclosure connected to the SAS host adapter. The SAS host adapter can support a up to 8 (no=1~8) enclosure with maximum 128 SAS/SATA devices. The following example figure shows how to connect the external Mini SAS cable from the SAS host adapter controller that has external connectors to the external drive enclosures.



The help command enc -h provides a table of contents, providing brief descriptions of the sub-commands. Typical output looks like:

```
CLI> enc -help
Sub-Command & Parameters Of [ enc ]
Sub-Command Description
=====
ident  Parameter: <no>xx> <p><0(indicator off)>|1(indicator on)>>.
        Fn: Identify Selected Enclosure.
        Ex: Identify Enc#1.
        Command: enc ident no=1 p=1[Enter]
info   None.
        Fn: Display Enclosure Info.
        Command: enc info [Enter]
=====
CLI> _
```

# COMMAND LINE INTERFACE

---

## 3.4.3.7.1 Identify Selected Enclosure

After connecting all enclosures, use this command to physically identify a enclosure expander on the selected SAS host adapter.

To identify enclosure physical position, please follow the procedure below:

Syntax

```
exp ident <no=xx> <p=<0<indicator off>:1<indicator on>>>
```

Parameters :

<no=xx> xx=1~8

<p=<0<indicator off>:1<indicator on>>>

Description:

To prevent removing the wrong enclosure, the selected Areca expander enclosure all disks fault LED indicator will light for physically locating the selected enclosure when the "Identify Enclosure" is selected. This function will also light the enclosure LED indicator, if it is existed.

Example:

```
CLI>enc ident no=1 p=1 [Enter]
```

Display the enclosure number=1 physical position indicator on.

## 3.4.3.7.2 Display Enclosure Information

After connecting all enclosures, use this command to display all enclosure information on the selected SAS host adapter. To view all enclosures information, please follow the procedure below:

Syntax

```
enc info
```

Description:

When you choose this option, the physical enclosures connected to the SAS host adapters are listed.

# COMMAND LINE INTERFACE

Example:  
CLI>enc info [Enter]

Display all enclosure brief information.

```
CLI> enc info
The Enclosure Information
=====
No Vendor Name      Product Name      Product Rev
=====
 1 Areca             ARC-8016-.B0.00.  b000
 2 N.A.              N.A.              N.A.
 3 N.A.              N.A.              N.A.
 4 N.A.              N.A.              N.A.
 5 N.A.              N.A.              N.A.
 6 N.A.              N.A.              N.A.
 7 N.A.              N.A.              N.A.
 8 N.A.              N.A.              N.A.
 9 Areca             Virtual SES       0123
=====
```

## 3.4.3.8 Exp Commands

Use the exp commands to manage expanders inside the enclosure connected to the SAS host adapter. Expanders are also considered “targets” and have a target ID. Each SAS enclosure has one expander. The CLI enables you to support in-band SES expander firmware update and expander identify function.

The help command exp -h provides a table of contents, providing brief descriptions of the sub-commands. Typical output looks like:

```
CLI> exp -help
Sub-Command & Parameters Of [ exp ]
Sub-Command Description
=====
updatefw  Parameter: <no=xx> <path=<PATH_OF_FIRMWARE_FILE>> <type=<1~8>>
          Fn: Expander Firmware Updating.
          Note: For 3G Expanders:
                1: CODE - Firmware (.bin)
                2: DATA region - Data file (mfgdataXXXXXXXX.XXX)
                3: DATA region - Data file (mfgdat1XXXXXXXX.XXX)
                4: Reserved
          For 6G Expanders:
                5: Reserved
                6: FW code region (sas2xfwXXXXX.XXX)
                7: Reserved
                8: DATA region ( mfgdat6gXXXXXXXX.XXX)
          Ex: Update 6G Expander FW code region And File Path Is In
          IG:\fu\sas2xfwXXXXX.bin.
          Command: exp updatefw no=1 path=c:\fu\sas2xfwXXXXX.bin
                  type=6 [Enter]
info      Parameter: <no=xx>.
          Fn: Display Expander Info.
          Command: exp info [Enter]
          Ex: Display Expander#1 Info.
          Command: exp info no=1 [Enter]
=====
CLI>
```

# COMMAND LINE INTERFACE

---

## 3.4.3.8.1 Expander Firmware Update

To update Areca expander firmware following the procedure below:

Syntax

```
exp <no=xx> updatefw <path=<PATH_OF_FIRMWARE_FILE>  
<type=1~8>
```

Parameter

<no=xx> xx=1~8

Note: id number 1 is for expander 1 which is on enclosure 1.

<path=<PATH\_OF\_FIRMWARE\_FILE>>

NOTE: For 6Gb/s expander

5: BOOT code region <sas2xfwXXXX.bin>

6: FW Code region <sas2xfwXXXX.bin>

7: Candidate DATA region - Data file <6gXXX-XX.bin>

8: DATA region <mfgdat6gXXXXXX.rom>

Description:

Since the expander controller features flash firmware, it is necessary to use the serial or Lan port in order to upgrade the expander controller firmware. The user can simply re-program the old expander firmware through this command. New releases of the expander firmware are available in the form of a DOS file at shipping CD, website or FTP.

Example:

```
CLI >exp updatefw no=1 path=c:\fw\sas2xfwXXXX.bin type=6  
[Enter]
```

Update 6Gb/s expander FW code region and file path ib in [c:\fw\sas2xfwXXXX.bin] to the selected expander (number 1) controller.

## 3.4.3.8.2 Display Expander Information

After connecting all enclosure expanders, use this command to display enclosure expander information about the selected SAS host adapter. To view all enclosure expanders information, please follow the procedure below:

# COMMAND LINE INTERFACE

Syntax  
exp info

Description:

When you choose this option, the physical enclosure expanders connected to the SAS host adapters are listed.

Example:

CLI>exp info [Enter]

Display all expanders detail information.

```
CLI> exp info
The Expander Information
-----
No Vendor Name      Product Name      Product Rev  SAS Address
-----
1 00ccca             0RC-8016--B0.00.  b000         50-01-B4-69-00-00-00-3F
2 N.A.              N.A.              N.A.         N.A.
3 N.A.              N.A.              N.A.         N.A.
4 N.A.              N.A.              N.A.         N.A.
5 N.A.              N.A.              N.A.         N.A.
6 N.A.              N.A.              N.A.         N.A.
7 N.A.              N.A.              N.A.         N.A.
8 N.A.              N.A.              N.A.         N.A.
-----
GuiErrMsg(0x00): Success.
```

Syntax  
exp info <no=xx>

Parameter

<no=xx>

Description:

The selected enclosure expander information will be shown as following.

Example:

CLI>exp info no=1 [Enter]

Display the expander number=1 detail information.

## 3.4.3.9 Event Commands

The event command provides a log of events that have occurred on the SAS host adapter. An event occurs when the SAS host adapter requires attention, such as when a disk is inserted or removed.

The event -h command can view the sub-command and parameters of the event function. Typical output looks like:

# COMMAND LINE INTERFACE

```
CLI> event -help
Sub-Command & Parameters Of [ event ]
Sub-Command Description
=====
info      Parameter: None.
          Fn: Display System Events.
          Command: event info [Enter]

clear     Parameter: None.
          Fn: Clear System Events.
          Command: event clear [Enter]
=====
CLI> _
```

Syntax  
event info

Description:  
Choose this option to view the system events information.

Example:  
CLI >event info [Enter]  
All the event of the currently selected controller information will be displayed.

```
CLI> event info
Date-Time      Device      Event Type
=====
2011-11-18 11:05:30 Exp#0 Slot#12 Device Removed
2011-11-18 11:05:30 Exp#0 Slot#8 Device Removed
2011-11-18 11:05:31 Exp#0 Slot#7 Device Removed
2011-11-18 11:05:31 Exp#0 Slot#11 Device Removed
2011-11-18 11:05:32 Exp#0 Slot#3 Device Removed
2011-11-18 11:05:32 Exp#0 Slot#5 Device Removed
2011-11-18 11:05:33 Exp#0 Slot#9 Device Removed
2011-11-18 11:05:33 Exp#0 Slot#2 Device Removed
2011-11-18 11:05:34 Exp#0 Slot#10 Device Removed
2011-11-18 11:05:34 Exp#0 Slot#6 Device Removed
2011-11-18 11:05:35 Exp#0 Enc#128 Device Removed
2011-11-18 11:05:40 Exp#0 Slot#9 H.D.D write cache mode enabled
2011-11-18 11:05:40 Exp#0 Slot#11 H.D.D write cache mode enabled
2011-11-18 11:05:40 Exp#0 Slot#12 H.D.D write cache mode enabled
2011-11-18 11:05:40 Exp#0 Slot#10 H.D.D write cache mode enabled
2011-11-18 11:05:40 Exp#0 Slot#2 H.D.D write cache mode enabled
2011-11-18 11:05:40 Exp#0 Slot#7 H.D.D write cache mode enabled
2011-11-18 11:05:40 Exp#0 Slot#3 H.D.D write cache mode enabled
2011-11-18 11:05:40 Exp#0 Slot#6 H.D.D write cache mode enabled
2011-11-18 11:05:40 Exp#0 Slot#5 H.D.D write cache mode enabled
2011-11-18 11:05:40 Exp#0 Slot#8 H.D.D write cache mode enabled
2011-11-18 11:05:41 Exp#0 Slot#7 Device added
2011-11-18 11:05:41 Exp#0 Slot#11 Device added
2011-11-18 11:05:42 Exp#0 Slot#3 Device added
2011-11-18 11:05:42 Exp#0 Slot#5 Device added
2011-11-18 11:05:43 Exp#0 Slot#9 Device added
2011-11-18 11:05:43 Exp#0 Slot#2 Device added
2011-11-18 11:05:44 Exp#0 Slot#10 Device added
2011-11-18 11:05:44 Exp#0 Slot#6 Device added
2011-11-18 11:05:45 Exp#0 Enc#128 Device added
2011-11-18 11:05:45 Exp#0 Slot#12 Device added
2011-11-18 11:05:46 Exp#0 Slot#8 Device added
=====
GuiErrMsg<0x00>: Success.
```

# COMMAND LINE INTERFACE

---

Syntax  
event clear

Description:  
This command clears the entire events buffer information.

Example  
CLI >event clear [Enter]  
All the event of the currently selected controller information will be cleared.

## 3.4.3.10 Hw Commands

To display the cooler fan, voltage, controller voltage and the associated disk temperature status on the enclosure, use the hardware monitor command.

The hw -h command can view the sub-command and parameters of the [ hw ] function. Typical output looks like:

```
CLI> hw -help
Sub-Command & Parameters Of [ hw ]
Sub-Command Description
=====
info          Parameter: None.
              Fn: Display Hardware Monitor Info.
              Command: hw info [Enter]
=====
CLI>
```

To view the hardware monitor information, follow the procedure below:

Syntax  
hw info

Description:  
Choose this option to view the hardware monitor information.

# COMMAND LINE INTERFACE

---

```
CLI> hw -help
Sub-Command & Parameters Of [ hw ]
Sub-Command Description
=====
info          Parameter: None.
              Fn: Display Hardware Monitor Info.
              Command: hw info [Enter]
=====
CLI>
```

Example

CLI >hw info [Enter]

All the hardware monitor information of the currently selected controller will be displayed.

```
CLI> hw info
The Hardware Monitor Information
=====
[Enclosure#1 : Areca   ARC-8016-.B0.00.b0001
 4U          : 1.040 U
 5U          : 5.080 U
 3.30       : 3.340 U
 12V        : 11.870 U
 Fan 01     : 2350 RPM
 Fan 02     : 310 RPM
 Fan 03     : 240 RPM
 Fan 04     : 2510 RPM
 PowerSupply01 : OK
 PowerSupply02 : OK
 ENC. Temp  : 28 C
 Chip Temp  : 38 C
 Slot01 Temp : 30 C
 Slot02 Temp : 31 C
 Slot03 Temp : 31 C
 Slot04 Temp : 30 C
 Slot05 Temp : 31 C
 Slot06 Temp : 31 C
 Slot07 Temp : 31 C
 Slot08 Temp : 32 C
 Slot09 Temp : 31 C
 Slot10 Temp : 31 C
 Slot11 Temp : 30 C
 Slot12 Temp : 32 C
 Slot13 Temp : 29 C
 Slot14 Temp : 28 C
 Slot15 Temp : 28 C
 Slot16 Temp : 29 C
[Enclosure#9 : Areca   Virtual SES      01231
=====
GuiErrMsg<0x00>: Success.
```

### 3.4.3.11 Exit Command

To close the currently selected controller and exit the CLI, use the exit command.

Syntax

CLI> exit

## Appendix A

### A-1 Upgrading Adapter Flash ROM Process

Since the PCIe SAS host adapter features flash ROM firmware, it is not necessary to change the hardware flash chip in order to upgrade the adapter BIOS. The user can simply re-program the old BIOS through the In-Band PCIe bus, using the CLI utility. New releases of the adapter BIOS is available in the form of a DOS file on the shipped CD or Areca website. The following files name is available at the FTP site or the shipped CD :

i13\_1320.bin: PCIe card BIOS for system board using readme.txt contains the history information of the BIOS code change in the main directory. Read this file first to make sure you are upgrading to the proper binary file. Select the right version file for the upgrade. Normally, user upgrades the i13\_1320.bin for system M/B compatibility.

### A-2 Upgrading Firmware Through CLI

To update SAS host adapter BIOS, follow the procedure below:

#### Syntax

```
sys updatebios <path=<PATH_OF_BIOS_FILE>>
```

#### Parameter

```
<path=<PATH_OF_BIOS_FILE>>
```

#### Description:

Since the SAS host adapter features flash BIOS, it is not necessary to change the hardware flash chip in order to upgrade the SAS host adapter BIOS. The user can simply re-program the old BIOS through this command. New releases of the BIOS are available in the form of a DOS file at shipping CD, website or FTP.

#### Example:

```
CLI >sys updatebios path=c:\fw\I13_1320.BIN [Enter]  
Update BIOS and file path is [C:\fw\I13_1320.BIN] to the currently  
selected SAS host adapter.
```