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ExaSAN

PCIe Storage & Switches

ExaSAN A08S4-PS

User Guide

Support Host Bus Adapter:
- *PCIe 2.0: Z1M-G2*
- *PCIe 3.0: Z2M-G3, Z2D-G3*

Support Host Convertor:
- *Thunderbolt2.0: C1M-G2*

Support Switch System:
- *PCIe 2.0: SW16, SWF16*

Accusys Storage Ltd.,

Version: V1.2

ACCUSYS®
The RAID Architects

Revision Sheet

Version	Date	Revision Description
V1.0	2016/6/20	Release version
V1.1	2016/8/12	Add Chapter 4.9 Disk RW Test
V1.2	2016/8/16	Add the detail of power supply spec in Chapter 1.1.2

PREFACE

Notice

The product features and specifications described in this guide are subject to change without notice.

The manufacturer shall not be liable for any damage, or the loss of data resulting from the performance or use of the information contained herein.

About this Guide

Congratulations on your purchase of the ExaSAN (pronounced X-sa-SAN) A08S4-PS. The 8 bay PCIe 3.0 tower model of the ExaSAN family, specifically designed for media streaming workflow. It delivers stability, outstanding performance and scalability. This guide contains instructions for installing and using the A08S4-PS.

Guide to Conventions

Inside the double boxes is important information that users should be aware of:

> **Caution**
> This indicates the existence of a potential hazard that could result in personal injury, damage to your equipment or loss of data if the safety instruction is not observed.

> **Note**
> This indicates useful tips on getting the most from your RAID system.

Trademarks

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference;
(2) this device must accept any interference received, including interference that may cause undesired operation.

ExaSAN A08S4-PS User Guide

Table of Content

1. Introduction of ExaSAN PCIe 3.0 Storage System

# 1.   Introduction of the ExaSAN PCIe 3.0 Storage System

1.1   Overview

1.1.1   What is the ExaSAN Solution

Developed by Accusys Storage Ltd., a worldwide leader in RAID (Redundant Array of Independent Disks) storage systems, ExaSAN   is a family of storage and switch products that takes advantage of well-known PCIe (PCI Express) technology speeds, standards, and roadmap.

The current ExaSAN products employ PCIe3.0 protocol that provides 8 Gb/s per lane transfers. With 4 lane QSFP (Quad SFP) connector and cable, ExaSAN can transfer up to 32 Gb/s by using single connection.

Post-production work, including non-linear editing (NLE), requires high bandwidth storage to quickly move volumes of data and ExaSAN storage solution meets those demands. The high bandwidth provided by ExaSAN technology allows clients to complete editing tasks in a much shorter period of time and so to save their money.
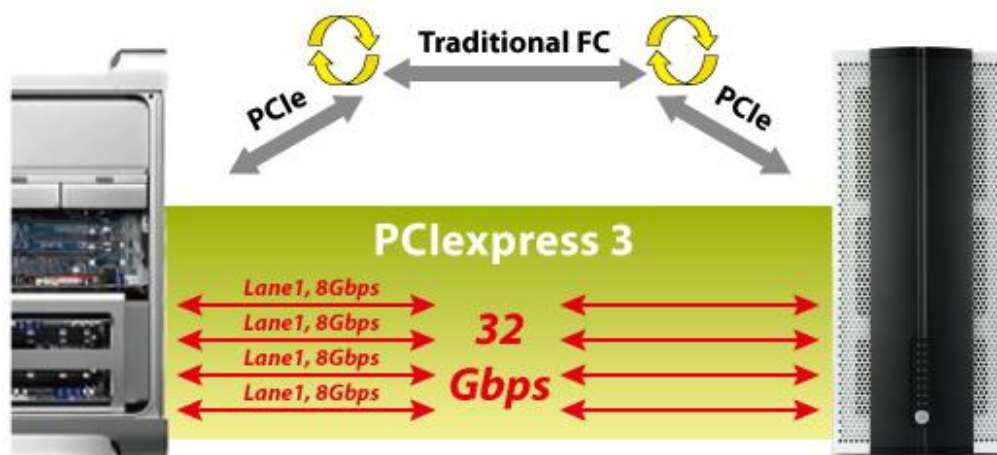
ExaSAN solution, including its complete line of rack mount RAID systems, tower RAID systems, PCIe switch systems and accessories, can be used for different application purposes. Users can build DAS (directly attached storage) via PCIe3.0 interface to enjoy extremely high performance; in addition, Accusys also can provide a SAN (storage attached network) turnkey solution to build a fast and shareable storage.

Standard DAS Environment

DAS with Z2D-G3; refer to the link below for more details about Z2D-G3:
http://www.accusys.com.tw/Accessories/HBA-Cable.html

Thunderbolt 2 DAS with C1M-G2; refer to the link below for more details about C1M-G2:
http://www.accusys.com.tw/Accessories/C1M.html

SAN environment; refer to the link below for more details on how to build a SAN environment:
http://www.accusys.com.tw/ExaSAN/SW16.html#

ExaSAN solutions offer a range of performance levels and storage capacities that scale to meet the needs of small-to-medium-sized organizations. Equally important and useful are its integrated design, centralized administration and monitoring, and a suite of built-in management tools; which eliminate the need to install and maintain a SAN for workgroups

1.1.2 **ExaSAN A08S4-PS features**

1. **Hardware Specifications**
   - One PCIe3.0 8Gb/s x4 lanes host port, transfers up to 32 Gb/s
   - Hardware XOR/Multi-Parity engine
   - 2GB DDRIII memory, ECC-protected
   - Supports 8 x 3.5"/2.5" SAS/SATA drive and SSD
   - Supports   expansion of up to 3 JBOD Enclosures
   - 400W power module
     - Single PSU: A08S4-PS
     - Redundant PSU: A08S4-PS+

Model	EFAP-S400				
AC Input	100-240VAC, 50-60Hz, 6A				
DC output	+3.3V	+5V	+12V	-12V	+5VSB
	16A	18A	33A	0.5A	3A
Max. Power	120W		396W	6.0W	15W
	400W				

2. **Software Specifications**
   - Multiple RAID levels: 0,1,5,6, 0+1 and enhance JBOD
   - Up to 5 disk array groups
   - Up to 16 disk array slices
   - Up to 64 LUNs
   - Selective initialization method (on-the-fly and performance evaluation)
   - Online RAID set expansion and level migration
   - Supports write-back and write-through caching of controller and drive
   - Automatic rebuilding
   - Disk health monitoring by S.M.A.R.T.
   - Array roaming and disk traveling
   - Dual firmware images for firmware recovery
   - Disk Lag Proof technology to guarantee disk timely response
   - Equalization mode to smooth the performance of sequential data transfers

3. **Management**
   - Java-based GUI, RAIDGuardX, centralized multiple RAID system management
   - LED indicator to monitor status of RAID enclosure
   - Event notification by email (SMTP)
   - Support SNMP traps

4. **Enclosure**
   - Dimensions: L: 369mm, W:175mm, H: 394.6mm
   - Weight: 13.64 Kg, 30 lbs (w/o drives)

5. **Support OS**
  - Windows 7, 8, 10, 2008 and 2012 (32/64bit)
  - Linux: Red Hat, SUSE, Fedora, CentOS etc.
  - MAC: OS X 10.5, 10.6, 10.7, 10.8, 10.9, 10.10 and 10.11.

6. **Operating Conditions**
  - Humidity: 5% - 85%
  - Operating Temperature: 0C – 40C

7. **Certification**
  - Humidity: 5% - 85%
  - Operating Temperature: 0C – 40C
  - Certification: RoHS, CE, FCC, BSMI

8. **Support Cable**
  - Copper 2M (standard), Optical 10M, 30M, 50M and100M.

1.2 What's in the Box

Your ExaSAN A08S4-PS is shipped in special packaging to provide protection during transportation. Carefully check your carton contents against the included packing list, or the inside flap of the box, and your original purchase order. You should have the items as described in the sections below.
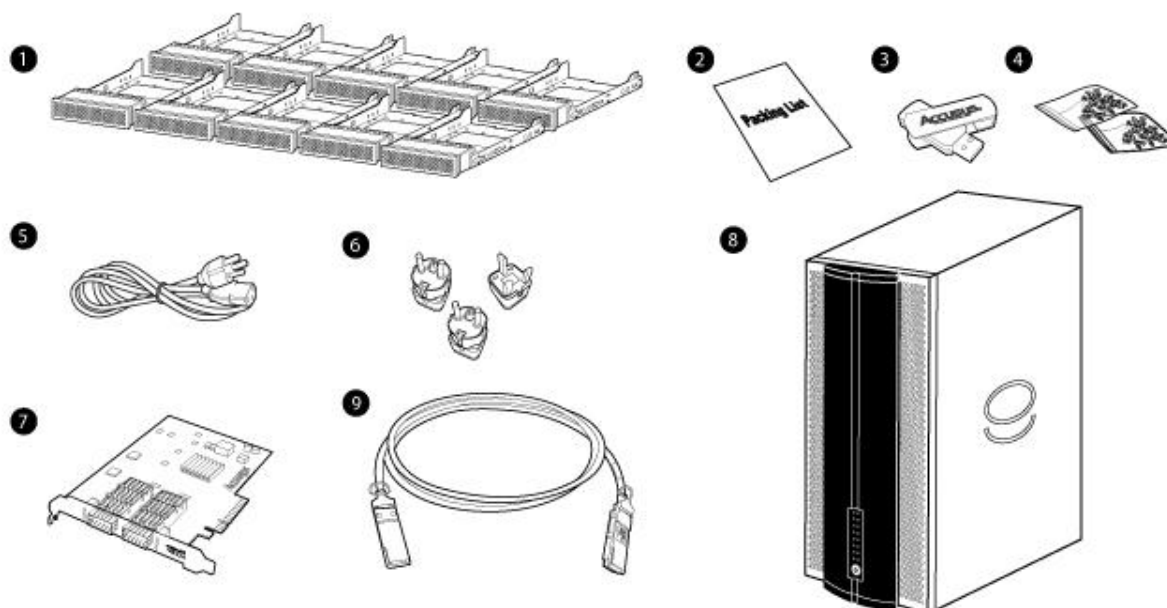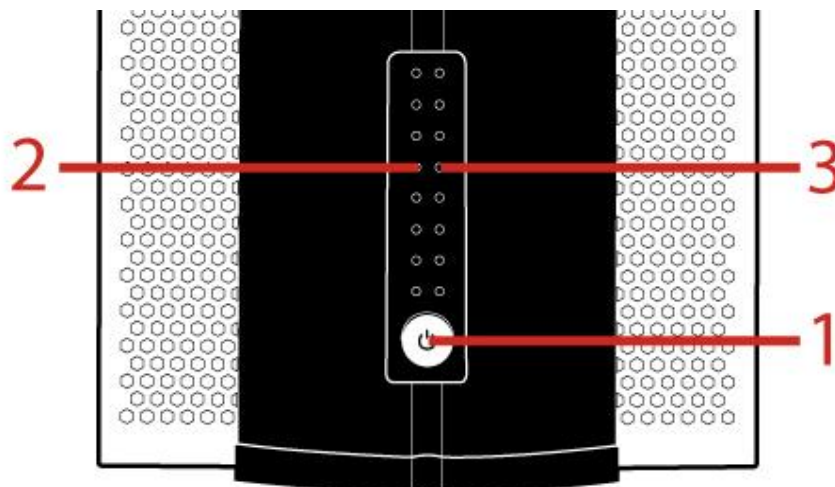

The Accessories package includes the following items. These items can also be ordered and shipped separately from an Accusys reseller.

1. Disk tray x 8
2. Packing list
3. Installation USB

4. Screw pack x 2
5. AC Power Cord cable
6. EU, AU, UK converter
7. "Z2M" HBA card
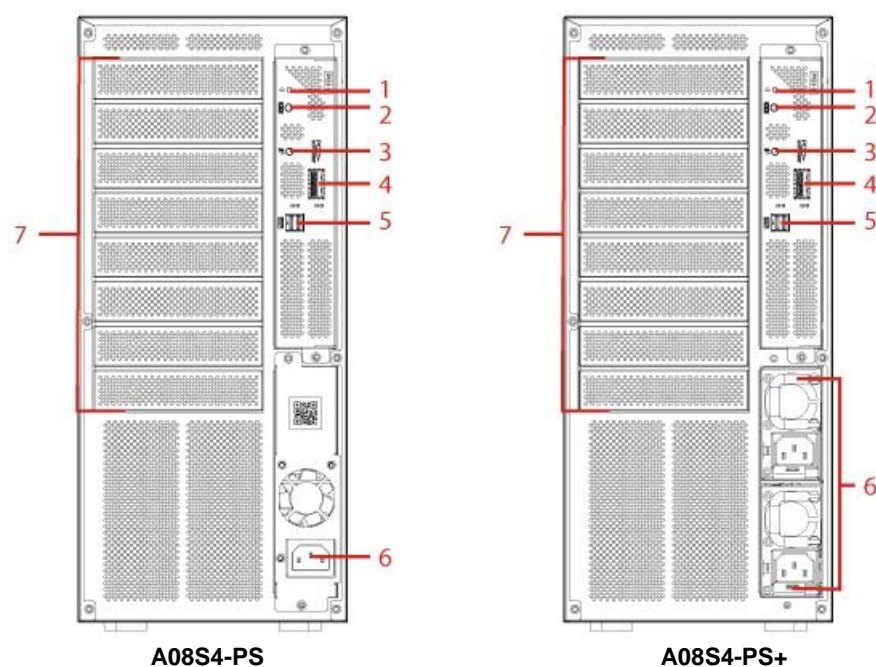8. ExaSAN A08S4-PS Storage
9. 2M QSFP copper cable

1.3 Your A08S4-PS at a Glance
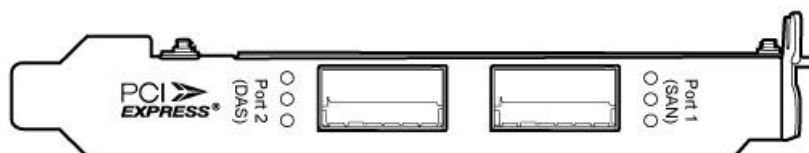
1.3.1   Front Panel & LED Indicators

No.	Name	Description
1	Power Button	**Click** to power up **Push for 5 seconds** to shut down
2	Disk status	Disk 1 (top) ~ 8 status **Green** disk online **Red** disk fail or offline **Green/Red Switching** disk rebuild, migrate or expand
3	Disk activity	Disk 1 (top) ~ 8 activity **Blue** disk in access

1.3.2 **A08S4-PS Rear Panel**

A08S4-PS   **A08S4-PS+**

No.	Name	Description
1	Heart beat LED	Flashing green indicates it works normally.
2	Debug port	For engineer debugging only
3	Mute button	Click to mute system beeper alert
4	QSFP host port	PCIe3.0 host port
		LED(left): **Green** PCIe3.0 link status / **Flash Green** PCIe2.0 link status
		LED(right): **Blue** Data access status
5	JBOD Expansion port	Expanding to another JBOD enclosure.
		LED(left): **Green** Link status
		LED(right): **Blue** Data access status
6	Power Supply	Connecting to power source with a power cord.
		Single: A08S4-PS
		Redundant: A08S4-PS+
7	Hard Drive Tray	Hard Drive Tray 1 (top) ~ 8

1.3.3 **Z2M-G3**

No.	Name	Description
1	QSFP Port 1	For connection with switch. <table><tr><td>**LED1**</td><td>**Amber** SAN mode enable</td></tr><tr><td>**LED2**</td><td>**Green** PCIe3.0 Link status **Flash Green** PCIe2.0 link status</td></tr><tr><td>**LED3**</td><td>**Blue** Data access status</td></tr></table>
2	QSFP Port 2	For connection with ExaSAN storage directly. <table><tr><td>**LED1**</td><td>Reserve</td></tr><tr><td>**LED2**</td><td>**Green** PCIe3.0 Link status **Flash Green** PCIe2.0 link status</td></tr><tr><td>**LED3**</td><td>**Blue** Data access status</td></tr></table>

Refer to the link below for more details about Z2M-G3:
http://www.accusys.com.tw/Document/HBA_Cable/Z2M_G3_QSG_20141216.pdf.

2.   **Prepare to Install the ExaSAN A08S4-PS**

2. Prepare to Install the ExaSAN A08S4-PS

To ensure safe and smooth operation of your ExaSAN A08S4-PS, it is essential that you choose an appropriate location for the system, provide an appropriate operating environment, and adequate power for all components of the system. As you plan for installation, follow the guidelines below to ensure that the system and its environment are safely and appropriately positioned for efficient operation and service.

2.1 Precaution for Handling the System

Take the following precautions to avoid damage to the system or potential injury to you.
1. Prepare a flat and sturdy surface before removing the system from its packaging. The table or cart that holds the system should be as close as possible to the system carton.
2. Make sure that all power switches have been turned off and all power cords disconnected to prevent personal injury and damage to the hardware.
3. Static electricity can damage electronic components of your system. Follow the guidelines below to avoid such damage:
    a. Work in a static-free environment.
    b. Wear a grounded anti-static wrist strap.
    c. Store uninstalled components in anti-static bags.
    d. Handle circuit boards by their edges and avoid touching chips and connectors.

2.2 Choose Location for the System

The ExaSAN A08S4-PS is designed as a tower solution. Depending on where your desk, rackmount cabinet, or other install location is, you should keep the following in mind when determining where to place your system.
1. Measure the available space of your desk for the space required for the A08S4-PS. (Refer to chapter 1.1.2 for the dimension.)
2. Measure the distance between any two components that need to be connected via cable(s). This measurement will help you determine the length of the required cable(s). If you've already purchased the cables, it helps you to determine the proximity of the components in question.
3. Leave sufficient room, at least two inches, around the unit to allow air ventilation.
4. Do not block or cover any of the ventilation holes in the front and back panels of the unit. Consistent airflow is essential to keep the system operating efficiently.
5. Make ample room at the front and back of the unit for service.
6. The ExaSAN A08S4-PS uses several cables and cords. It's a good idea to determine how they will be arranged at the rear of the system, and where the cables will be routed to connect the host systems and RAID disk systems.

2.3 Electrical Power

At your chosen location for the ExaSAN A08S4-PS, make sure that the electrical circuitry and power outlets are sufficient for the combined power needs of all hardware components. To plan for safe and adequate power for the system, follow these guidelines:
1. Check the documentation for all hardware components at the chosen location to determine their power requirements. Then make sure that the available power supply for that location is sufficient for the planned components.
2. It is better to use surge protectors or power conditions as part of the installation.

3. When planning for electrical power, make sure you have more power than the total power requirements specified for all components. Also make certain that the power load is distributed evenly among circuits on that location. Consult an electrician or an expert if you need assistance in planning for the power needs for your components.
4. Make sure that the power outlets for all hardware components are grounded according to local and national standards. Consult an electrician if you need assistance in grounding.

2.4 Operating Environment

The operating environment for the ExaSAN A08S4-PS must meet certain requirements:
1. Verify that the temperature range of the chosen location is within the limits established for the system and all other components.
2. Make certain that the chosen location has adequate ventilation to maintain the necessary temperature range.
3. If there are multiple hardware components installed at the chosen location, consider additional cooling measures to assure efficient operation of the system and other components.
4. Environment parameters:
    a. Operating temperature: 0°C to 40°C (32°F to 104°F)
    b. Operating humidity: 5-85%, non-condensing
    c. Storage humidity:5%-95%, non-condensing

2.5 Security

To ensure the security of the ExaSAN A08S4-PS, make certain that the chosen location meets your security requirements.
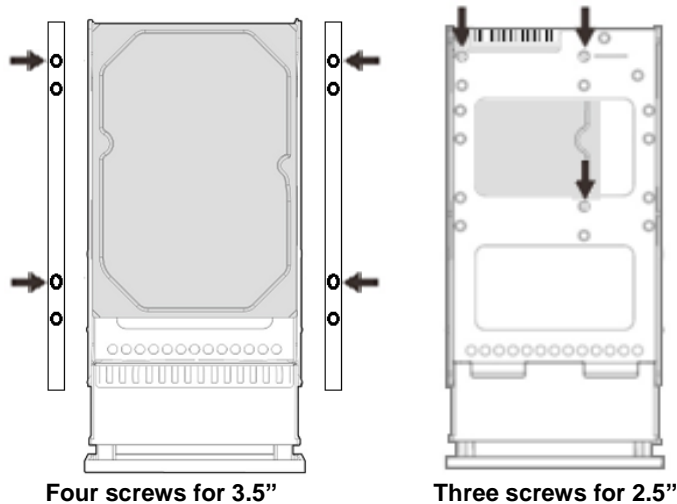
3. Install the ExaSAN A08S4-PS

3. Install the ExaSAN A08S4-PS

Follow the steps in this chapter to install your ExaSAN A08S4-PS system

3.1 Install Disk Drive

Follow the steps below to install your drives:
1. Place the drive with connector aligned with the edge of the disk tray.
2. Secure the drive with screws as the figures below show.

Four screws for 3.5"   **Three screws for 2.5"**

3. Slide the disk tray into the disk bays on the back of the chassis.
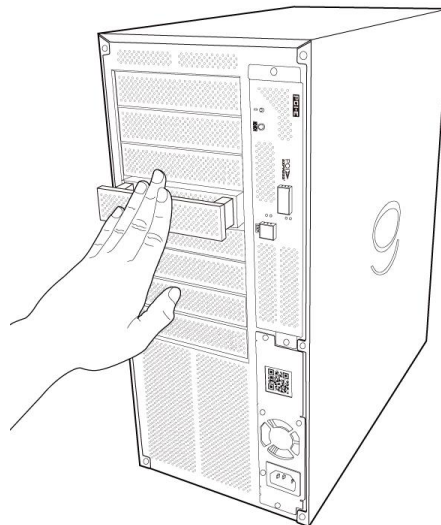
4. Push the tray inward until it clicks and firmly connects.
5. Repeat step 4 until all the drives are installed into the A08S4-PS.

> **Note**
> Drives with the same size, speed, model and firmware version are recommended.

3.2 Install the HBA Card

Before the ExaSAN A08S4-PS is ready to be connected and powered on, you must install the HBA card in the workgroup client system. The HBA card is compatible with PCIe x8 and x16 slots, and both PCIe 2.0 and 3.0 standards. Note, PCIe x16 slots is recommended.

> **Note Caution**
> PCIe slots on some motherboards are for graphics cards only. Check with the motherboard vendor for compatibility.

Follow these steps to install the card in the host system:

1. Make sure that the client system is turned off.
2. Open the client system's outer casing cover; check your vendor documentation for instructions if necessary.
3. Locate the available PCIe slot.
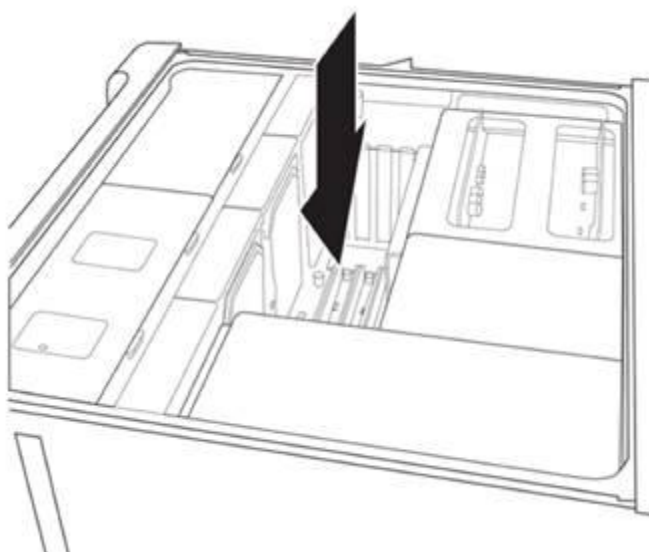
4. Position the connector of the card over the slot, insert the connector into the slot, and press gently but firmly until it is securely seated.
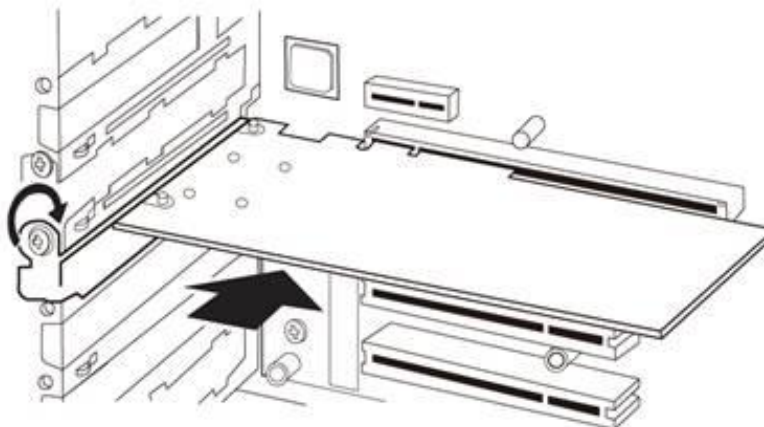
5. Put back the outer casing cover and you are done.
6. Connect QSFP cable to Z2M HBA, which has two ports for DAS and SAN.

- DAS port: For DAS (Direct-Attached Storage) mode.
- SAN port: For SAN (Storage-Attached Network) mode, supporting ExaSAN switch.
  (Refer to the link below for more detail on how to build a SAN environment:
  http://www.accusys.com.tw/ExaSAN/SW16.html#)
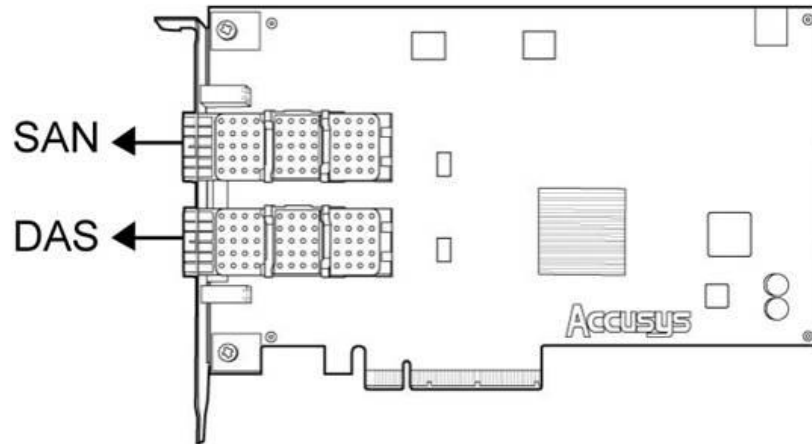
7. Connect the other end of the QSFP connector to the ExaSAN A08S4-PS.

8. Turn on the A08S4-PS. RAID will be ready in a few seconds with a short beep, and then power host system to install driver and GUI.

3.3 Install Driver and GUI

Installation files can be found in installation USB, or can be downloaded from our website (http://www.accusys.com.tw/support/download.html). If you need further technical support, please contact your reseller or Accusys support team (see Appendix B "Customer Service and Technical Support" for more information).

Note
• For Mac/Windows platform: Double click installer package to install both driver and GUI.   • For Linux platform: Linux driver and GUI must be installed separately and manually.

3.3.1 Install Driver and GUI on MAC and Windows

1. For Mac, double click the file "/MAC Installer/Vx.x/Accusys_IP_MAC x.x.x.mpkg".
2. For Windows, double click the file "/Windows installer/Vx.x/Accusys_Win_x.x.exe".
    Follow the onscreen instructions and click **Restart** to complete installation.

3.3.2   **Install Driver and GUI on Linux**

Linux driver and GUI must be installed manually; the following procedures will guide you.

- **Driver Installation**
- **RAIDGuardX Installation**

3.3.2.1 Driver Installation

1. You must have your Linux system with developmental environment to make driver for respective Linux kernel. For example, when installing CentOS, you should check "Development Tools > Optional Packages".

2. Open a terminal window, change to Linux driver source directory, and type command 'make' to build driver file 'ACS6x.ko'

   # sudo make

   # sudo insmod ACS6x.ko
   # sudo lsmod   //to see if ACS6x driver is running

3. Start ACS6x.ko driver automatically after reboot

A. Copy driver file ACS6x.ko to driver folder.

 # sudo cp ACS6x.ko /lib/modules/{linux kernel}/kernel/drivers/scsi
(Note: 'uname -a' can find {linux kernel})

B. Upgrade all default modules

//For RHEL, CentOS, Ubuntu, etc
 # sudo depmod –a

// For SUSE, SLES
#Set the line "**allow_unsupported_modules**" from 0 to **1** by editing
/etc/modprobe.d/unsupported-modules

C. Reboot to make it available

3.3.2.2 RAIDGuardX Installation

Before running RAIDGuardX, make sure the driver is running.

1. Two source files needed: GS (RAIDGuardX Server) and GC (RAIDGuardX Client), which can be downloaded from Accusys website:
   http://www.accusys.com.tw/support/download.html.

   GS location: /{ExaSAN model}/GUI/Server/Linux.zip
   GC location: /{ExaSAN model}/GUI/Client/x.x.x.zip

Note
• If the ExaSAN storage is connected with PCIe switch, GS is not necessary then; GC can manage RAID system remotely through Ethernet.

2. Perform GS, open a terminal console, and enter the following commands:

   # sudo cd /Accusys/GS/Linux/X.X.X
   # sudo chmod -R 777 SourceCode
   # sudo cd /Accusys/GS/Linux/X.X.X/SourceCode/
   # sudo ./make.sh
   # sudo cd /Accusys/GS/Linux/X.X.X/AP_Accusys/
   # sudo ./DTRGuiSrv_64   //RAID controller serial number would appear once GS ran success

```
[accusys@accusys Desktop]$ su
Password:
[root@accusys Desktop]# cd '/home/accusys/Desktop/Linux/AP_Accusys'
[root@accusys AP_Accusys]# ls
activation.jar            jMsgFrame.class
DTRGuiSrv                 mail.jar
DTRGuiSrv_64              MulticastReceiver.class
EchoBack$1.class          SendMail$1.class
EchoBack.class            SendMail.class
event_0000300000000000000       sock2srv.class
event_0000300000000000000_376   sockThread.class
event_0000300000000000000_406   srvGui_req_frame.class
event_0000300000000000000_522   UDPBombermanServer.class
event_0000300000000000000_670   UDPServer.class
event_bin_0000300000000000000
[root@accusys AP_Accusys]# ./DTRGuiSrv_64
GS.89 (Jun 17 2016 - 16:12:43).
Test ACSDBGMSG.
Start initialize share Mem for GUI Config ...
Start initialize share Mem for all Ctlrs ...
Find Card [0] : Index : 0.
Find Card [1] : Index : 0.
FillCtlrInfoDevName : Dev 00 bCtlrSN: 0000300000000000000, bModelName A08S4-PS
```

3. Open another terminal, make sure the Java version is higher than 1.6, and enter the following commands:

   # java –version

```
[root@localhost ~]# java -version
java version "1.6.0_14"
Java(TM) SE Runtime Environment (build 1.6.0_14-b08)
Java HotSpot(TM) Client VM (build 14.0-b16, mixed mode, sharing)
[root@localhost ~]#
```

If your Java version is earlier than 1.6, please upgrade it from www.java.com

4. Perform GC, and enter the following commands

   # sudo cd /Accusys/GC/3.x.x./3.x.x/
   # sudo java –jar RAIDGuardX.jar   //RAIDGuardX Client console would appear

```
root@localhost ~]# cd Desktop/Accusy/GC/3.1.8/3.1.8/
[root@localhost 3.1.8]# ls
Help  RAIDGuard X.app  RAIDGuardX.jar
[root@localhost 3.1.8]# java -jar RAIDGuardX.jar
```

5.　Add controller to manage ExaSAN RAID system.
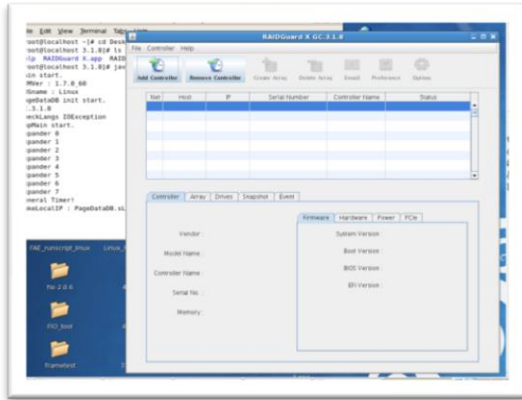
3.4　Create Array

Array can be created with a few clicks on RAIDGuardX (refer to Section: Creating an Array for more detail);

1.　On RAIDGuardX, select RAID level, Sector size, drive member and initialization type, then check Assign LUN automatically and press **Create Array** bottom to complete.

2.　New disk volume should appear on host OS immediately; format it as you want and enjoy the high access speed of the ExaSAN storage.

4. Use RAIDGuardX

4.   Use RAIDGuardX GUI

4.1 RAIDGuardX Overview

RAIDGuardX supports local and remote monitoring of multiple controllers that are connected to the same network. It consists of 2 components: **RAIDGuardX-Client** and **RAIDGuardX-Server**.

RAIDGuardX-Client: A java-based console for managing and monitoring RAID system.

RAIDGuardX-Server: RAIDGuardX-Server is an agent service in charge of communication between RAIDGuardX-Client and RAID controller; it MUST be installed on the host directly connected to RAID system.
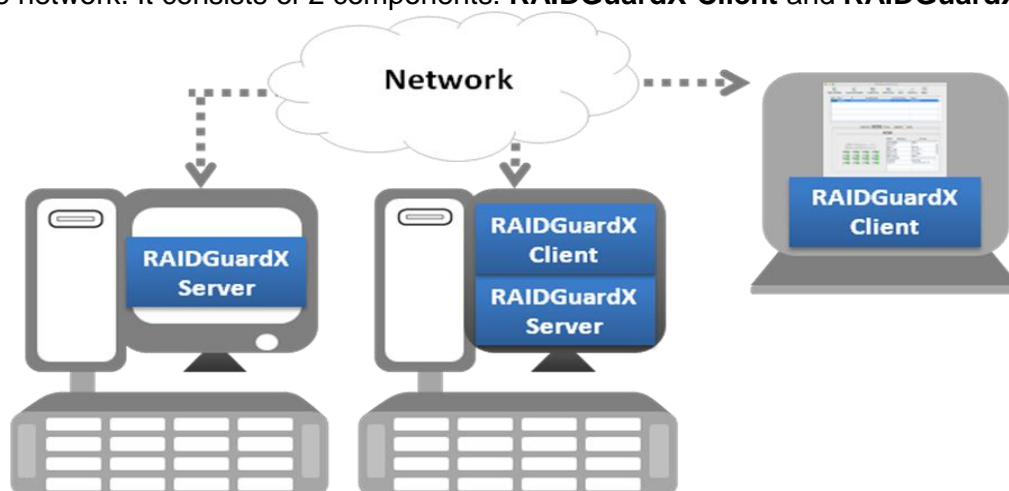
4.1.1 Menu Bar

The menu bar contains the following functions:

Function		Description
File	Exit	Close the program
	Load Controller List	Refresh the controller list
	Language	English and Japanese are supported
Controller	Manual Add Controller	Add remote controller by IP address of RAIDGuardX-Server
	Update	Update firmware (System Code, Boot Code, etc.)
	Dump controller log	Download controller log for troubleshooting
	Disk RW Test	Test Read/Write speed on each disk
Help	Search	Search keyword in RAIDGuard X
	Help Center	Displays the help for RAIDGuard X

4.1.2   **RAIDGuardX Main Console**
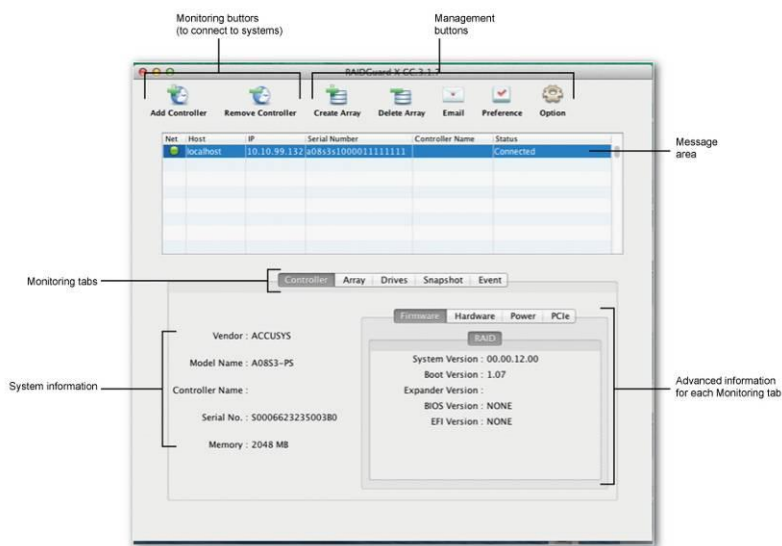
| Function	Description		
Monitoring Buttons	**Add controller** into RAIDGuardX (for DAS only)		
	Remove controller from RAIDGuardX		
Management Buttons	**Create array** in the RAID system		
	Delete array in the RAID system		
	Email notification setting		
	Preference	**Drive Lag Proof** Enable/ Disable	
		NCQ mode Enable/ Disable	
		SMART Mode Enable/ Disable	
		Beeper Enable/ Disable	
		Equalization Enable/ Disable	
		Cache of controller and drives can be enabled/disabled	
		MISC for controller Time setup	
	Option	**Slicing** an existing array for multiple slices	
		LUN Map setup for multiple slices	
		Expansion with new drive into an array	
		Migration between different RAID level	
		Snapshot for backup data in a particular time	
		Health Center for checking array status	
		Unlock Drives from locked mode	

4.2 Add/Remove Controller

RAIDGuardX can manage the RAID controller locally or remotely via intranet access.
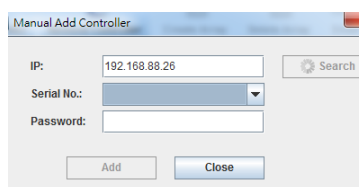
4.2.1 Add Controller

1. Open RAIDGuardX-Client, you may add controller **locally** or **remotely**;

   Locally: Click **Add Controller** to display a list of available controllers.
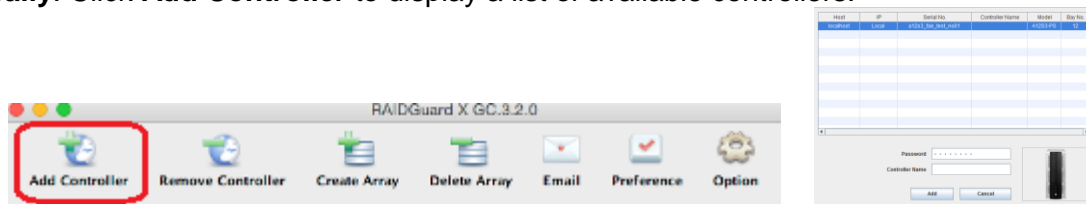
   Remotely: Click Controller tab > Manual Add Controller, key in the remote host IP address (where the RAIDGuard-Server is installed), and click Search to display all available controllers.

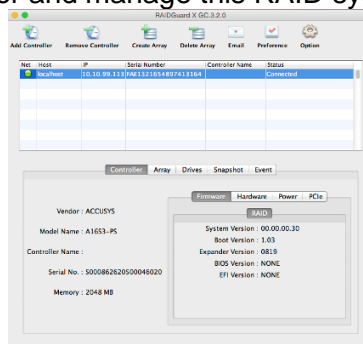2. Click a controller and enter password (default is 00000000, 8 zeros), key in a controller name to remark, and click **Add** to open main console.

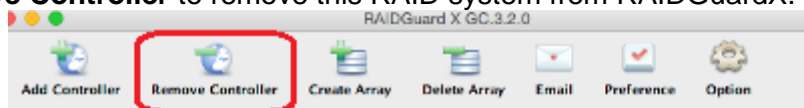   > **Note**
   > Password can be changed in section **Preference > MISC**.

3. In main console, you can monitor and manage this RAID system.

4.2.2 Remove Controller

Click **Remove Controller** to remove this RAID system from RAIDGuardX.

4.3 Create/Delete an Array

This chapter will guide you on how to use RAIDGuardX to create/delete a disk array.

4.3.1 Create Array

1. Click **Create Array**, and the create array page will pop up as below.

> **Note**
> 1. Check **LUN assign automatically** and you can select host port.
> 2. You can change the setting of host port on **Options > LUN connect**.

2. Select the RAID level from the drop down menu. Available levels are: 0, 1, 5, 6, 0+1, and enhanced JBOD. Find more detail in **Chapter 5 RAID Overview.**

3. Select the sector size. Available sector sizes are 512 bytes (default) and 4096 bytes. The sector size 4096 bytes is only used on WinXP for recognized over 2TB volume.

4. Click the drive icon or **Select all spare drivers** to select all available drives.

> **Note**
> Unselected drive will be set to Hot (Global) spare drive. If an array member drive fails, spare drive will start to rebuild automatically.

5. Click the initialization type: **On-the-fly initialization** or **Performance evaluation.**
   On-the-fly initialization (Default) – While RAID systems record the initialized sectors in the bitmap, you can still use the RAID system during the initialization.

- Initialization completed
- Access without overhead

Bitmap to record the initialized sectors

- Initialization not completed
- Access with parity resync and record in the bitmap
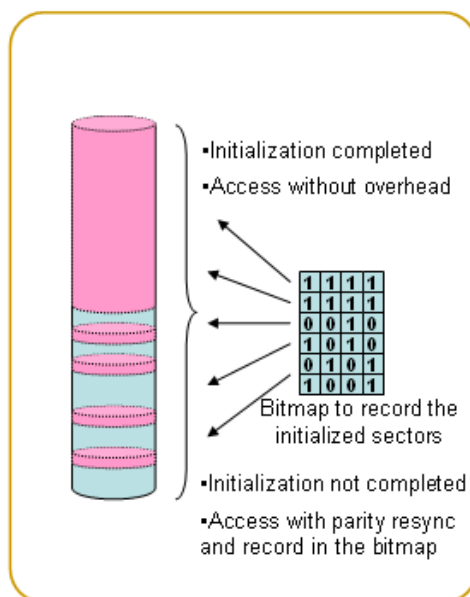
Performance evaluation – Select it to evaluate the performance of the target array. It will take no time for array initialization; there is no data protection, for testing purpose only.

> **Caution**
> Array created by **Performance evaluation** could not do array rebuild, DO NOT use this type for production environment.

6. Check **Assign LUN automatically**. You can change the LUN map in **Options** anytime.
7. Click **Create Array** to start array initialization; the status of the array initialization progress can be observed.
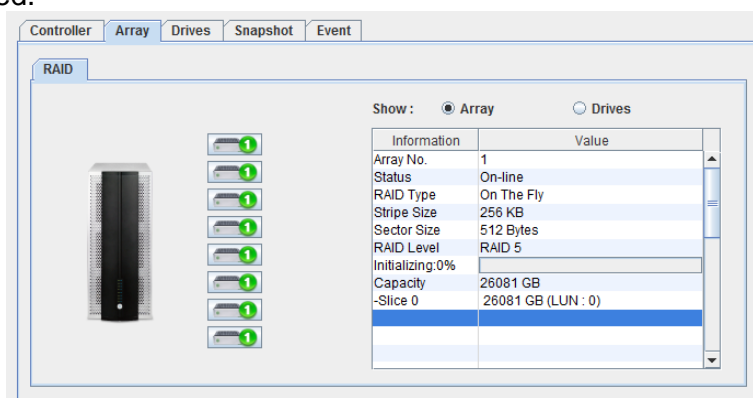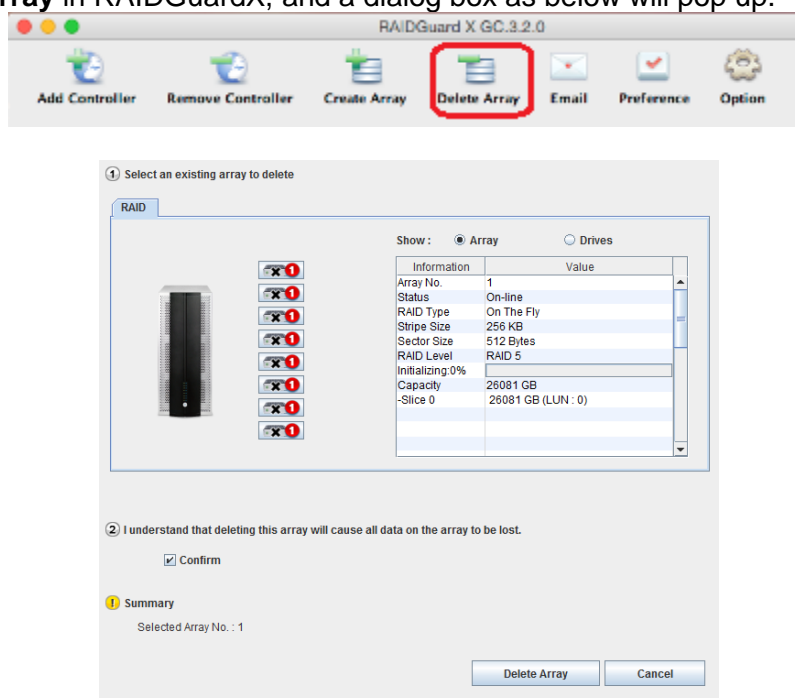
> **Note**
> Up to 5 array groups.

4.3.2 Delete an Array

1. Click **Create Array** in RAIDGuardX, and a dialog box as below will pop up.

2. Click the drive icon of the array to delete it.
3. Check the **Confirm** box. Click **Delete Array** to complete the process.

> **Note**
> Array cannot be deleted during any actions, e.g. initialing, rebuilding.

> **Caution**
> When an array is deleted, all data on the hard disk drives will be lost.

4.4   Email Notification

It may be necessary for network administrators to receive e-mails in the event of errors, alerts, and changes to the RAID array. These alerts can be e-mailed to a maximum of 20 e-mail addresses.

1. Mailing List
Enter the e-mail addresses that will receive controller error reports.
Click **Remove** to delete e-mail addresses from the list.
Click **Send Test Email** to check that the e-mail is working.

2. SMTP Setting
Mail Server Name – Enter the address of the mail server.
From Email Address – Enter the e-mail address of the mail server.

3. SMTP Server – Set authenticated user name and password
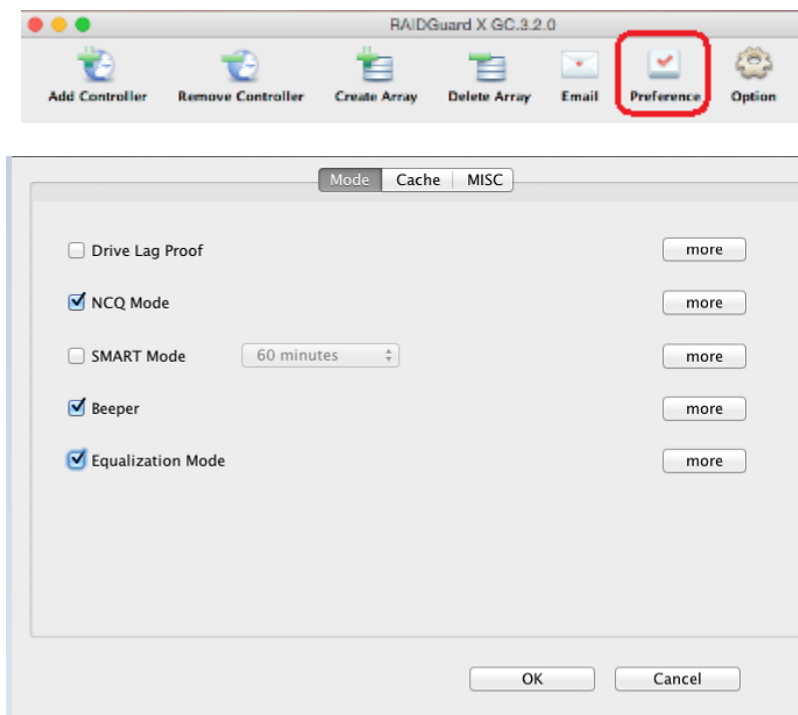Check this box if your mail server requires a user name and password.

4. SMTP POST Event
When an error happens, RAID controller will automatically send a notice email to the specified mailing list.

> **Note**
> 1. Ask your systems administrator for SMTP Server detail.
> 2. Support outbound SMTP mail service, e.g. Hotmail, Yahoo.
> 3. Contact tech support for more detail.

4.5 Preference

4.5.1 Disk Lag Proof

This feature ensures the stability and continuity of the RAID performance. In RAID 5 and RAID 6, DLP prevents a single hard disk influencing the overall performance from aging or slow response. The advantage of this feature is to make sure the data is protected when some of the hard disks fail to perform well.
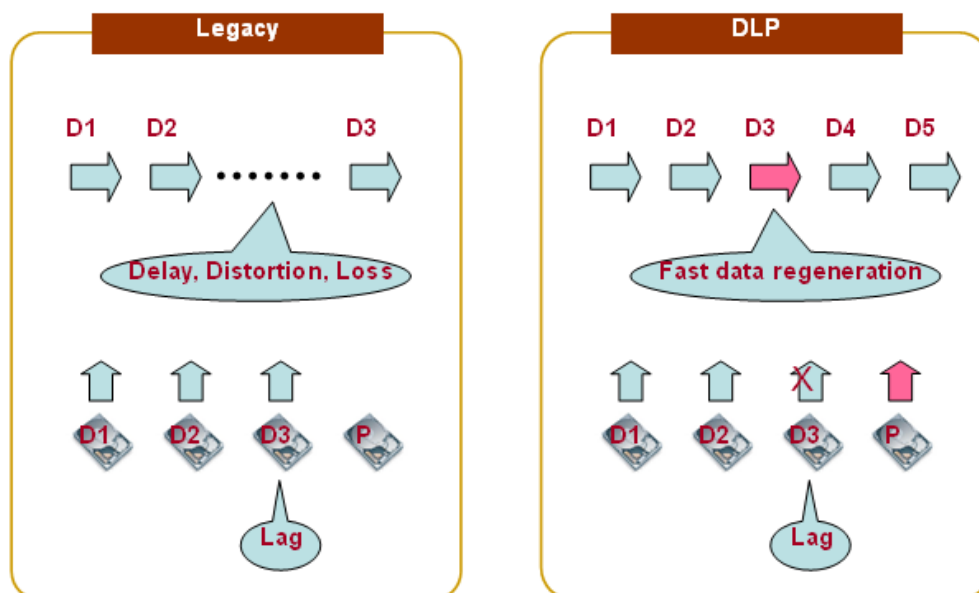
In the event of performance degradation or delay of a single drive due to aging, the RAID system reads both data and parity stripes concurrently. It bypasses the slow reads, returns data to the host with the regenerated one, and provides stable performance based on the RAID parity.

> **Note**
> Slow response of some hard disks can be tolerated in DLP mode.You may use S.M.A.R.T. function to check the conditions of hard disks in an array and replace the faulty ones.

4.5.2 **NCQ**

Native Command Queuing (NCQ) is an extension of the Serial ATA protocol allowing hard disk drives to internally optimize the order, in which received read and write commands are executed. This can reduce the amount of unnecessary drive head movement, resulting in increased performance (and slightly decreased wear of the drive) for workloads, where multiple simultaneous read/write requests are outstanding.
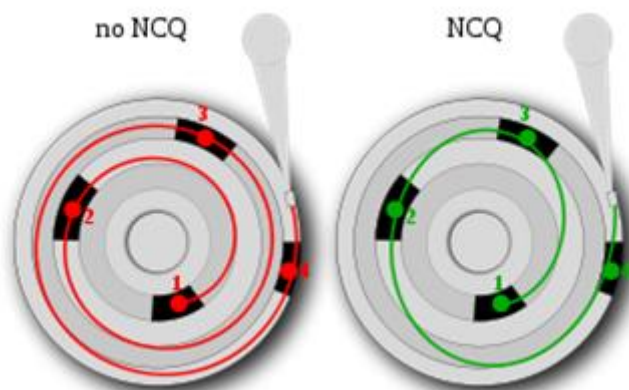
The figures above illustrate the access sequence in NCQ and non-NCQ mode. The content sequences of the two hard disks are the same: 1, 2, 3, 4. However, the access sequence in NCQ mode may vary to improve the performance.

4.5.3 **SMART Mode**

S.M.A.R.T. is a monitoring system of disk drives to detect and report on various indicators of reliability, in the hope of anticipating failure. Accusys RAID system supports S.M.A.R.T. Once this function is selected, you can select check interval from 1 minute to 8 hours from the drop-down list for SMART Mode to be active. The RAID controller will command each hard disk to perform S.M.A.R.T. according to the check interval selected. The check results will be shown as an event message in the main menu.

When running S.M.A.R.T. mode, the performance of the system will be slightly affected. The higher the check frequency is, the more the sequential accesses are affected. It is recommended to turn off S.M.A.R.T. if high performance is required. On the other hand, running S.M.A.R.T. constantly allows you to monitor the conditions of hard disks anytime.

The options of interval time to check disk's S.M.A.R.T are 1,15,30,60 minutes and 2, 4, 8 hours. We strongly suggest 8 hours. Frequent checking will reduce the life time of hard drives.

4.5.4   **Beeper**

You can choose to enable/disable the system beeper; the default is beeper enabled.


4.5.5   **Equalization Mode**

Regardless the transmission method, the data transmission speed cannot be guaranteed at all times. This feature allows the continuous I/Os to operate more smoothly and substantially reduce large fluctuations in efficiency during data transfer. For video editing, it enables equalization to prevent video frame drops.
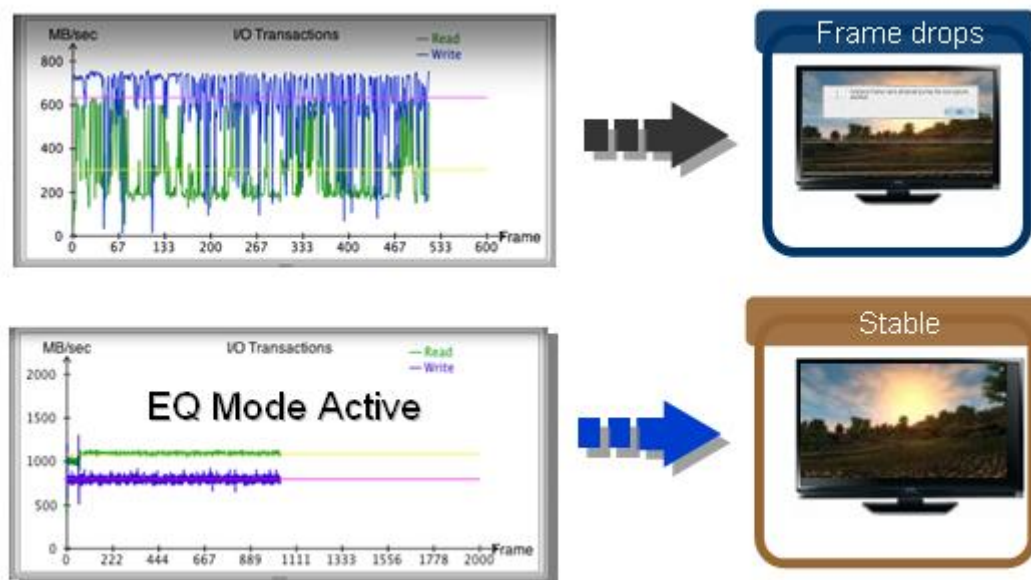
4.5.6   **Cache**

In this section, cache of RAID controller and drive can be configured manually; the default setting is tuned for the video streaming application.
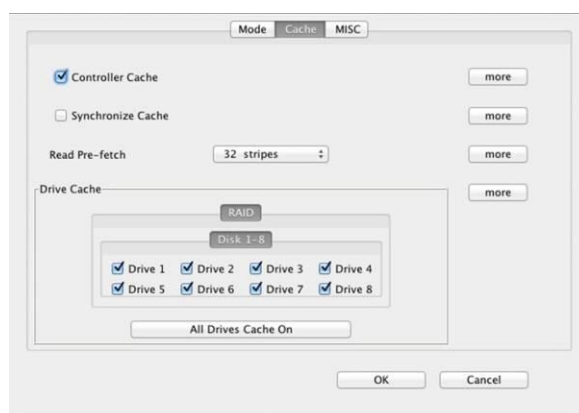
Controller Cache – Check this box to enable the controller cache. This speeds up the data transferring to and from the disks.

> **Caution**
> Data in cache may be erased if unexpected power-down occurs. It is suggested to use a UPS (uninterruptible power supply) to prevent this scenario.

Synchronize Cache – Check this box to enable cache synchronization with drives to ensure all write data is correct, in case there is frequent latency. For video capture, disable synchronization, because the video capture needs to constantly write data to the RAID storage without long latency.

Read Pre-fetch – It identifies sequential access patterns and actively pre-fetches patters into cache. Choose the number of stripes from the drop down list to pre-fetch. The default is 32, which is recommended.

Drive Cache – Choose the drives to cache. When more than one application accesses the database, the first application cache needs to synchronize with the second one. Each drive contains a built=in write cache; check these boxes to choose which drives to enable the caching on. Caching improves the efficiency and speed of data transfer.

All Drives Cache on/All Drives Cache off – Click this button to enable/disable the caching on for all available drives.

> **Note**
> If **Equalization mode** is enabled, **Synchronize Cache** and **Read Pre-fetch** will be disabled automatically.

4.5.7   **MISC**

MISC (Minimal Instruction Set Computer) has standard RAID controller time settings. The time of each event is displayed in the event logs in event message.

Controller Time – Click this button to see a calendar and to change the time and date of the controller.

Password – Enter the new controller password. The default password is 00000000 (8 zeros). Type another 8 characters to create a new password.

**Password Confirmation** – Confirm the new controller password.

> **Note:**
> If you forget your password, you will have to contact your agent or the Accusys Support Team.

SNMP Notification –SNMP stands for Simple Network Management Protocol. Select **SNMPv1** or **SNMPv2** to send notifications for error conditions and possible problems to the SNMP servers.

SNMP Target – Enter the IP address for sending the SNMP notifications.

4.6 Option
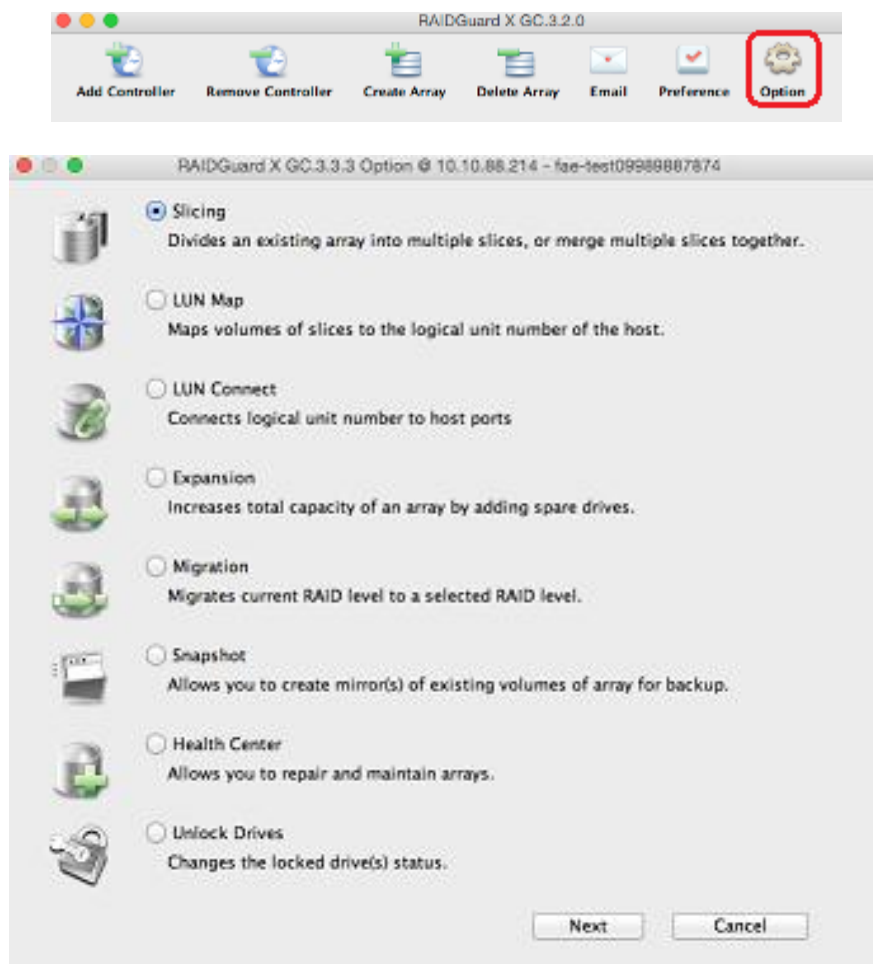
4.6.1 Slicing

RAID slicing overcomes the inherent design of how data is stored on a drive or RAID system by subdividing a RAID array into segments, or slices. These slices are effective hardware partitions of all drives in the array. Each slice is a separate LUN and appears as a separate volume on the host computer. After slicing, the LUN map must be set for each slice.


Slicing concept
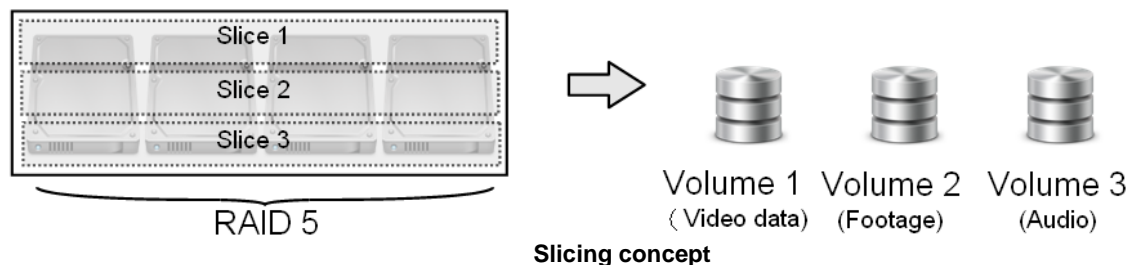
Usage Scenario:

The access speed of the data stored in the outer circle is faster than that in the inner circle. Suppose there are two slices in a hard drive, Slice 0 in the outer circle and Slice 1 in the inner circle, for audio/video editing, you may store video data in Slice 0 and audio data in Slice 1.

Slice 0
(outer circle)

Slice 1
(inner circle)

RAID 5
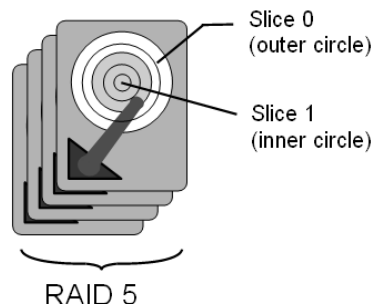
Follow the steps below to select an array to slice or merge.
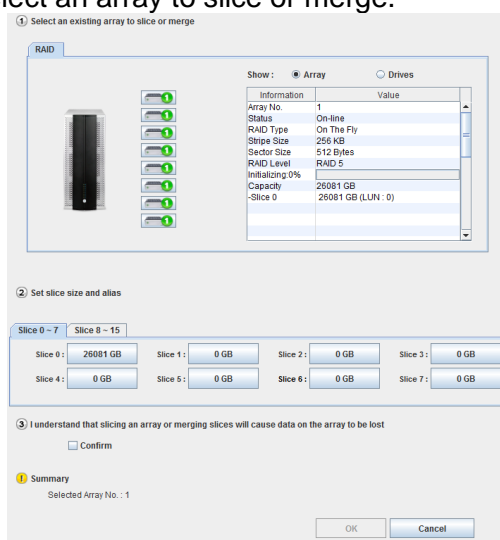
1. Select the array by clicking on a drive with an array number. The capacity is displayed. By default, Slice 0 contains the entire capacity of the disk array.
2. Click on Slice 0, use the slide bar or button of percentage to slice space and click OK to confirm. Repeat this steps to slice more spaces if needed.
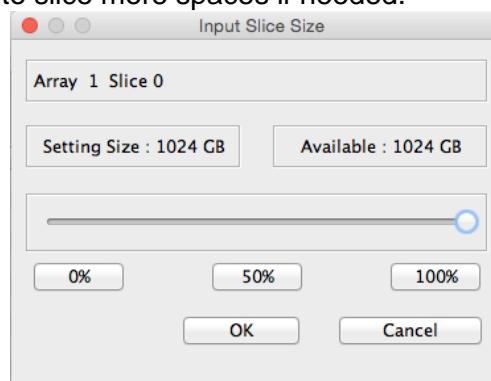
Note
- Up to 16 slices per array.
- The total number of unique arrays' slices cannot exceed 16.

4.6.2 **LUN Map**

LUN, acronym for **L**ogical **U**nit **N**umber, is used to identify a logical unit in computer storage. When creating an array, you may select **Assign LUN automatically** to automatically assign a LUN to the new array. If **Assign LUN automatically** is not selected, you will need to assign the LUN manually by using LUN map.

> **Note**
> • One slice can only be assigned as one LUN.
> • Up to 64 LUNs.

1. Select the array to map by clicking on a drive with an array number.

2. Choose a LUN, select a slice from the drop down list to map, check the **Confirm** box and click **OK**.

3. Repeat the steps to set more LUN maps if needed.
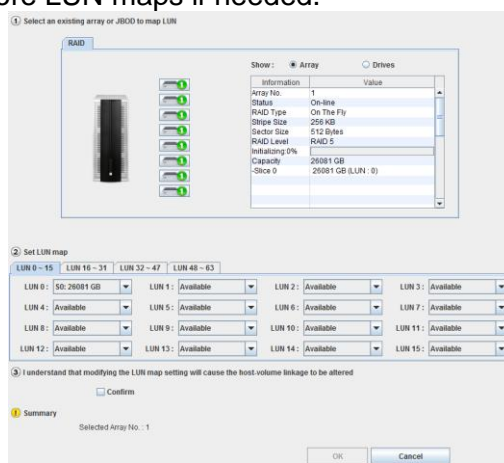
4.6.3 **Expansion**

Expansion means to add extra disks to an existing array. There is no need to create a new array or stop an array; you may add new disks online while the array is in use, but during the process its performance will be affected considerably. You may check the progress of Expansion in the main view.

Example:

RAID 6 with 4 drives   x2 spare disks   RAID 6 with 6 drives

> **Note**
> The capacity of each new hard drive must be larger than or equal to the minimum capacity of the existing one of the array.

Follow the steps below to to expand an array:

1. Select the array to add additional drives, and select the number of drives added. A "+" sign appears above the drives to be added.

2. Check the **Confirm** box and click **Expand Array**.

4.6.4   **Migrations**

Different from Expansion, which enlarges an array by adding hard drives to a fixed RAID level, Migration changes the RAID level of an array. It allows live changes to the RAID without deleting or rebuilding the array. This can be useful when new drives have been added, and a new array type needs to be created.
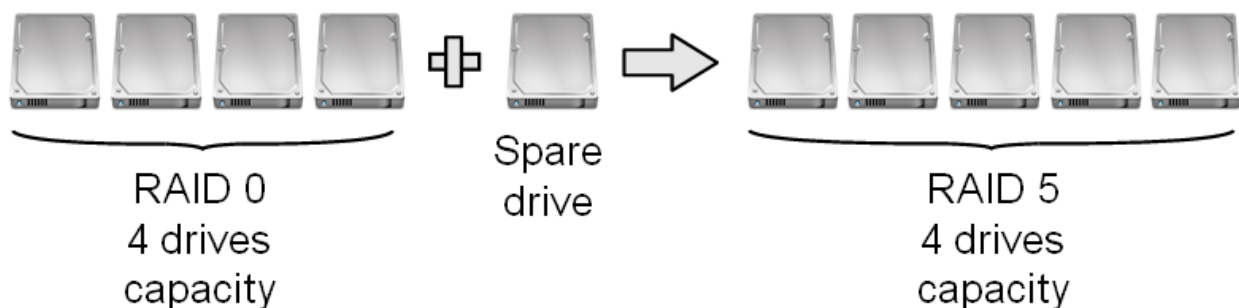
Example 1:
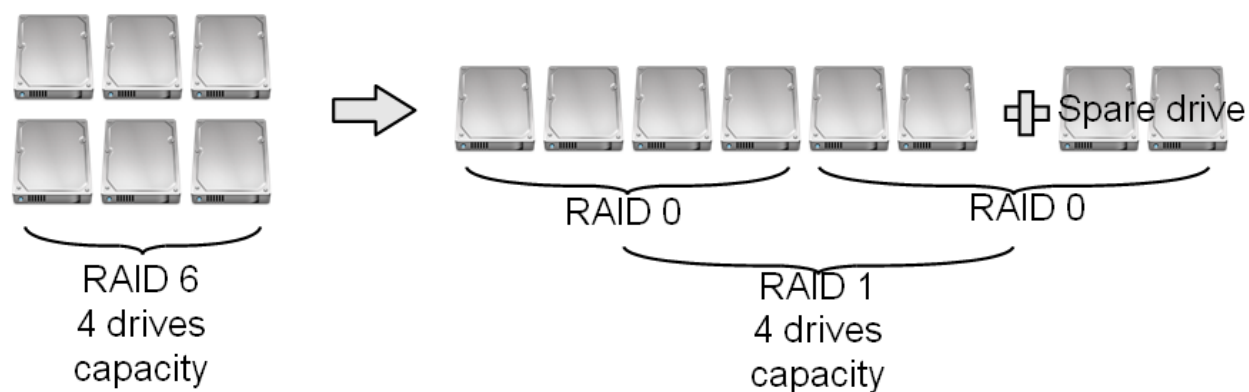RAID 5 (12 drives) –Migrating→ RAID 0 (>11 drives)
RAID 5 (12 drives) –Migrating→ RAID 6 (>13 drives)
RAID 5 (12 drives) –Migrating→ RAID 0+1 (>22 drives)

Example 2:

RAID 0
4 drives
capacity

Spare
drive

RAID 5
4 drives
capacity

Example 3:

RAID 6
4 drives
capacity

RAID 0

RAID 1
4 drives
capacity

RAID 0

Spare drive

> **Note**
> The capacity of each new hard drive must be larger than or equal to the minimum capacity of the existing one of the array.

Follow the steps below to migrate an array. This changes the RAID level, such as from RAID 1 to RAID 5.

1. Select the array to migrate. Select the RAID level from the drop down menu to migrate, and then select the total number of drives to be added to the array. A "+" appears above the drive(s) to be added, and a "-" sign above the drive(s) to be removed.
2. Check the **Confirm** box and click **Migrate**.

3.   The main array information screen shows whether the array is currently migrating.

4.6.5   **Snapshot**

A snapshot is initialized with a data duplicate from a source to a target. The mirror snapshot is offered by the ExaSAN RAID controller.

> **Note**
> The source and target volume of the snapshot must be identical.

Before setting a snapshot, you need to set the slice in the array. The capacity of each slice and the number of shots should be in accordance with the space you need.

As shown in the figure below, a snapshot can be created by splitting the source and target after the background sync is completed. The I/O mirroring is stopped, and the difference is under tracking in a bitmap table to support fast re-sync.
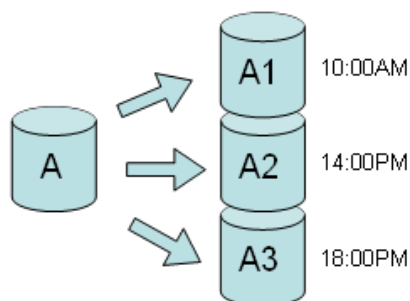
Create Shot
Create a snapshot of the selected slice. A maximum of 8 shots can be created. Once all shots have been used, older shots must be deleted before new ones can be taken.

1. Select **Create Shot** from the drop down menu.
2. Select the required shot by clicking on the Shot No. radio button, and then select the source volume and destination volume from the respective drop down menus. Unavailable shots are grayed out.
3. Check the **Confirm** box and click **OK** to take a snapshot.

Delete Shot
Delete the selected shot.

1. Select **Delete Shot** from the drop down menu.
2. Select the required shot by clicking on the Shot No. radio button, and then select the source volume and destination volume from the respective drop down menus. Unavailable shots are grayed out.
3. Check the **Confirm** box and click **OK** to delete a snapshot.

Split Shot
Split Now –
Split the selected shot or changes scheduling. The shot is split and read as two separate shots; therefore, it becomes two separate slices after being split.

1. Select **Split Shot** from the drop down menu.
2. Select the Split Now radio button.
3. Select the required shot by clicking on the Shot No. radio button, and then select the source volume and destination volume from the respective drop down menus. Unavailable shots are grayed out.
4. Check the **Confirm** box and click **OK** to split the snapshot.

Split Scheduling –
Set time to split shot.

1. Select **Split Shot** from the drop down menu.
2. Select the Split Scheduling radio button.
3. Click on the time and date button to set split time.
4. Select the required shot by clicking on the Shot No. radio button, and then select the source volume and destination volume from the respective drop down menus. Unavailable shots are grayed out.

5. Check the **Confirm** box and click **OK** to split the snapshot.

Cancel Scheduling –
Cancel the split shot scheduling.

1. Select **Split Shot** from the drop down menu.
2. Select the Cancel Scheduling radio button.
3. Select the required shot by clicking on the Shot No. radio button, and then select the source volume and destination volume from the respective drop down menus. Unavailable shots are grayed out.
4. Check the **Confirm** box and click **OK** to split the snapshot.

Resynchronize Shot
Resynchronize the selected shot. This function can speed up mirroring for previous snapshots.

1. Select **Resynchronize shot** from the drop down menu.
2. Select the required shot by clicking on the Shot No. radio button. You can only select split shot for resynchronization.
3. Check the **Confirm** box and click **OK** to split the snapshot.

> **Note**
> 1. The destination volume must be equal to or larger in size than the source volume.
> 2. The source volume and the destination volume can be in different arrays.
> 3. The destination volume must NOT be mapped to a LUN.
> 4. A shot will not be deleted if the details of the array change. The only way to delete a shot is using the Delete Shot function under Snapshot.

4.6.6 **Health Center**

To ensure the accuracy of the RAID parity data, RAID controller offers Background checking and "Rebuild parity data." During checking or rebuilding parity, the performance of the array will be affected. You may check the progress in the Main view or in the Health Center.

Follow the steps below to select an array to verify, rebuild, or condition.
1. Select the Array to verify, rebuild, or condition.
2. Click the radio button to:

Rebuild the parity data – Rebuilding parity on an array uses the data on the array to create new parity data, no repair problems with the data.

Verify the parity data – Verify that the data is free of errors.

Refresh array data and parity – Select the priority between Low, Med., or High. This process scans, rewrites, and scrubs bad data conditions caused by excessive vibration during drive I/Os, or data degradation caused by Adjacent Track Interference (ATI).

3. Click OK to start the operation.

4. The main array information screen will indicate that the array is undergoing rebuilding, verification, or refreshing.

4.6.7 **Unlock Drives**

The RAID controller may lock abnormal drives in an array. You may unlock these drives and rejoin them into an array. Drives may be locked with one of the following conditions:

1. If a drive returns data too slowly, the controller will determine the drive is experiencing a failure and execute Drive Drop. When you unlock the drive, it will be added directly to the array if there has not been drive access during the locked period. Otherwise, the controller will rebuild parity data on the drive when the drive is online.

> **Note**
> If "Drive Drop" occurs, it is recommended to use S.M.A.R.T. to check the drive condition and replace it if necessary.

2. When a drive has been used by RAID system, that drive will be locked if inserted to another RAID system.
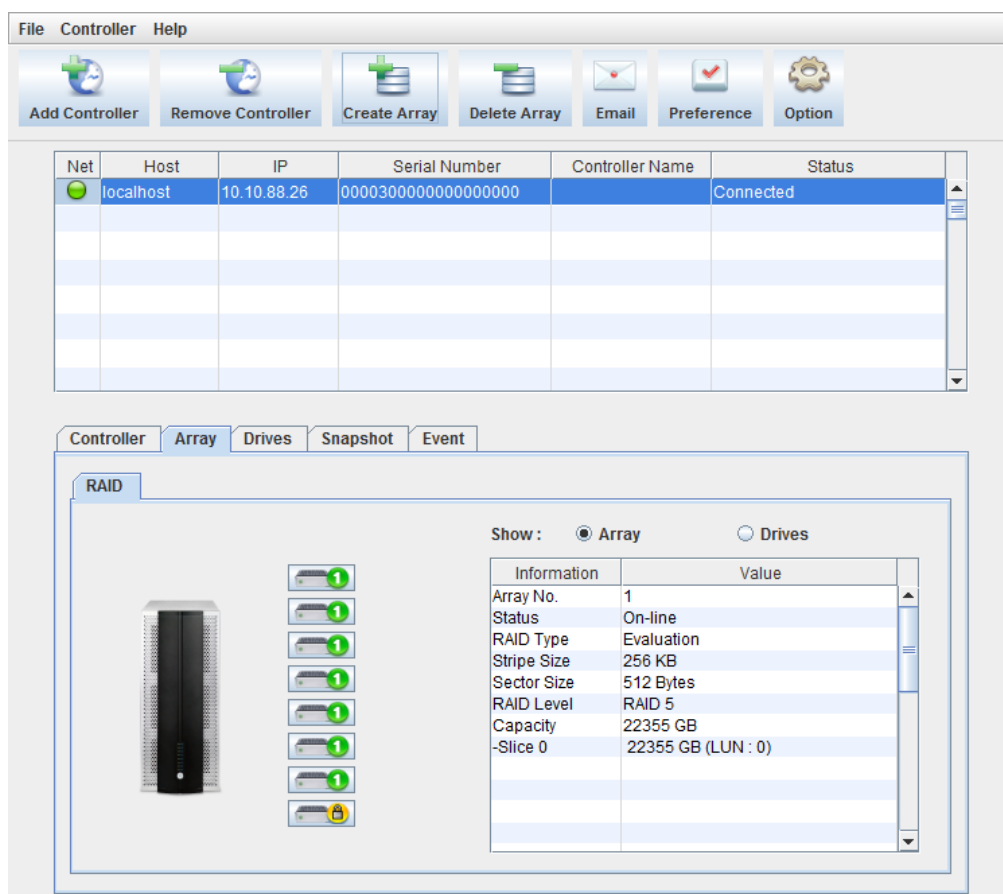
Follow the steps below to unlock a drive:

1. Select the drive with the ![lock icon] icon. It will change to the ![unlocked icon] icon.

① Select locked drive(s) to unlock

RAID

Show : ● Array ○ Drives

Information	Value
Array No.	1
Status	On-line
RAID Type	Evaluation
Stripe Size	256 KB
Sector Size	512 Bytes
RAID Level	RAID 5
Capacity	22355 GB
-Slice 0	22355 GB (LUN : 0)

② I understand that updating locked drive(s) status will cause all data on locked drive(s) to be lost

☐ Confirm

⚠ Summary

Unlock Drive   Cancel

2. Check the **Confirm** box and click **Unlock Drive**.

① Select locked drive(s) to unlock

RAID

Show : ● Array ○ Drives

Information	Value
Drive No.	A8
Status	On-line

② I understand that updating locked drive(s) status will cause all data on locked drive(s) to be lost

☑ Confirm

⚠ Summary

Selected JBOD : A8,

Unlock Drive   Cancel

4.7 Updating the ExaSAN RAID System Firmware

Follow the steps to update the firmware of your RAID system:

1. Check the current firmware version (System Code, Boot Code, Expander Code, etc) from RAIDGuardX.

2.

3. Download the latest firmware from the link below:
   http://www.accusys.com.tw/Support/Download/

4. Select **Controller** in the Menu bar, move to **Update** > **Update System Code** in the drop down menu.
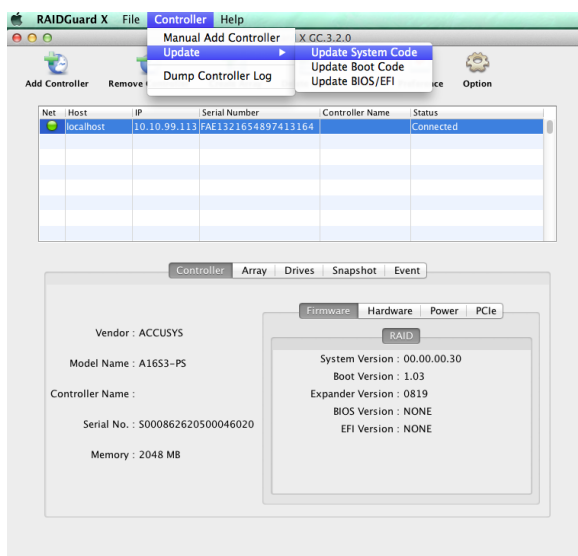
5. Choose correct **System Code** file to start updating. During the update process, the RAID system will block all data access.

> **Caution**
> Do NOT interrupt or stop updates in progress. It takes 2~5 minutes to upate the firmware.

6. Once the update is completed, make sure to restart (power off/on) the RAID system to make new firmware available.

7. Repeat the steps to update other firmware.

4.8 Download Controller Log

Download the event log for troubleshooting by clicking **Dump Controller Log**; log file (zip) will be saved in RAIDGuardX installed folder.
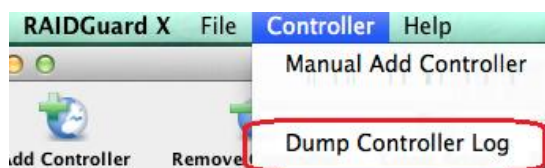
Default folder for saving log file:
MAC: /Application/RAIDGuardX/Log
Windows: /Program Files/Accusys/RAIDGuardX/Log
Linux: /{RAIDGuardX Client folder}/log

4.9 Disk RW Test

Read/Write throughput is highly depending on the condition of disk inserted in RAID system. When one of disks begins to drop down in Read/Write, the entire RAID system would slow down, and sometimes SMART function cannot figure out which one is the slow disk; Disk RW Test funtion executes read/write test on each disk and list the result on Event page for reference. User can replace the slowest disk to improve the whole system performance.

When performing Disk RW Test,
- All disks in RAID/JBOD enclosures would be individually executed sequently in a few seconds
- Both read/write test on all spare disk
- ONLY read test on all array member disk

Requirements
System Code version 3.4.1 and later
RAIDGuardX version 3.4.1 and later

Executing Disk RW Test
1. Stop IO access into RAID system
2. Click RAIDGuardX > Tab/Controller > Disk RW test
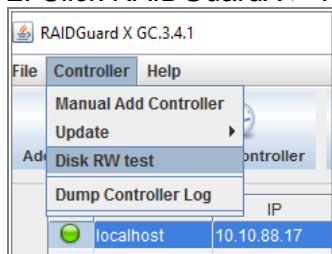
2. Click Yes on dialog window

Disk RW Test ✕

? Driver RW Test will not change data; Read test will perform on all Online drive;
Write test will perform on Global Spare drive only. Depends on drive's condition,
test may spend few minutes; Test result can be found on Event page.

[Yes] [No]
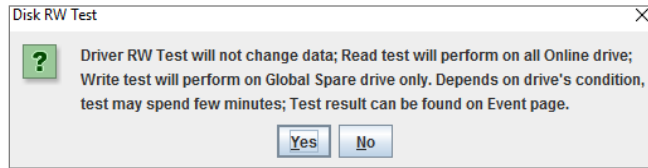
3. Display test result on Event page

| Controller | Array | Drives | Snapshot | **Event** |

Date/Time	Event Message
07/13/16-14:18:28	Disk RW test completed.
07/13/16-14:18:28	Drive A8 Read/Write (MB/s) : 170.0 / 169.0.
07/13/16-14:18:28	Drive A7 Read/Write (MB/s) : 171.0 / 170.0.
07/13/16-14:18:28	Drive A6 Read/Write (MB/s) : 166.0 / 165.0.
07/13/16-14:18:28	Drive A5 Read/Write (MB/s) : 164.0 / 161.0.
07/13/16-14:18:20	Drive A4 Read/Write (MB/s) : 169.0 / NA.
07/13/16-14:18:20	Drive A3 Read/Write (MB/s) : 171.0 / NA.
07/13/16-14:18:20	Drive A2 Read/Write (MB/s) : 169.0 / NA.
07/13/16-14:18:20	Drive A1 Read/Write (MB/s) : 170.0 / NA.
07/13/16-14:18:12	Disk RW test started.
07/13/16-14:16:38	LUN 0 Changed.

Spare disks (A8–A5)

Array Member disks (A4–A1)

5. RAID Overview

5. RAID Overview

5.1 How RAID Works

RAID, or Redundant Array of Independent Disks, is a data-storage technology that spreads data across multiple drives. This technology provides several benefits:
:
- Data redundancy for protection and availability.
- Higher performance as a result of reading or writing on several drives simultaneously.
- Scalability for expansion of storage.

Accusys RAID systems use a hardware controller to manage multiple drives as one or more RAID array group, which offloads RAID task from host, and provides independent, fast and highly efficient storage.
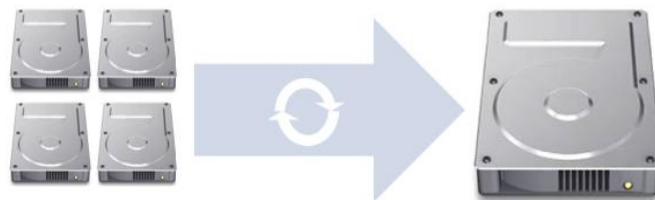
The way of controller stores and retrieves data on the RAID system is determined by the RAID level and storage method you choose. Once you have defined a group of drives as an array group, each logical disk appears to the host system as one Logical Unit (LUN), regardless of the number of actual drives in that logical unit.

Hard Drive 100GB	Hard Drive 100GB	Hard Drive 100GB		300GB

Logical Disk

Array Group

LUN (Logical Unit)

RAID System   **Host System**
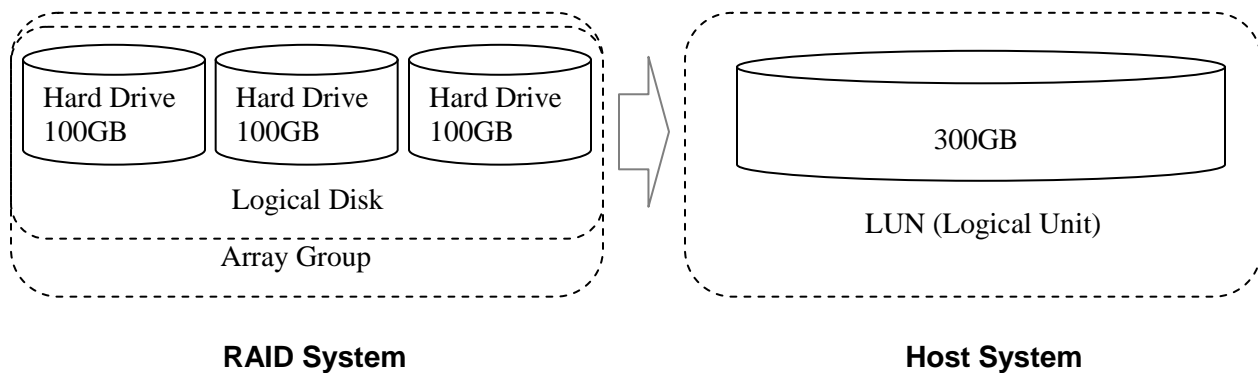
5.2 RAID Levels

The RAID system supports several RAID levels and configurations. Each level has a different architecture and provides varying degrees of performance and fault tolerance.

5.2.1 RAID 0: Striping

RAID level 0, striping only, is the fastest and most efficient array type, but offers no fault-tolerance. Any drive failure destroys the data in the array.

5.2.2 RAID 1: Mirroring

RAID level 1, mirroring, each drive stores identical data. RAID 1 provides very high data reliability and improved performance for read-intensive applications, but this level has a high capacity cost because it retains a full copy of your data on each drive in the mirror set.
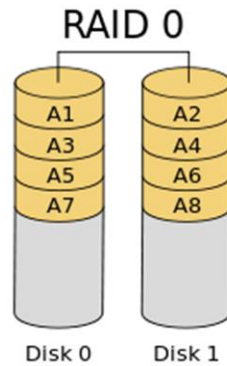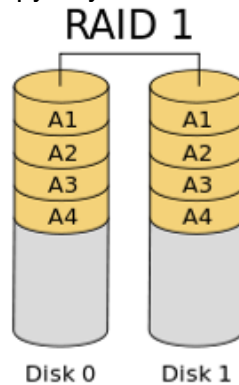

5.2.3 RAID 5: Striping Disks with Distributed Parity

By distributing the parity information across all drives in a set, RAID level 5 achieves high reliability and data availability, which allows one of the array member disk to have failure and keeps the storage working. Disk failure has a moderate impact on the total transfer rate.
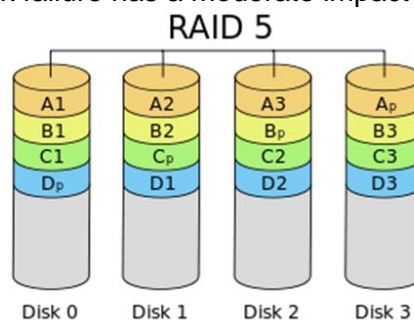
5.2.4 RAID 6: Independent Data Disks with Two Independent Parity Schemes

RAID level 6 extends RAID level 5 by adding an additional parity block; thus it uses block-level striping with two parity blocks distributed across all member disks. RAID 6 allows two of the array member disks to have failure at the same time and keeps the storage working.

5.2.5 **RAID 0+1: Striped Set with Mirroring**

RAID 0+1 combines the advantages of RAID 0 and RAID 1 with no disadvantages. RAID 0+1 creates a mirror of the primary striped set. RAID 0+1 provides optimal speed and reliability.
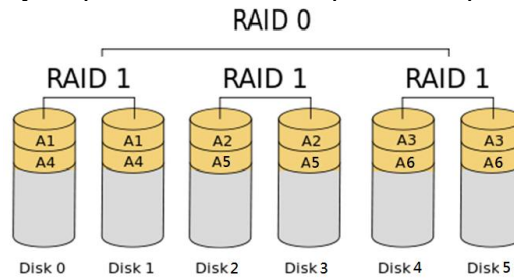
5.2.6 **Enhance JBOD: Single Disk**

Enhance JBOD is just export single disk to the host system. The capacityand speed are the same as the original single disk.
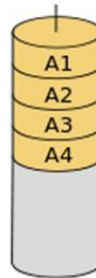
RAID Level	Data Format	Minimum Drive	Total Capacity (N = number of drive)	Redundancy	Performance
RAID0	Stripe	2	Single Drive * N	None	High
RAID1	Mirror	2	Single Drive * 1	N − 1	Low
RAID5	Stripe with 1 Parity	3	Single Drive * (N-1)	1	Medium
RAID6	Stripe with 2 Parities	4	Single Drive * (N-2)	2	Medium
RAID 0+1	Stripe + Mirror	4	Single Drive * (N/2)	2	Low
Enhance JBOD	Single Drive	1	Single Drive * 1	None	Low

6. Appendices

Appendix A: FAQs

1. **Q: I have created an RAID 5 array in RAIDGuardX, but host does not find the array volume, any solution?**
   A: Please check as steps below;
   I.   Go to GUI page 'Options > LUN Mapping' to ensure the array has been mapped to a LUN
   II. Restart RAID system, to avoid the driver is not ready.
   III. Format array volume to which format type you desired, then new volume would appear;

   On MAC: /Applications/DiskUtility
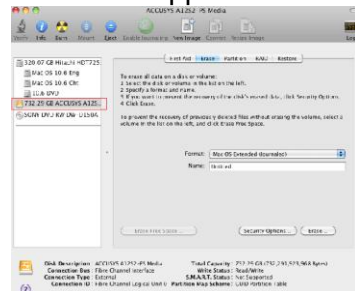
   On Windows: in Disk Management console
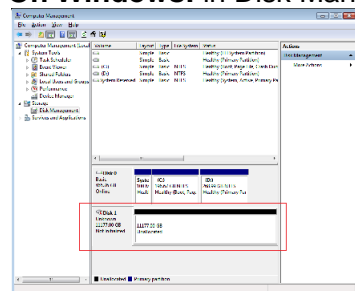
   On Linux: use fdisk command
   # fdisk -l
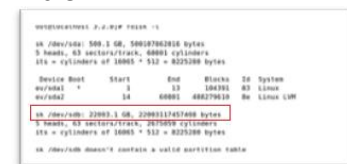
2. **Q: I moved my A08S4-PS to another computer with the same Z2M, Cable and RAID system, but disk volume does not appear on this computer, any solution?**
   A: Please check as steps below;
   I.   Make sure RAID system is boot up ready (all front LEDs light blue; green heartbeat LED of controller is flashing).
   II. Make sure the link LED of Z2M is correct.
   III. Ensure the QSFP cable is connected securely. You would hear a "click" sound when connected cable to connector of host and storage.
   IV. Ensure cable connected to correct port of Z2M; DAS port is for connecting storage directly, SAN port is for connecting to ExaSAN switch.

V.   Make sure the driver is running well;
VI. If the problem cannot be fixed, it might be a compatibility issue. Ask for technical support to your reseller, or send email to support@accusys.com.tw and briefly describe the problem. Be sure to include the driver error code, the motherboard (or host) model and the OS version, we would help to resolve the issue.

3. **Q: What does four internal LEDs of Z2M mean?**
    A: these LEDs indicate the link status of the HBA, refer to user guide (http://www.accusys.com.tw/Document/HBA_Cable/Z2M_G3_QSG_20141216.pdf) for more detail;

    LED 1: HBA properly link with the PCIe slot of main board
    LED 2: The upper QSFP connector is active as SAN mode
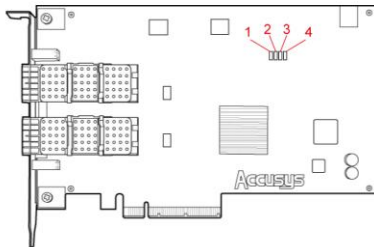   LED 3: The lower QSFP connector is active as DAS mode
    LED 4: The HBA card is failure, disconnected from host computer

4. **Q: On Windows, a dialog "Find no RAID card" appears when boot up, how can this be resolved?**
    A: Please check as steps below;
    I.   Reload RAIDGuardX Server with Administrator permission, or disable User Account Control (UAC) protection.
    II.   Make sure RAID system is boot up ready (all front LEDs light blue; green heartbeat LED of controller is flashing).
    III. Make sure the link LED of Z2M is correct.
    IV.   Ensure the QSFP cable is connected securely. You would hear a "click" sound when connected cable to connector of host and storage.
    V.   Ensure cable connected to correct port of Z2M; DAS port is for connecting storage directly, SAN port is for connecting to ExaSAN switch.
    VI.   Make sure the driver is running well;
    VII. If the problem cannot be fixed, it might be a compatibility issue. Ask for technical support to your reseller, or send email to support@accusys.com.tw and briefly describe the problem. Be sure to include the driver error code, the motherboard (or host) model and the OS version, we would help to resolve the issue.

5. **Q: On a MAC host, to open RAIDGuardX and press Add Controller icon, but there is no controller on list, how can this be resolved?**
    A: Please check as steps below;
    I.   Check if Accusys driver is up. ("**Utilities > System Information> Software > Extensions**", ACS6x.kext should list.)
    II.   Reload RAID GuardX Server by double click **DTRGuiSrv01_64** on path /Libaray/ StartupItems/ RGX_Accusys.

III. Make sure RAID system is boot up ready (all front LEDs light blue; green heartbeat LED of controller is flashing).
IV. Make sure the link LED of Z2M is correct.
V. Ensure the QSFP cable is connected securely. You would hear a "click" sound when connected cable to connector of host and storage.
VI. Ensure cable connected to correct port of Z2M; DAS port is for connecting storage directly, SAN port is for connecting to ExaSAN switch.
VII. Make sure the driver is running well;
VIII. If the problem cannot be fixed, it might be a compatibility issue. Ask for technical support to your reseller, or send email to support@accusys.com.tw and briefly describe the problem. Be sure to include the driver error code, the motherboard (or host) model and the OS version, we would help to resolve the issue.

6. **Q: Why doesn't the performance reach the expected levels while testing the A08S4-PS? Why isn't the performance steady enough?**
A: If the performance is unsteady or not achieving the expected level, in many cases, the Drive is the cause. It is strongly recommended to use the enterprise level Drive.

7. **Q: When inserting a drive into A08S4-PS, in RAIDGuardX, this drive shows in Locked mode and system start issue 3 short bi repeatedly, what does it mean?**
A: It indicates this drive has been used in another Accusys RAID system and contains a portion of RAID data. If data is not important, unlock the drive in RAIDGuardX > Options > Unlock, it would become a new global drive.

8. **Q: I exchanged my original computer to a new one, with the same HBA, Cable and RAID system, but disk volume does not appear, any solution?**
A: it could be hardware or compatible issue, please check as steps below;
   a. Ensure the QSFP cable is connected securely. You should be able to hear a "click" sound when you connect the cable to the connector.
   b. Please check the connection port is correct. DAS is for host directly, SAN is for connecting to ExaSAN switches.
   c. Please check if the installer and the driver have been installed correctly. If the installation has completed and the error still persists, it may be a compatibility issue. Send an email to support@accusys.com.tw and briefly describe the problem. Be sure to include the driver error code, the motherboard (or host) model name and the OS. We will contact you to assist you in resolving the issue.

9. **Q: How do I know the meaning of all beeper alerts?**
A: Below table is the Beeper Code.

Beeper mode	Description
1 short beep (boot up)	RAID system is ready
1 short beep	Array init, rebuild, expansion, migratrion
2 short beeps	Wrong ID setting of JBOD enclosure
3 short beeps	Error of Fan, Power, RAID or Disk locked
1 long beep	System Panic

Appendix B: Customer Service and Support

C.1   System Log

When you contact us for technical support, our support staff might ask for your system log file for troubleshooting purpose.

1) RAID controller log by Dump controller log of RAIDGuard X
2) Client operation system log. (it's better to record related error message.)

C.2   Contact Us

Email us for customer services and technical support;

Sales: sales@accusys.com.tw

Technical Support: support@accusys.com.tw

C.3   Our Website

Please visit our websites frequently for the most up-to-date product and support information.

All countries: www.accusys.com.tw

Korea: http://accusys.co.kr