Alnico iSCSI to SAS/SATA-II RAID Subsystem Software Operation Manual V1.1

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About This Software Operation Manual

This manual contains all the information you need to initially configuring and monitoring the Alnico RAID.

Task Map

1. Prepare

Refer to Software Operation Manual and Hardware Installation Guide, let yourself know the features, capabilities of Alnico RAID and make sure you have everything on hand.

2. Install Hardware

Install the Alnico RAID Subsystem. Refer to:

Hardware Installation Guide

3. Configuration

To create a RAID set and define a volume set via LCD display front panel, remote utility or 10/100 base-T Ethernet.

4. Make a Record

Be sure to clearly write down every items of the configuration, it will help you to rescue the data back in case of RAID fail up.

Symbols in Text

These symbols may be found throughout this guide. They have the following meanings.

Caution

Caution

This icon indicates that failure to follow directions could result in personal injury, damage to your equipment or loss of information.



Important terms, commands and programs are put in **Boldface** font.x.

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Chapter 1. INTRODUCTION

This chapter provides a brief introduction of Array Definition and RAID concept.

1.1 Features

Alnico 6 Series iSCSI RAID Subsystem:

AL-6080i: Gigabit LAN (x2) -to- SATA II 8 bay AL-6120i: Gigabit LAN (x2) -to- SATA II 12 bay

Alnico 8 Series iSCSI RAID Subsystem:

AL-8121i: Gigabit LAN (x4) -to- SAS/SATA II 12 bay AL-8161i: Gigabit LAN (x4) -to- SAS/SATA II 16 bay

Alnico iSCSI RAID features:

- * RAID 6 / 10 / 30 / 50 / 60
- * Snapshot / Rollback / Snapshot Export.
- * Remote replication for client
- * SAS support with SATA-II backward compatible.
- * N-way mirror.
- * On-line volume expansion and RAID level migration.
- * Global/dedicated cache configuration by volume.
- * S.M.A.R.T. enabled.
- * Support SES.
- * Support Microsoft VSS (Volume Shadow Copy Service, model dependent).
- * Disk roaming.
- * MPIO ready (initiator driver support is needed).
- * MC/S ready (initiator driver support is needed).
- * Support iSCSI header and data digest.
- * Support CHAP authentication.
- * Support Link Aggregation Trunking / LACP.

Alnico iSCSI RAID connects to the host system in iSCSI interface. It can be configured to any RAID level, including **RAID 6**, and provides reliable data protection for servers. The RAID 6 function allows two HDD failures without any impact on the existing data. Data can be recovered from the remaining data and parity drives. (Data can be recovered from the rest disks/drives.)

Snapshot is a fully usable copy of a defined collection of data that contains an image of the data as it appeared at the point in time, which means a point-in-time data replication. It provides consistent and instant copies of data volumes without any system downtime. **AL-60801i** / **AL-6120i** / **AL-8121i** / **AL-8161i** can keep up to 512 snapshots. **Rollback** feature is provided for restoring the previously-snapshot data easily while continuously using the volume for further data access. The data access is regular as usual including read/write without any impact to end users. The snapshot function does not require any proprietary agents installed at host side, but is taken at target side and done by **iSCSI** controller inside. It will not consume any host CPU time thus the server is dedicated to the specific or other application. The snapshot copies can be taken manually or by schedule every hour or every day, depends on the modification.

Alnico iSCSI RAID is a cost-effective disk array with completely integrated high-performance and data-protection capabilities which meet or exceed the highest industry standards, and the best data solution for small/medium business (SMB) users.

1.2 Terminology

The document use the following terms

RAID	RAID is the abbreviation of "Redundant Array of Independent Disks". There are different RAID levels with different degree of the data protection, data availability, and performance to host environment.
PD	The P hysical D isk belongs to the member disk of one specific RAID group.
RG	Raid Group is created to decide the RAID Level and the number of hard drives used for that RAID Level. Raid Group must be created prior to the creation of Virtual Disk.
VD	Virtual Disk is equal to volume disk for the operating system to use. Without RG, VD can't be created.

СМ	Cache Memory. Controller takes the onboard memory for cache memory usage in a smart way that the cache size can be auto adjusted invisibly for the max performance.	
LUN	Logical Unit Number. A logical unit number (LUN) is a unique identifier which enables it to differentiate among separate devices (each one is a logical unit).	
GUI	Graphic User Interface.	
RAID width, RAID copy, RAID row (RAID cell in one row)	 RAID width, copy and row are used to describe one RG. E.g.: One 4-disk RAID 0 volume: RAID width= 4; RAID copy=1; RAID row=1. One 3-way mirroring volume: RAID width=1; RAID copy=3; RAID row=1. 	
	One RAID 10 volume over 3 4-disk RAID 1 volume: RAID width=1; RAID copy=4; RAID row=3 RAID width=1; RAID copy=4; RAID row=3.	
WT	Write-Through cache-write policy. A caching technique in which the completion of a write request is not signaled until data is safely stored in non-volatile media. Each data is synchronized in both data cache and accessed physical disks.	
WB	Write-Back cache-write policy. A caching technique in which the completion of a write request is signaled as soon as the data is in cache and actual writing to non-volatile media occurs at a later time. It speeds up system write performance but needs to bear the risk where data may be inconsistent between data cache and the physical disks in one short time interval.	
RO	Set the volume to be Read-Only.	
DS	Dedicated Spare disks. The spare disks are only used by one specific RG. Others could not use these dedicated spare disks for any rebuilding purpose.	
GS	Global Spare disks. GS is shared for rebuilding purpose. If some RGs need to use the global spare disks for rebuilding, they could get the spare disks out from the common spare disks pool for such requirement.	
DC	Dedicated Cache.	
GC	Global Cache.	

DG	DeGraded mode. Not all of the array's member disks are functioning, but the array is able to respond to application read and write requests to its virtual disks.	
SCSI	Small Computer Systems Interface.	
SAS	Serial Attached SCSI.	
iSCSI	Internet Small Computer Systems Interface.	
SAS	Serial Attached SCSI.	
FC	Fibre Channel.	
S.M.A.R.T.	Self-Monitoring Analysis and Reporting Technology.	
WWN	World Wide Name.	
HBA	Host Bus Adapter.	
SAF-TE	SCSI Accessed Fault-Tolerant Enclosures.	
SES	SCSI Enclosure Services.	
NIC	Network Interface Card.	
LACP	Link Aggregation Control Protocol.	
MPIO	Multi-Path Input/Output.	
MC/S	Multiple Connections per Session	
MTU	Maximum Transmission Unit.	
СНАР	Challenge Handshake Authentication Protocol. An optional security mechanism to control access to an iSCSI storage system over the iSCSI data ports.	
iSNS	Internet Storage Name Service.	

1.3 iSCSI Introduction

iSCSI (Internet SCSI) is a protocol which encapsulates SCSI (Small Computer System Interface) commands and data in TCP/IP packets for linking storage devices with servers over common IP infrastructures. iSCSI provides high performance SANs over standard IP networks like LAN, WAN or the Internet.

IP SANs are true SANs (Storage Area Networks) which allow few of servers to attach to an infinite number of storage volumes by using iSCSI over TCP/IP networks. IP SANs can scale the storage capacity with any type and brand of storage system. In addition, using any type of network (Ethernet, Fast Ethernet, Gigabit Ethernet) and combining operating systems (Microsoft Windows, Linux, Solaris, ...etc.) within the SAN network. IP-SANs also include mechanisms for security, data replication, multi-path and high availability.

Storage protocol, such as iSCSI, has "two ends" in the connection. These ends are the initiator and the target. In iSCSI we call them iSCSI initiator and iSCSI target. The iSCSI initiator requests or initiates any iSCSI communication. It requests all SCSI operations like read or write. An initiator is usually located on the host/server side (either an iSCSI HBA or iSCSI SW initiator).

The iSCSI target is the storage device itself or an appliance which controls and serves volumes or virtual volumes. The target is the device which performs SCSI commands or bridges it to an attached storage device. iSCSI targets can be disks, tapes, RAID arrays, tape libraries, and etc.



The host side needs an iSCSI initiator. The initiator is a driver which handles the SCSI traffic over iSCSI. The initiator can be software or hardware (HBA). Please refer to the certification list of iSCSI HBA(s) in Appendix A. OS native initiators or other software initiators use the standard TCP/IP stack and Ethernet hardware, while iSCSI HBA(s) use their own iSCSI and TCP/IP stacks on board.

Hardware iSCSI HBA(s) would provide its initiator tool. Please refer to the vendors' HBA user manual. **Microsoft**, **Linux** and **Mac** provide software iSCSI initiator driver. Below are the available links:

Link to download the Microsoft iSCSI software initiator:

http://www.microsoft.com/downloads/details.aspx?FamilyID=12cb3c1a-15d6-4 585-b385-befd1319f825&DisplayLang=en

Please refer to Appendix A & B for Microsoft iSCSI initiator installation procedure.

Linux iSCSI initiator is also available. For different kernels, there are different iSCSI drivers. Please check Appendix A & B for software iSCSI initiator certification list. If user needs the latest Linux iSCSI initiator, please visit Open-iSCSI project for most update information. Linux-iSCSI (sfnet) and Open-iSCSI projects merged in April 11, 2005.

Open-iSCSI website: http://www.open-iscsi.org/

Open-iSCSI README: http://www.open-iscsi.org/docs/README

Features: http://www.open-iscsi.org/cgi-bin/wiki.pl/Roadmap

Support Kernels:

http://www.open-iscsi.org/cgi-bin/wiki.pl/Supported_Kernels

Google groups:

http://groups.google.com/group/open-iscsi/threads?gvc=2

http://groups.google.com/group/open-iscsi/topics

Open-iSCSI Wiki: http://www.open-iscsi.org/cgi-bin/wiki.pl

ATTO iSCSI initiator is available for Mac.

Website: http://www.attotech.com/xtend.html

1.4 RAID Concept

RAID is an acronym for Redundant Array of Independent Disks. It is an array of multiple independent hard disk drives that provide high performance and fault tolerance. The RAID subsystem controller implements several levels of the Berkeley RAID technology. An appropriate RAID level is selected when the

volume sets are defined or created. This decision is based on disk capacity, data availability (fault tolerance or redundancy), and disk performance. The following are the RAID levels which are supported in the RAID subsystem.

The RAID subsystem controller makes the RAID implementation and the disks' physical configuration transparent to the host operating system. This means that the host operating system drivers and software utilities are not affected, regardless of the RAID level selected. Correct installation of the disk array and the controller requires a proper understanding of RAID technology and the concepts.

1.2.1 RAID 0

RAID 0, also referred to as striping, writes stripping of data across multiple disk drives instead of just one disk drive. RAID 0 does not provide any data redundancy, but does offer the best high-speed data throughput. RAID 0 breaks up data into smaller blocks and then writes a block to each drive in the array. Disk striping enhances performance because multiple drives are accessed simultaneously; but the reliability of RAID Level 0 is less than any of its member disk drives due to its lack of redundancy.



1.2.2 RAID 1

RAID 1 also known as "disk mirroring", data written to one disk drive is simultaneously written to another disk drive. Read performance may be enhanced if the array controller can parallel accesses both members of a mirrored pair. During writes, there will be a minor performance penalty when compared to writing to a single disk. If one drive fails, all data (and software applications) are preserved on the other drive. RAID 1 offers extremely high data reliability, but at the cost is doubling the required data storage capacity.



1.2.3 RAID 0+1

RAID 0+1 is a combination of RAID 0 and RAID 1, combing stripping with disk mirroring. RAID Level 10 combines the fast performance of Level 0 with the data redundancy of Level 1. In this configuration, data is distributed across several disk drives, similar to Level 0, which are then duplicated to another set of drive for data protection. RAID 0+1 provides the highest read/write performance of any of the Hybrid RAID levels, but at the cost of doubling the required data storage capacity.



1.2.4 N-way mirroring

Extension to RAID 1 level. It has N copies of the disk.

1.2.5 RAID 3

RAID 3 provides disk striping and complete data redundancy through a dedicated parity drive. RAID 3 breaks up data into smaller blocks, calculates parity by performing an exclusive-or on the blocks, and then writes the blocks to all but one drive in the array. The parity data created during the exclusive-or is then written to the last drive in the array. If a single drive fails, data is still available by computing the exclusive-or of the contents in the corresponding strips of the surviving member disk. RAID-3 is best for applications that require very fast data- transfer rates or long data blocks



1.2.6 RAID 5

RAID 5 is sometimes called striping with parity at block level. In RAID 5, the parity information is written to all of the drives in the subsystems rather than concentrated on a dedicated parity disk. If one drive in the system fails, the parity information can be used to reconstruct the data from that drive. All drives in the array system can be used to seek operation at the same time, greatly increasing the performance of the RAID system.



1.2.7 RAID 6

A RAID 6 array is essentially an extension of a RAID 5 array with a second independent distributed parity scheme. Data and parity are striped on a block level across multiple array members, just like in RAID 5, and a second set of parity is calculated and written across all the drives. As larger disk arrays are considered, it is desirable to use stronger codes that can tolerate multiple disk failure. When a disk fails in a parity protected disk array, recovering the contents of the failed disk requires successful reading on the contents of all no-failed disks. RAID 6 provides an extremely high fault tolerance, and can sustain two simultaneous drive failures without downtime or data loss. This is a perfect solution when data is mission-critical.



1.2.8 RAID X0

RAID level-X0 (available only on Alnico 8 Series) refers to RAID level- 10, 30,

50 and 60. RAID X0 is a combination of multiple RAID x volume sets with RAID 0 (striping). Striping helps to increase capacity and performance without adding disks to each RAID x array. The operating system uses the spanned volume in the same way as a regular volume. Up to one drive in each sub-volume (RAID 1, 3 or 5) may fail without loss of data. Up to two drives in each sub-volume (RAID 6) may fail without loss of data.



The following illustration is an example of a RAID level-X0 logical drive.

RAID level-X0 allows more physical drives in an array. The benefits of doing so are larger volume sets, increased performance, and increased reliability.

RAID level-30 50 and 60 can support up to eight sub-Volumes.

If the volume is RAID level-30, 50, or 60, you cannot change the volume to another RAID level. If the volume is RAID level-0, 1, 1E, 3, 5, or 6, you cannot change the volume to RAID level-30, 50, or 60.

1.2.9 Summary of RAID Levels

YOTE

RAID subsystem supports RAID Levels 0, 1, 1E, 3, 5, 6, 30, 50 and 60. The following table provides a summary of RAID levels

RAID	Description	Disks requirement	Data Reliability
Level		(Cost)	
0	Also known as stripping.	N	* No data
	Data distributed across multiple drives in the array. There is no data protection		Protection.
1	Also known as mirroring.	2	* Lower than RAID 6.
	All data replicated on N Separated disks. N is almost always 2.		* Higher than
	This is a high availability Solution, but due to the 100% duplication, it is also a costly solution.		RAID 3, 5.
0+1	Also known Block-Interleaved Parity.	N (N>2)	* Lower than RAID 6.
	Data and parity information is subdivided and distributed		* Higher than
	across all disk. Parity must be the equal to the smallest disk capacity in the array. Parity information normally stored on a dedicated parity disk.		RAID 3, 5.
3	Also known Bit-Interleaved Parity.	N+1	* Lower than RAID 1, 10, 6;
	Data and parity information is subdivided and distributed across all disk. Parity must be the equal to the smallest disk capacity in the array. Parity information normally stored on a dedicated parity disk.		* Higher than a single drive.
5	Also known Block-Interleaved Distributed Parity.	N+1	* Lower than RAID 1, 10,
	Data and parity information is subdivided and distributed across all disk. Parity must be the equal to the smallest disk capacity in the array. Parity information normally stored on a dedicated parity disk.		and 6. * Higher than a single drive.
6	AS RAID level 5, but with additional independently computed redundant information	N+2	* Highest of all listed alternatives.
30	RAID 30 is a combination multiple RAID 3 volume sets with RAID 0 (striping)	(N+1) *2	Up to one disk failure in each sub-volume
50	RAID 50 is a combination multiple RAID 5 volume sets with RAID 0 (striping)	(N+1) *2	Up to one disk failure in each sub-volume
60	RAID 60 is a combination multiple RAID 6 volume sets with RAID 0 (striping)	(N+2) *2	Up to two disk failure in each sub-volume

1.2.10 Rebuild

If one physical disk of the RG which is set as protected RAID level (e.g.: RAID 3, RAID 5, or RAID 6) is FAILED or has been unplugged/removed, then the status of RG is changed to degraded mode, the system will search/detect spare disk to rebuild the degraded RG to a complete one. It will detect dedicated spare disk as rebuild disk first, then global spare disk.

Alnico iSCSI RAID support Auto-Rebuild. The following is the scenario:

Take RAID 6 for example:

When there is no global spare disk or dedicated spare disk in the system, controller will be in degraded mode and wait until (A) there is one disk assigned as spare disk, or (B) the failed disk is removed and replaced with new clean disk, then the Auto-Rebuild starts. The new disk will be a spare disk to the original RG automatically.

If the new added disk is not clean (with other RG information), it would be marked as RS (reserved) and the system will not start "auto-rebuild".

If this disk is not belonging to any existing RG, it would be FR (Free) disk and the system will start Auto-Rebuild.

If user only removes the failed disk and plugs the same failed disk in the same slot again, the auto-rebuild will start running. But rebuilding in the same failed disk may impact customer data if the status of disk is unstable. We suggests all customers not to rebuild in the failed disk for better data protection.

When there is enough global spare disk(s) or dedicated spare disk(s) for the degraded array, controller starts Auto-Rebuild immediately. And in RAID 6, if there is another disk failure occurs during rebuilding, controller will start the above Auto-Rebuild process as well. Auto-Rebuild feature only works at that the status of RG is "**Online**". It will not work at "**Offline**". Thus, it will not conflict with the "**Roaming**".

In degraded mode, the status of RG is "**Degraded**". When rebuilding, the status of RG/VD will be "**Rebuild**", the column "**R%**" in VD will display the ratio in percentage. After complete rebuilding, the status will become "Online". RG will become completely one.



"Set dedicated spare" is not available if there is no RG or only RG of RAID 0, JBOD, because user can not set dedicated spare disk to RAID 0 & JBOD.

Sometimes, rebuild is called recover; they are the same meaning. The following

table is the relationship between RAID levels and rebuild.

RAID 0	Disk striping. No protection for data. RG fails if any hard drive fails or unplugs.
RAID 1	Disk mirroring over 2 disks. RAID 1 allows one hard drive fails or unplugging. Need one new hard drive to insert to the system and rebuild to be completed.
N-way mirror	Extension to RAID 1 level. It has N copies of the disk. N-way mirror allows N-1 hard drives failure or unplugging.
RAID 3	Striping with parity on the dedicated disk. RAID 3 allows one hard drive failure or unplugging.
RAID 5	Striping with interspersed parity over the member disks. RAID 5 allows one hard drive failure or unplugging.
RAID 6	2-dimensional parity protection over the member disks. RAID 6 allows two hard drives failure or unplugging. If it needs to rebuild two hard drives at the same time, it will rebuild the first one, then the other in sequence.
RAID 0+1	Mirroring of RAID 0 volumes. RAID 0+1 allows two hard drive failures or unplugging, but at the same array.
RAID 10	Striping over the member of RAID 1 volumes. RAID 10 allows two hard drive failure or unplugging, but in different arrays.
RAID 30	Striping over the member of RAID 3 volumes. RAID 30 allows two hard drive failure or unplugging, but in different arrays.
RAID 50	Striping over the member of RAID 5 volumes. RAID 50 allows two hard drive failures or unplugging, but in different arrays.
RAID 60	Striping over the member of RAID 6 volumes. RAID 40 allows four hard drive failures or unplugging, every two in different arrays.
JBOD	The abbreviation of "Just a Bunch Of Disks". No data protection. RG fails if any hard drive failures or unplugs.

1.2.11 Disk roaming

RAID subsystem supports RAID Levels 0, 1, 1E, 3, 5, 6, 30, 50 and 60. The

following table provides a summary of RAID levels.

Physical disks can be re-sequenced in the same system or move all physical disks from system-1 to system-2. This is called disk roaming. System can execute disk roaming online. Please follow the procedures.

- 1. Select "/ Volume configuration / RAID group".
- 2. Mouse moves to the gray button next to the RG number; click "Deactivate".
- 3. Move all PDs related to the RG to another system.
- 4. Mouse moves to the gray button next to the RG number; click "Activate".
- 5. Done.

Disk roaming has some constraints as described in the followings:

Check the firmware of two systems first. It is better that both systems have the same firmware version or newer.

All physical disks of related RG should be moved from system-1 to system-2 together. The configuration of both RG and VD will be kept but LUN configuration will be cleared in order to avoid conflict with system.



The off-line RG from the AL-8161i and 8121i can't be moved to the AL-6080i and 6120i. Contrariwise.

Chapter 2. Configuration Methods

2.1 Overview

After the hardware installation, the SAS (or SATA) disk drives installed to the RAID must be configured and the volume set units initialized before they are ready to use. This can be accomplished by one of the following methods:

- Front LCD control module
- Remote utility connected through the **Console Serial Port** (VT-100 or Hyper terminal)
- Using **Remote Control-Secure Sell (SSH)** through the controller's 10/100 Ethernet LAN port .
- Web GUI RAID manager via the controller's 10/100 Ethernet LAN port.

Those user interfaces can access the built-in configuration and administration utility that resides in the controller's firmware. They provide complete control and management of the controller and disk arrays, eliminating the need for additional hardware or software.

There are two sets of login account supported by Alnico RAID iSCSI RAID:

Login name: admin

Default password: 0000

Or login with read-only account which only allows reading the configuration and cannot change setting.

Login name: user

Default password: 1234



The RAID subsystem allows only one method to access menus at a time.

2.2 Front LCD control module

The front panel keypad and liquid crystal display (LCD) is the primary user interface for the RAID subsystem. All configuration and management of the

RAID and its properly connected disk arrays can be performed from this interface.

The front panel keypad and LCD are connected to the RAID subsystem to access the built-in configuration and administration utility that resides in the controller's firmware. Complete control and management of the array's physical drives and logical units can be performed from the front panel, requiring no additional hardware or software drivers for that purpose.

This Chapter provides, in quick reference form, procedures that use the built-in LCD panel to configure and operate the controller.

A touch-control keypad and a liquid crystal display (LCD) mounted on the front panel of the RAID subsystem is the primary operational interface and monitor display for the disk array controller. This user interface controls all configuration and management functions for the RAID subsystem controller and for all SAS (or SATA) disk array subsystems to which it is properly connected.

The LCD provides a system of screens with areas for information, status indication, or menus. The LCD screen displays up to two lines at a time of menu items or other information.

The Initial screen is as following:



The four function keys at the button of the front panel perform the following functions:

Кеу	Function
Up Arrow	Use to scroll the cursor Upward / Rightward
Down Arrow	Use to scroll the cursor Downward / Leftward
ENT Key	Submit Select ion Function (Confirm a selected item)
ESC Key	Return to Previous Screen (Exit a selection configuration)

There are three LED indicators on the front panel. Following table provides a summary of the meanings of these LED indicators:

LED Indicator	Normal Status	Problem Indication
Power On indicator	Bright Blue	This LED does not light up after power switched on
Fail Indicator	LED never lights up	LED lights up as Red.
Data Access Indicator	Blink blue during host computer accessing the RAID subsystem.	LED never flickers

For additional information on using the LCD panel and keypad to configure the RAID see "LCD Control Module Configuration" on Chapter 3.

2.3 Console Serial Port

The serial port on the RAID subsystem's back panel can be used in Remote manage mode. The provided interface cable converts the RS232 signal on the RAID subsystem into a RJ-11 male connector. The firmware-based terminal array management interface can access the array through this RS-232 port. You can attach a VT-100 compatible terminal or a PC running a "Hyper terminal" program to the serial port for accessing the text-based Setup Menu.

To ensure proper communications between the RAID subsystem and the VT-100 Terminal Emulation, Please configure the VT100 terminal emulation settings to the values shown below:

Terminal requirement				
Connection Null-modem cable				
Baud Rate	115,200			
Data bits	8			
Stop	1			
Flow Control	None			

The RAID Subsystem's 6-pin RJ-11 connector's pin assignments are defined as below :

Pin#	Signal	Pin#	Signal
1	NC	4	ТХ
2	GND	5	CTS
3	RX	6	NC

2.3.1 Keyboard Navigation

The following definition is the VT-100 RAID configuration utility keyboard navigation:

Кеу	Function
Arrow Key	Move cursor
Enter Key	Submit selection function
ESC Key	Return to previous screen

2.3.2 Start-up VT100 Screen

By connecting a VT100 compatible terminal, or a PC operating in an equivalent terminal emulation mode, all RAID subsystem monitoring, configuration and administration functions can be exercised from the VT100 terminal.

There are a wide variety of Terminal Emulation packages, but for the most part they should be very similar. The following setup procedure is an example Setup VT100 Terminal in Windows XP system using Hyper Terminal use Version 3.0 or higher.

Step 1. From the Desktop open the Start menu. Pick Programs, Accessories, Communications and Hyper Terminal. Open Hyper Terminal (requires version 3.0 or higher)

My My C	Compute	er Outlook Express								
		Snaglt 6		1						
98		Programs F_avorites Documents Settings Eind Help Bun	•		Accessories Online Services Snagt 6 StartUp Internet Explorer MS-DOS Prompt Dutlook Express Windows Explorer		Communications Entertainment Internet Tools System Tools Address Book Calculator Imaging Notepad Paint Synchronize VictorPart	•		Dial-Up Networking Direct Cable Connection HyperTerminal Phone Dialer
Windows	l₁ ⊗¦))	Log Off Billion Shyt Down				2	woundd		J	

Step 2. Open HYPERTRM.EXE.

😋 HyperTerminal	
<u>File E</u> dit <u>V</u> iew <u>G</u> o F <u>a</u> vorites <u>H</u> elp	100 C
↔ ↔ ↓ ↓ ↓ ↓ Back Forward Up Cut Copy Paste Undo	**
Address C:\Program Files\Accessories\HyperTerminal	-
	a
HyperTermi	
Hypertrm.exe Application qqq	
Modified: 4/23/99 10:22 PM	
Size: 24KB	
4	
24.0KB 🛄 My Computer	

Step 3. Enter a name for your Terminal. Click OK.



Step 4.	Select an	appropriate	connecting	port in	your	Terminal.	Click OK
---------	-----------	-------------	------------	---------	------	-----------	----------

<u>De es eb s</u>	Connect To	
-	Enter details for the phone number that you want to diat Country code: Prone number: Prone number: Cognect using: Discrete Cont	
Disconnected Auto detect	OK Cancel	e Printecho

Step 5. Configure the port parameter settings. Bits per second: "115200", Data bits: "8", Parity: "None", Stop bits: "1", Flow control: "None". Click OK

COM1 Propertie	5	2 X		
Port Settings				
r .		-		12
<u>B</u> êz per	second 115200			
2	ata bêz 🔋 💌			
	Baily Nove 💌			
5	2xp bitz 1			
Bow	controt Name		lş.	
Advanc	ed			
Di	OK Cancel (20	27	CAPS NUM Capture Print echo	<u>₹</u>

Step 6.	Open the File men	u, and then open	Properties
---------	-------------------	------------------	------------

Blew Connection Doen Save Save &	<u>a</u>	
Page Setup Bird		
Egi Akifi		

Step 7. Open the Settings Tab.

Software Operation Manual

Ele Edt Yew Gal Transfer	Cannect To Setings	
	Anal Change joon.	
	Loundy code: United States of America (1)	
L C	Errer the area code without the long-astrance press.	
	Arga code:	
	Ehone number	
	Cogrect using: Direct to Cont	
	Configure	
	 Use country code and a calcode 	
	 BLOG DOWN 	
J		
Connected 0.04:27 Auto d	OK Cancel	Print echo

Step 8. Open the Settings Tab. Function, arrow and ctrl keys act as: Terminal Keys, Backspace key sends: Crtl+H, Emulation: VT100, Telnet terminal: VT100, Back scroll buffer lines: 500. Click OK.

<u>180 810 810</u>	Connect to Seamps Function arrow and cell keys act as IF Institutional keys C Spindows keys
	Backspace key sends F Dahl C Del C Del-U Space, Od-H
	Enviroism VT100 Texwood Senup
	Toget terms //T100
	Ising these these when connecting or disconnecting
	DK Carol

Now, the VT100 is ready to use.

Press "Enter' key to display the disk array Monitor Utility screen on your VT100 Terminal.

2.4 Remote Control-Secure Sell

Using the controller's 10/100 Ethernet port and SSH client software to remote login to the RAID. Secure Shell is a program to log into another computer over a network, to execute commands in a remote machine, it provides strong authentication and secure communications over insecure channels. When using ssh's slogin (instead of rlogin) the entire login session, including transmission of **password**, is encrypted; therefore it is almost impossible for an outsider to collect passwords.

SSH client software is available at the following web site:

SSHWinClient WWW: <u>http://www.ssh.com/</u> Putty WWW: <u>http://www.chiark.greenend.org.uk/</u>

2.4.1 Keyboard Navigation

The following definition is the VT-100 RAID configuration utility keyboard navigation.

Кеу	Function
Arrow Key	Move cursor
Enter Key	Submit selection function
ESC Key	Return to previous screen

2.4.2 Start-up SSH client software

Step 1. Double clicks to execute SSH client software



Step 2. Press a "Enter" to create a new connection.

Software Operation Manual

👹 - SSH Tectia - Terminal 📃 🔍 🗐
Eile Edit View Window Help
🖬 🔿 🖪 🔎 🖻 🖻 🖹 🖊 🔤 🕵 🚳 🛷
2 Quick Connect 🦳 Profiles
SSH Tectia - Terminal 6.0.3.9 Copyright (c) 2000-2008 SSH Communications Security Corp - http://www.ssh.com/
Evaluation period will end in 44 days.
Connect to Server
Host Name: Connect
Liser Name: Cancel
Port Number: 22
Not connected - press Enter or Space to connect 80x27

Step 3. Key in IP address into the field of Host name, it will be default shown on the LCD screen. Then login name in the field of User name. The defaults of Port Number is "22".

💐 - SSH Tectia - 1	Termin	al			<u>- 0 ×</u>		
Eile Edit <u>V</u> iew <u>W</u> indow <u>H</u> elp							
2 Quick Connect i Profiles							
SSH Tectia - To Convright (c)	ermina	al 6.0.3.9 2008 SSH Communi	cations Security Corn	- http://www.ss	h.com/		
Copyright (c)				1100p.//0000.55	II. COM/		
Evaluation per:	10d W1	ill end in 44 da	ys.				
	Connect	t to Server		×			
		<u>H</u> ost Name:	169.254.76.73	Connect			
	<u> </u>	<u>U</u> ser Name:	admin	Cancel			
		<u>P</u> ort Number:	22				
_							
					-		
I Not connected - press	s Enter d	or Space to connect 🛛		80×27			

Step 4. Select "Proceed with the connection but do not save the key" to have higher security.

👹 169.254.76.73 - SSH Tectia - Terminal	
Eile Edit Yiew Window Help	
Image: Connect Image: Profiles	
SSH Tectia ? SSH Tectia ? Host key for the host "169.254.76.73" not found from database. Evaluation peri The fingerpint of the host public key is: "xepac-futuc-lehuf-pigev-lebis-fahid-sebux-tatys-zahuf-bofec-myxyd" Please select how you want to proceed. C Cancel the connection. C Dancel the connection but do not save the key. Proceed with the connection and save the key for future use. UK 0K	× //www.ssh.com/
Requesting new channel - please wait	80×27

Step 5. Enter the password

👹 169.254.76.73 - SSH Tectia - Terminal	
Eile Edit View Window Help	
🖉 Quick Connect 🦳 Profiles	
SSH Tectia - Termi: SSH Tectia ?X Copyright (c) 2000 admin@169.254.76.73's password	
Evaluation period OK Cancel	
	-
Requesting new channel - please wait 80x27	

Step 6. Then you will login into Alnico iSCSI RAID subsystems

🖉 169.254.76.73 - SSH Tectia - Terminal		
Eile Edit View Window Help		
🖬 🗿 💽 🗩 🕲 🖻 🖻 🗛 !	🖃 🛃 🚳 🛷	
🛛 🔁 Quick Connect 📄 Profiles		
[+		+ 🔺
I Alnio	co AL-8161i Fri Oct	3 10:13:31 2008
Duick installation		+
System configuration		i
iSCSI configuration		!
Enclosure management		
Maintenance		·
Logout		L I
1		I.
li		i i
11		
		i 1
+-Path:/		
Quick installation		I
1!		
I		+
li		i I
INF0: 2008/10/03 10:13:24 CST adm	nin login from 169.254.26.1	65 via Console UI
<u> </u> +		+ 💌
Connected to 169.254.76.73 a	es128-cbc - hmac-md5 - none	80x27

Now, the SSH software is ready to use.

2.5 Web GUI RAID manager via the controller's 10/100 Ethernet LAN port.

The controller has embedded the TCP/IP & Web Browser-based RAID manager in the firmware. User can remotely manage the RAID system, without adding any specific software (platform independent), via standard web browsers directly connected to the 10/100 Ethernet RJ45 LAN port.


To configure RAID subsystem on a local or remote machine, you need to know its IP Address. The IP address will be default shown in the LCD screen. Launch your firmware-embedded TCP/IP & Web Browser-based RAID manager by entering http://[IP Address] in the web browser.



You must be logged in as administrator with local admin rights on the remote machine to remotely configure it. The RAID subsystem controller default username is "**admin**" and the password is "**0000**".

Chapter 3.

Front LCD Control Module

Configuration

The Alnico RAID's Front LCM is character-based which you can use after powering the unit. Use LCD Configuration panel to:

System Info.	Display system information.
Alarm Mute	Mute alarm when error occurs.
Reset/Shutdown	Reset or shutdown controller.
Quick Install	Quick steps to create a volume. Please refer to next chapter for operation in web UI for more convenience configuration.
Volume Wizard	Smart steps to create a volume. Please refer to next chapter for operation in web UI for more convenience configuration.
View IP Setting	Display current IP address, subnet mask, and gateway.
Change IP Config	Set IP address, subnet mask, and gateway. There are 2 options: DHCP (Get IP address from DHCP server) or static IP.
Change IP Config Reset to Default	Set IP address, subnet mask, and gateway. There are 2 options: DHCP (Get IP address from DHCP server) or static IP. Reset to default will set password to default: 0000 , and set IP address to default as static setting.
Change IP Config Reset to Default	Set IP address, subnet mask, and gateway. There are 2 options: DHCP (Get IP address from DHCP server) or static IP. Reset to default will set password to default: 0000 , and set IP address to default as static setting. Default IP address: 192.168.001.100
Change IP Config Reset to Default	Set IP address, subnet mask, and gateway. There are 2 options: DHCP (Get IP address from DHCP server) or static IP. Reset to default will set password to default: 0000 , and set IP address to default as static setting. Default IP address: 192.168.001.100 Default subnet mask: 255.255.255.0

LCM function keys are the basic user interface for the RAID subsystem, there are very limited features supported. If user would like to have more advanced configuration, please use Web GUI configuration, this is a primary user interface for the RAID subsystem.

3.1 Starting LCD Configuration Utility

The main menu appears on the LCD screen, as shown below:

Use the up and down arrow buttons to move left and right to select a menu item. Press **ENT** to select the item. Press the **UP/DOWN** to browse the selection. Press **ESC** to return to the previous screen.

192.168.0.1 Alnico AL-8161i ↔

3.2 Navigation Map of the Configuration

The password option allows user to set or clear the raid subsystem's password protection feature. Once the password has been set, the user can only monitor and configure the raid subsystem by providing the correct password. The password is used to protect the internal RAID subsystem from unauthorized entry. The controller will check the password only when entering the Main menu from the initial screen. The RAID subsystem will automatically go back to the initial screen when it does not receive any command in twenty seconds. The RAID subsystem password's default setting is 0000 by the manufacturer.



3.2.1 Show System Information

Choose this option to display firmware version and cache memory size. To check the system information, press **ENT** to enter the main menu. Press **UP/DOWN** to select the **Show System Information** option, and then press **ENT**. All major controller system information will be displayed. Press **UP/DOWN** to browse all the system information.



3.2.2 Alarm Mute

The Alarm Mute function item is used to control the RAID subsystem Beeper. Select the "No" and press **Enter** key in the dialog box to turn the beeper off temporarily. The beeper will still activate on the next event.



3.2.3 Reset / Shutdown

The Reset / Shutdown function item is used to control the RAID subsystem either to reset or shutdown the system. Select the "Yes" or "No" and press **Enter** key to confirm the action.



3.2.4 Quickly Install

Quickly Install is the fastest way to prepare a RAID group and volume. It only needs a few keystrokes to complete it. Although disk drives of different capacity may be used in the RAID Group, it will use the smallest capacity of the disk drive as the capacity of all disk drives in the raid set. The Quick Volume and Raid Setup option creates a raid set with the following properties:



1. All of the physical disk drives are contained in a RAID group..

2. A single volume set is created and consumes all or a portion of the disk capacity available in this RAID group..

Detail procedure references to this chapter's section: Volume Wizard.

3.2.5 Volume Wizard

User manual configuration can completely control the raid set setting, but it will take longer time to complete than the Quickly install.. Select the Volume Wizard Function to manually configure the RAID group and Virtual Disk .

To enter a Volume Wizard Functions, press **ENT** to enter the Main menu. Press **UP/DOWN** to select the **Volume Wizard Functions** option and then press **ENT** to enter further submenus. All submenus will be displayed.



To Select "Use default algorithm", system will use all hard disks in RAID subsystem to create a RAID group and adjust the capacity to create a "Virtual Disk Volume". Or you

can manually to select "New X disks" to specify the numbers of disk for RAID group.

3.2.6 View IP setting

Use to check the setting of management Ethernet port of RAID subsystem.



3.2.7 Change IP Config

To change IP configuration, press **ENT** to enter the Main menu. Press **UP/DOWN** key to select the **Change IP Config** option, and then press **ENT**.



3.2.8 Reset to Default

Use this feature to Reset all parameters to Default volues.

Press ENT to enter the main menu. Press UP/DOWN to select the Reset to Deafult, and then press ENT.



Chapter 4. Web Browser- Based

Configuration

This iSCSI RAID subsystem (TCP/IP protocol) web browser-based RAID manage interface is firmware-based and used to configure this iSCSI RAID subsystem. The table below unfolds the complete hierarchy of this interface:

Quick installation	→	Step 1 / Step 2 / Confirm
System configuration		
System setting	\rightarrow	System name / Date and time
IP address	→	MAC address / Address / DNS / port
Login setting	→	Login configuration / Admin password / User password
Mail setting	→	Mail
Notification setting	→	SNMP / Messenger / System log server / Event log filter
iSCSI configuration		
Entity property	→	Entity name / iSNS IP
NIC	→	Aggregation / IP settings for iSCSI ports /
		Become default gateway /
		Enable jumbo frame
Node	\rightarrow	Create / Authenticate / Rename / User /
		Delete
Session	→	Session information / Delete
CHAP account	→	Create / Modify user information / Delete
Volume configuration		
Volume create		Step 1 / Step 2 / Step 3 / Step 4 / Confirm
wizard		
Physical disk	→	Set Free disk / Set Global spare /
		Set Dedicated spare / Set property /
		More information

RAID group	→	Create / Migrate / Activate / Deactivate / Scrub / Delete / Set disk property /
Virtual disk	→	More information Create / Extend / Scrub / Delete / Set property / Attach LUN / Detach LUN
		/ List LUN / Set snapshot space /
		Auto snanshot / List snanshot /
		More information
Snapshot	→	Cleanup snapshot / Auto snapshot /
	-	Take snapshot / Export / Rollback / Delete
Logical unit	→	Attach / Detach
Enclosure management		
SFS	د	Enable / Disable
configuration		
Hardware	→	Auto shutdown
monitor		
S.M.A.R.T.	→	S.M.A.R.T. information
		(Only for SATA disks)
UPS	\rightarrow	UPS Type / Shutdown battery level /
		Shutdown delay / Shutdown UPS
Maintenance		
System	\rightarrow	System information
information		
Upgrade	>	Browse the firmware to upgrade / Export configuration
Reset to default	→	Sure to reset to factory default?
Import and	\rightarrow	Import/Export / Import file
export		
Event log	→	Download / Mute / Clear
Reboot and shutdown	→	Reboot / Shutdown
Logout		Sure to logout?

4.1 Firmware-embedded (TCP/IP protocol) web browser-based RAID manage interface (making use of the controller's 10/100 Ethernet LAN port)

To ensure proper communications between the RAID subsystem and the web browser-based RAID manage interface, please connect this iSCSI RAID subsystem Ethernet LAN port to any LAN switch port or NIC port.

This iSCSI RAID subsystem's firmware is embedded with a web browser-based RAID manage interface that follows TCP/IP protocol. The users are able to manage this RAID subsystem from the remote sides with standard web browsers like IE without the needs of installing any user-specific software (platform independent).

To configure this RAID subsystem from a local or remote server, you need to know this RAID subsystem's IP address. The default IP address is displayed on the LCD screen.

4.2 Login

Launch the firmware-embedded web browser-based RAID manage interface by entering http://[IP Address] in the web browser.

You must login as the administrator no matter from a local or remote server. The default User Name is "**admin**" and Password is "**0000**". Or login with read-only account whose default User Name is "**user**" and the Password is "**1234**". This special account allows the users to view the configuration only and cannot change the settings. Additionally, there are four languages available to be selected from the language menu: **English \ Simplified Chinese \ German \ French.**

Wel	come to AL-8	1611
User name	admin	
Password	••••	
English		Login
Simplified Chinese German		

After login, the main manage menu as below will be displayed on the left side of window to make configurations



There are six indicators at the top-right corner of the window:



RAID light: Green means RAID works well. Red represents RAID failure. When red appears, examine the event log (Maintenance \rightarrow Event Log) to find out what error messages are issued; this is the first step to analyze RAID failure.

Temperature light: Green means normal temperature. Red represents abnormal temperature. When red appears, examine the event log (Maintenance \rightarrow Event Log) to find out what error messages are issued; this is the first step to analyze over temperature.

Voltage light: Green means normal voltage. Red represents abnormal voltage. When red appears, examine the event log (Maintenance \rightarrow Event Log) to find out what error messages are issued; this is the first step to analyze abnormal voltage.

UPS light: Green means UPS works well. Red represents UPS failure. When red appears, examine the event log (Maintenance \rightarrow Event Log) to find out what error messages are issued; this is the first step to analyze UPS problem. What should be noted is this iSCSI RAID subsystem only supports APC UPS. **Fan light:** Green means Fan works well. Red represents fan failure. When red appears, examine the event log (Maintenance \rightarrow Event Log) to find out what error messages are issued; this is the first step to analyze FAN problem.

Power light: Green means Power works well. Red represents power failure. When red appears, examine the event log (Maintenance \rightarrow Event Log) to find out what error messages are issued; this is the first step to analyze Power problem.

4.3 Quick Installation

It is easy to use "Quick installation" to create a volume. It uses whole physical disks to create a RG; the system will calculate maximum spaces on RAID levels 0/1/3/5/6/0+1. "Quick installation" will occupy all residual RG space for one VD, and it has no space for snapshot and spare. If snapshot is needed, please create volumes manually, and refer to snapshot configuration for more details. If some physical disks are used in other RG(s), "Quick installation" can not be run because "Quick installation "is valid only when all the physical disks in this iSCSI RAID subsystem are at free status. Below is one example of Quick Installation.

Step 1: Click **"Quick installation"**, then choose the RAID level. After choosing the RAID level, then click "

Step 2: On Confirm page, if all settings are correct, click "

<u>AL-8161i</u>	/ Quick installation / Step 2			■	
Quick installation * System configuration * System configuration	RAID level: Volume size (GB) :	RAID 5 on Local enclosure 668			
 BisCSI conjugration Volume configuration Enclosure management Maintenance Logout 			<< Back	•	Confirm

Then a VD will be created. Now you can start to use this RAID subsystem.

<u>AL-8161i</u>	/ Volu	ime configurat	tion /	' Virtu	al disk							1	68	¥ ₩ 0
Quick installation Quick installation Quick installation Qu	No.	Name	Size (GB)	Right	Priority	Bg rate	Status	Health	R %	RAID	#LUN	Snapshot space (MB)	#Snapshot	RG name
 Volume configuration Volume creation wizard Physical disk 	1	QUICK75210	668	WB	ні	4	Initiating	Optimal	1	RAID 5	1	0/0	D	QUICK7859
RAID group Virtual disk													Cr	eate o
Snapshot														
* 🔁 Enclosure management														
 Logout 														

(A RAID 5 virtual disk, named "QUICK75120" with the total available volume size 668GB)

4.4 System configuration

"System configuration" is designed to setup the "System setting", "IP address", "Login setting", "Mail setting", and "Notification setting" for this iSCSI RAID subsystem.

AL-81611	/ System configuration		▤◗▤▴⊹◐
Quick installation - System configuration System setting	System setting	System name for identification System time for event log	
IP address Login setting	IP_address	Internet Protocol(IP) address for remote administration	
Mail setting Notification setting ISCSI configuration	Login setting	Configuration for auto logout and login lock Administrator's password	
 Sector Sector Sec	Hail setting	Alert by e-mail	
Maintenance Logout	Notification setting	Alert via Simple Network Management Protocol(SNMP) Transmits net send and alerter service messages between clients and servers Alert to remote system log server	

4.4.1 System setting

"System setting" can set the system name and date.

Quick installation	System name			
configuration	System name :	AL-0161		
System setting IP address	Date and time			
Login setting	Change date and	l time		
Mail setting	Current time :	2008/9/30 13:21:23		
Notification setting	Time zone :	(GMT+08:00) Taipel	8	
Volume configuration	 Setup date 	and time manually		
Enclosure management	Date :	2008 9 / 9 9 / 20 9		
* 📮 Maintenance	Tiene :	13 % : 21 % : 18 %		
Logout	O NTP			
	Server :			
				Confirm +

Check "Change date and time" to setup the date, time, and time zone before using or synchronizing time with the NTP (Network Time Protocol) server.

The Network Time Protocol (NTP) is one way to ensure your clock stays accurate. Find out NTP server near you, and setup NTP server IP address. Finally click Confirm , the controller will connect to the NTP Time server and get time offered by the NTP server.

4.4.2 IP address

On this page, the users can change the iSCSI 's IP address \ DNS address, even the HTTP \ HTTPS, and SSH port number when the default port number is not allowed on the host/server. SSH (secure shell) is required when the users want to login this iSCSI RAID subsystem from a remote side. The SSH client software is available at the following web site:

SSHWinClient WWW: http://www.ssh.com/

Putty WWW: http://www.chiark.greenend.org.uk/

AL-8161i	/ System con	figuration / IP addre	55	E & B 4
Quick installation	MAC addre	55		
configuration System setting		MAC address :	00:13:78:A6:D0:DA	
IP address	Address			
Login setting	0	DHCP		
Mail setting	۲	Static		
SCSI configuration		Address :	192,168,1.100	
Volume configuration		Mask :	255.255.255.0	
Enclosure management		Gateway :	192.168.1.254	
Maintenance	DNS			
Logout		DNS :	127.0.0.1	
	Port			
		HTTP port :	80	
		HTTPS port :	443	
		SSH port :	22	

Besides, there is no need to create a reserved space on the arrays prior to the running the Ethernet port and HTTP / HTTPS services. The firmware-embedded web browser-based RAID manage interface can be accessed with any standard internet browser that is installed on any host computer having TCP/IP protocol-based NICs inside. Thus, there is also no need to install any extra software or patches.

DHCP (Dynamic Host Configuration Protocol) is a protocol that lets network administrators manage centrally and automate the assignment of IP (Internet Protocol) configurations on a computer network. When using the Internet's set of protocols (TCP/IP), in order for a computer system to communicate to another computer system it needs a unique IP address. Without DHCP, the IP address must be entered manually at each computer system. DHCP lets a network administrator supervise and distribute IP addresses from a central point. The purpose of DHCP is to provide the automatic (dynamic) allocation of IP client configurations for a specific time period (called a lease period) and to eliminate the work necessary to administer a large IP network.

4.4.3 Login setting

"Login setting" can set single admin, auto logout time, and admin/user password. The single admin can prevent multiple users from accessing the same controller at the same time.

/ System configuration / Login setting	
Login configuration	
Auto logout : Disable - M Login lock :	
Admin password	
Change admin password Old password : Password : Confirm :	
User password	
Change user password Password : Confirm :	
	/ System configuration / Login setting Login configuration Auto logout : Detable: Det

Auto logout: The options are (1) Disable; (2) 5 minutes; (3) 30 minutes; (4) 1 hour. The system will log out automatically when the web browser-based RAID manage interface has been inactive for 5 minutes $\$ 30 minutes $\$ 1 hour, depending on the Auto Logout setting.

Login lock: Disable/Enable. When the login lock is enabled, the web browser-based RAID manage interface allows only one user to login or modify system settings. Check "Change admin password" or "Change user password" to change admin or user password. The maximum length of password is 12 characters.



User password is used for the read-only account whose default User Name is "user" and the Password is "1234". This special account allows the users to view the configuration only and cannot change the settings.

4.4.4 Mail setting

"Mail setting" can allow at most 3 mail addresses for receiving the event notification. The firmware contains SMTP manager, and it monitors all system events and the users can select either single or multiple user notifications to be sent via 'Plain English' e-mails without the need of installing any extra software or patches. Some mail servers would check "Mail-from address" and need authentication for anti-spam. Please fill the necessary fields and click "Send test mail" to test whether email functions are available. In addition to that, the users can also select which levels of event logs are needed to be sent via Mail. Default setting only enables ERROR and WARNING event logs.

Software Operation Manual

	/ aystem configuration / Plan setting		≣ ै ⊟ ∔ ⊀ 0
Quick Installation	Mail		
System configuration System setting IP address Login setting Mail setting Notification setting ISCSI configuration Volume configuration Enclosure Enclosure Maintenance Logout	Mail-from address : Mail-to address 1 : Send events 1 : Mail-to address 2 : Send events 2 : Mail-to address 3 : Send events 3 : ✓ SMTP relay SMTP server : Authentication : Account : Pacsword : Confirm :	Info WWARNING WERROR	
	50	no cese man e	
	<u>)</u>		Confirm =

4.4.5 Notification setting

"Notification setting" allows the users to setup event log levels, SNMP trap, Windows messenger (not MSN), or alert event logs via syslog protocol.

AL-81611	/ System configuration / Notification setting	
Quick Installation	SNMP	
configuration	SNMP trap address 1 :	
System setting	SNMP trap address 2 :	
Login setting	SNMP trap address 3 :	
Mail setting	Community :	
Notification setting	Send events :	MINFO WARNING LERROR
• Volume configuration	Messenger	
management	Messenger IP/Computer name 1 :	
Maintenance	Messenger IP/Computer name 2 : Messenger IP/Computer name 3 :	
Logout	Send events :	INFO WARNING ERROR
	System ion server	
	Server IP/hostname ;	
	UDP Port :	514
	Facility :	User ビ
	Event level :	
	Event log filter	
	Pop up events :	INFO WARNING ERROR
	Show on LCM :	INFO WARNING ERROR

1."SNMP" allows up to 3 SNMP trap addresses. Default community setting is "public". User can choose the event log levels, and default setting only enables INFO event log in SNMP. There are many SNMP tools. The following web sites are for your reference:

SNMPc: <u>http://www.snmpc.com/</u> Net-SNMP: <u>http://net-snmp.sourceforge.net/</u> 2.Using "Messenger", the users must enable the service "Messenger" in Windows

(Start \rightarrow Control Panel \rightarrow Administrative Tools \rightarrow Services \rightarrow Messenger), and then event logs can be received. It allows up to 3 messenger addresses. The users can choose the event log levels. The default setting enables the WARNING and ERROR event logs.

Messenger Properties (Local Computer)	? 🔀							
General Log On Recovery Dependencies								
Service name: Messenger								
Display name: Messenger								
Description: Transmits net send and Alerter service messages between clients and servers. This service is not								
Path to executable:								
C:\WINDOWS\System32\svchost.exe -k netsv	'CS							
Startup type: Automatic	~							
Service status: Started								
Start Stop Pau	ise Resume							
You can specify the start parameters that apply when you start the service from here.								
Start parameters:								
ОК	Cancel Apply							

3.Using "**System log server**", the users can choose the facility and the event log level. The default port of syslog is 514. The default setting enables event level: INFO, WARNING and ERROR event logs.



There are some syslog server tools. The following web sites are for your reference:

WinSyslog: http://www.winsyslog.com/

Kiwi Syslog Daemon: http://www.kiwisyslog.com/

4."Event log filter" allows the users to setup event log levels for "Pop up events" and "LCM". The levels are: INFO, WARNING and ERROR

4.5 iSCSI Configuration

"iSCSI configuration" is designed to setup the "Entity Property", "NIC", "Node", "Session", and "CHAP account".

<u>AL-8161i</u>	/ iSCSI configuration		
Quick installation	Entity property	iSCSI entity property	
• • iSCSI configuration Entity property NIC Node	NIC	iSCSI portal configuration	
	Nosla	ISCSI node configuration	
Session CHAP account	Session	ISCSI session information	
 Volume configuration Enclosure management 	CHAP account	Add/Remove account for iSCS1 node	
Maintenance			

4.5.1 Entity property

"Entity property" can view the entity name of this iSCSI RAID subsystem, and setup the "iSNS IP" for iSNS (Internet Storage Name Service). The iSNS protocol is designed to facilitate the automated discovery, management, and configuration of iSCSI devices on a TCP/IP network environment. iSNS provides intelligent storage discovery and management services comparable to those found in Fibre Channel networks, allowing a commodity IP network to function in a similar capacity as a storage area network. To use iSNS, it needs to install a iSNS server. Add an iSNS server IP address into the iSNS server lists so that a iSCSI initiator service can send queries.



1: the server that functions as ISNS server must not be installed with Microsoft iSCSI initiator.

2: the entity name of the iSCSI RAID subsystem quad-port models can be changed but dual-port model doesn't support entity name changing.

4.5.2 NIC

"NIC" can change the IP addresses of iSCSI host ports. This iSCSI RAID subsystem has four Gb/s LAN ports working as the host port to transmit data. Each of them must be assigned with a unique IP address unless the link aggregation or Trunking mode has been selected. If any two or more ports are set in link aggregation or Trunking mode, they will display same IP.



The iSCSI RAID subsystem AL-8121i and AL-8161i have four gigabit LAN ports to transmit data, but AL-6080i and AL-6120i has two ports only.

International Contraction Contract	Contract of the local division of the									
Quick Installation	Name	LAG	LAG No	DHCP	IP address	Netmask	Gateway	Jumbo frame	MAC address	Lin
System configuration	LAN1	No	N/A	No	192.168.1.1	255.255.255.0	192.168.1.254	Disabled	00:13:78:a6:03:64	Dow
Entity property NIC	IP set Becon	tings for ne defau	iSCSI ports It gateway	5	192.168.2.1	255.255.255.0	192.168.2.254	Disabled	00:13:78:a6:03:65	Vp
Node Session	Enabl				192.160.3.1	255.255.255.0	192.168.3.254	Disabled	00:13:78:a6:03:66	Dow
CHAP account		No	N/A	No	192.168.4.1	255.255.255.0	192.168.4.254	Disabled	00:13:78:a6:03:67	Dow
 Volume configuration Enclosure management Maintenance Logout 							1		Aggreg	Jation (

AL-8161i	/ iSCSI configuration /	NIC / 1P address		a a	5	8 4	\$	0
Quick installation System configuration Signification Entity property	DHCP Static Address:	192.168.1.1						
NIC Node Session	Mask : Gateway :	255.255.255.0 192.168.1.254						
CHAP account CHAP account Enclosure management Maintenance Logout			<c back<="" td=""><td>•</td><td></td><td>Conf</td><td>irm</td><td>*</td></c>	•		Conf	irm	*

1.Click "**IP settings for iSCSI ports**"; the users now can change the IP address by moving mouse to the gray button of LAN port. There are 2 selections, DHCP (Get IP address from DHCP server) and Static IP.

2.Click "**Become default gateway**"; then the default gateway now can be changed by moving mouse to the gray button of LAN port, and enter in the right gateway IP address.

AL-8161i	/ISCS1 configuration / NIC E & B & +										
Quick installation	Name LAN1	LAG	LAG No	DHCP	IP address	Netmask	Gateway	Jumbo frame	MAC address	Link	
 Entity property 	IP set	No N/A No 192.168.1.1 255.255.255.0 192.168.1.254 P settings for ISCSI ports JewsScript X						Disabled	00:13:78:a6:03:65	Up	
Node Session	Enabl	ie jumbo sist	frame		(192.168.1	100>		Disabled	00:13:78:a6:03:66	Down	
CHAP account		NO	N/A	NO	Stille in pec	oue orient franksiv		Disabled	00:13:78:a6:03:67	Down	
Logout	1000										
AL-8161i	/ iscsl co	antigura	tion / NIC /	IP addre	155	_			= 6 H 4	* 0	
Quick installation	0	DHCP									
iSCS1 configuration	۲	Static									
Entity property		Address	19	2.169.1.1							
NIC		Mask :	21	5.255.25	5.0						
Session		Gatewa	y : 15	2,168,1,2	19 4						
CHAP account CHAP account CH									Back e Con	firm e	

3. Click **"Enable jumbo frame"**; then the users can enable or disable jumbo frame by moving mouse to the gray button of LAN port, and clicking **"Enable jumbo frame"**.

AL-8161i	/ iSCS1 configuration / NIC 🗐 🕹 🗄 🗍 🗍 🐇 🖓 😡									
Quick installation = System configuration = ISCSI configuration Entity property NIC Node Session CHAP account = Volume configuration = Enclosure management = Meintenance	Name LAN1	LAG No	LAG No DHCP IP address Netmask Gateway N/A No 192.168.1.1 255.255.55.0 192.168.1.254				Gateway 192.168.1.254	Jumbo frame Disabled	MAC address 00:13:78:a6:03:64	Link
	IP se Becor Enab	IP settings for ISCSI port Become default patrway Enable jumbo frame						Disabled Disabled	00:13:78:a6:03:65 00:13:78:a6:03:66	Up Down
		No	N/A	a Ship e	Sure to enable jumbo securing scription this p	tane? OK	4 Cancel	Disabled	00:13:78:a6:03:67	Down
Logout										

Jumbo Frame is designed to enhance Ethernet networking throughput and largely lower the CPU consumption of large file transfers by enabling more efficient larger payloads per packet. Conventionally, jumbo frames can carry up to 9,000 bytes of payload. Basically, a data transfer path from the iSCSI to the server includes at least a NIC and iSCSI itself. To prove jumbo frame really works on this path, the jumbo frame function of both the iSCSI and the NIC must be enabled. If an Ethernet switch is involved in this path, please enable the jumble frame function of this switch, too, and ensure MTU (maximum transmission unit) are all identical. "**Wireshark** "can be used to obtain the current MTU of any devices supporting jumbo frame.

4.Click "<u>Aggregation</u>"; then the users can select "**Trunking**" or "**LCAP**" to increase the data transfer speed beyond the limits of any one single

cable/port, or increase the redundancy for higher availability by paralleling multiple Ethernet network cables/ports.

<u>AL-8161i</u>	/ iSCSI configuration /	NIC / Aggregation			6	● ● 8 ≩	*	0
Quick installation Cutoperformation Cutoperformation Cutoperformation Cutoperformation NIC Node Session	Aggregation : Address : Mask : Gateway : NIC :	 C Trunking C LACP 192.168.1.1 255.255.255.0 192.168.1.254 IAN1 IF LAN2 □ LAN3 □ LAN4 						
CHAP account CHAP account CHAP account Colume configuration Chapter management Maintenance Logout			<< Back	0		Confi	rm	0

<u>AL-8161i</u>	/ iSCSI configuration / NIC 🗧 👌 🗄 🦂 🎋										. 0
Quick installation	Name LAN1	LAG	LAG No	DHCP	IP address	Netmask	Gateway	Jumbo frame	MAC	address	Link
Entity property	LAN2	Trunking	0	No	192.168.1.1	255.255.255.0	192.168.1.254	Disabled	00:13:	78:a6:03:64	Up
Nic Node Session	LAN3	No	N/A	No	192.168.3.1	255.255.255.0	192.168.3.254	Disabled	00:13:	78:a6:03:66	Down
CHAP account	LAN4	No	N/A	No	192.168.4.1	255.255.255.0	192.168.4.254	Disabled	00:13:	78:a6:03:67	Down
Enclosure management Anintenance Logout	10.									Aggregatic	n e

The following is the description of Trunking /LACP:

Trunking: It is defined as combining multiple ports in order to form faster logical communication links between devices. For example, connect all four data ports to the Gb/s Ethernet switch to form a single logical 4 Gb/s path.

LACP: The Link Aggregation Control Protocol (LACP) is part of IEEE specification 802.3ad that allows bundling several physical ports together to form a single logical channel. LACP allows a network switch to negotiate an automatic bundle by sending LACP packets to the peer. The advantages of LACP are (1) increases the bandwidth. (2) failover when link status fails on a port.

To remove Trunking/LACP setting, mouse move to the gray button of LAN port, click "Delete link aggregation". Then a confirmation message will pop up.

4.5.3 Node

"**Node**" allows the users to setup the target name and enable CHAP for the iSCSI initiator. This iSCSI RAID subsystem supports multiple nodes, and there is no default node; it is empty, and must be created first.

ntstate	Portal 192.168.2.1:3260
_	
•	
2.168.11.226:3260 2.168.12.226:3260 2.168.13.226:3260 2.168.14.226:3260	(LAN 1, DHCP: No, Jumbo frame: Disabled (LAN 2, DHCP: No, Jumbo frame: Disabled (LAN 3, DHCP: No, Jumbo frame: Enabled) (LAN 4, DHCP: No, Jumbo frame: Disabled
	2.168.13.226:3260 2.168.13.226:3260 2.168.14.226:3260



1. After the executing **"Quick installation"**, a node will be auto-created.

2. The **iSCSI** RAID subsystem quad-port models support multi-node and renaming node's name. Unlike the quad-port models, the dual-port model only supports single-node, and the node name exists by default and can not be changed.

To use CHAP authentication, please follow the steps below:

Step 1: Mouse moves to the gray button of "Auth" column, click "Authenticate".

AL-8161i	/ iSCSI configuration / Node			E & B & * O
Quick Installation • System configuration • SCSI configuration Entity property	Auth	Name amd	Portal 192.160.2.1:3260	
NIC Node Session CHAP account Solume configuration Chalosure management Maintenance Logout	Rename User Delete			Create e

Step 2: Select "CHAP".

AL-8161i	/ ISCSI configuration / Node / Authenticate	
Quick Installation	Authentication : CHAP = Incom	
Entity property NIC Node Session CHAP account Enclosure management Maintenance Logout		<< Back • Confirm •
Step 3: C	lick "Confirm • ".	

Step 4: Mouse moves to the gray button of "Auth" column, click "User".

AL-8161i	/ iSCSI configuration / Node			6 8 4 × 0
Quick Installation System configuration SiGCSI configuration Entity property	Auth None Authenticate	Name amd	Portal 192.160.2.1:3260	
NIC Node Session CHAP account In Volume configuration In Enclopure management In Maintenance Logout	Roname User Defete			Create .

Step 5: Select CHAP user(s) that will be used. It's a multi option; it can be one or more. If choosing none, CHAP can not work.

Node :	all	
	User	
	chap1	
	chap2	

Step 6: Click " Confirm • ".

Step 7: Mouse moves to the gray button of "Auth" column, click "Authenticate", select "None" when you want to disable CHAP for the existing node.

AL-8161i	/ iSCSI configuration / Node / Authenticate	ē ↓	8 4 4 0
Quick installation	Authentication :		
Entity property NIC Node Session CHAP account Solution Solution Enclosure management Maintenance Logout	CHAP	<< Back =	Confirm e

4.5.4 Session

"Session" can display iSCSI session and connection information, including the following items:

- 1. Host (Initiator Name)
- 2. Error Recovery Level
- 3. Error Recovery Count
- 4. Detail of Authentication status and Source IP: port number

Quick installation				_								and the second second
System configuration	N0.	TSIH	Initiator name	Target name	InitialR2T	Immed. data	MaxOutR2T	MaxDataBurstLen	DataSeqInOrder	DataPDUInOrder	Error recovery level	Error
Entity property NIC		0x0001	iqn.1991- 05.com.microsoft:win- lot.7og3vw49.edsor	amd	Yes	Yes	1	262144	Yes	Yes	0	0
Node	Dele	connection te	1									
CHAP account			100									
volume configuration												
Enclosure												

Mouse moves to the gray button of session number, click "List connection". It will list all connection(s) of the session.



Error Recovery Level: To provide a technique whereby a value of an error recovery level determined in negotiation processing between an initiator and a target can be set to a suitable value that is intended by a manager. A storage system comprises a storage section containing a target module that is connected to an initiator device; and a management section that manages the storage section. The target module carries out negotiation processing with the initiator device so as to determine a value of a first error recovery level. The first error recovery level is determined as the smaller of a value of a second error recovery level of the initiator device and a value of a third error recovery level of the target module. The management section carries out setting processing for allocating the initiator device that is to be connected to the target module to the target module, according to an instruction from a manager. In the setting processing, the value of third error recovery level is notified to the manager.

4.5.5 CHAP Account

"CHAP account" can allow the users to create multiple CHAP accounts for node authentication.

To create CHAP account, please follow the steps below:

Step 1:	Click "	Crea	te	• "						
AL-81611	/ iSCS1 configuration / CH	AP account				Ĭ	6	8	*	õ
Quick installation	U	er			Node name					
iSCSI configuration				No user now!						
NIC								Cr	eate	
Node Session										
CHAP account										
Enclosure										
management Maintenance										
Logout										

Step 2: Enter "User", "Secret", and "Confirm" secret (re-enter the secret password). "Node" can be selected here. If none is selected here, it still can be enabled in "/ iSCSI configuration / Node / User".

AL-8161i	/ iSCSI configuration	/ CHAP account / Create		∃ 6	8 4 4 0
Quick Installation System configuration SiSCSI configuration Entity property	User : Secret : Confirm : Node :	otto (min: 12	(max: 223) 2, max: 16) 2, max: 16)		
NIC Node Session CHAP account ■ Volume configuration ■ Enclosure management ■ Maintenance Logout				<c back="" th="" •<=""><th>Confirm .</th></c>	Confirm .
Step 3:	Click "	Confirm	• "		

Step 4: If wanting to delete existing CHAP accounts, click "Delete" to delete existing CHAP accounts.



4.6 Volume configuration

"Volume configuration" is mainly designed to setup the volume configuration which includes "Volume create wizard", "Physical disk", "RAID group", "Virtual disk", "Snapshot", and "Logical unit".

etaStor	Securing Your Data	through Us!	
AL-8161i	/ Volume configuration	≣ 5 B 4 % 0	
Quick installation	Yolume creation wizard	Easy and quick step-by-step volume configuration	
 SCSI configuration Volume 	Physical disk	Hard disks to store data	
Volume creation	RAID group	Sets of physical disks with RAID functions	
Physical disk BAID group	Virtual disk	Slices of RAID groups	
Virtual disk Snapshot	Snapshot	Point-in-time copies of the data	
Logical unit • 🔁 Enclosure	Logical unit	Target volumes for hosts access	
Maintenance			

4.6.1 Volume create wizard

"Volume create wizard" has a smarter policy. When this iSCSI RAID subsystem is inserted with some hard drives, "Volume create wizard" will list all the possible RAID level and capacities that the users can choose. For example, the users choose RAID 5 and the array has 12*200G + 4*80G hard drives inserted. If the users want to make use of all the 16 hard drives for a RAID 5, the maximum capacity of the volume is 1200G (80G*15). Taking advantage of "Volume create wizard, this iSCSI RAID subsystem will take a smarter check and find out the most efficient way of using all the available hard drives; thus, in this case, the wizard will only uses the 200G hard drives, making a RAID 5 volume consisted of 200G*11=2200G. The volume capacity, by doing so, becomes bigger, and the maximum hard drive capacity is fully used, too.

The smarter policy gives the users:

- 1. Biggest capacity of RAID level for the users to choose
- 2. The fewest disk number for RAID level / volume size

To use Volume create wizard, please follow the steps below:

Step 1: Select "Volume create wizard" and then choose the RAID level. After

the RAID level is chosen, click " Next >> • ". Then it will link to next page.

<u>AL-8161i</u>	/ Volume configuration	on / Volume creation wizard / Step 1	 6 B 4 %	0
Quick installation Time System configuration	RAID enclosure :	Local 💌		
iSCSI configuration Solution Solution	RAID level :	- RAID 0 (1190 GB) - 🔽		
Volume creation wizar Physical disk	d		Next >>	0
RAID group Virtual disk				
Snapshot Logical unit				
 Enclosure management Maintenance Logout 				

Step 2: Please select the combination of the RG (RAID Group) capacity, or "Use default algorithm" for maximum RG capacity. After RG capacity is chosen, click " Next >> • ".

<u>AL-8161i</u>	/ Volume configuration / Volume	creation wizard / Step 2		111	6	8 4	*	Ø
Quick installation	C Use default algorithm C Customization RAID group: -n	ew 1 disk (148 GB) - ♥ =w 2 disk (148 GB) - =w 2 disk (297 GB) - =w 4 disk (446 GB) - =w 4 disk (595 GB) - =w 5 disk (743 GB) - =w 6 disk (892 GB) - =w 7 disk (1041 GB) - =w 8 disk (1190 GB) -	<< Back	0		Next	>>	0

Step 3: Decide VD (Virtual Disk) capacity. The users can enter a number less or equal to the default capacity. Then click "



Step 4: Confirm page. Click "<u>Confirm</u>" if all settings are correct. Then a VD will be created.

<u>AL-8161i</u>	/ Volume configuration	/ Volume creation wizard / Step 4	_	= 2	8 4 4 6
Quick installation * 🗃 System configuration * 🔄 iSCSI configuration	RAID level: RAID group: Volume size (GB):	RAID O new rg 1190			
 Volume configuration Volume creation wizard Physical disk PAID arguin 			<< Back	0	Confirm •
Virtual disk Snapshot Logical unit					
 Enclosure management Maintenance Logout 					

Done. You can start to use the system now.

<u>AL-8161i</u>	/ Volu	me configurat	ion / '	Virtua	l disk							E	6 B	¥ 4 0
Quick installation Guick installation Guick	No.	Name	Size (GB)	Right	t Priority	Bg rate	Status	Health	R %	RAID	#LUN	Snapshot space (MB)	#Snapshot	RG name
Volume configuration	1	QUICK20595	1190	WB	ні	4	Online	Optimal		RAID	1	0/0	0	QUICK21218
					10.00		1			0				
	0													
													Cr	eate e
Virtual disk														
🖲 🚞 Enclosure management														
🖲 🧰 Maintenance														

(A RAID 0 virtual disk, named "QUICK20595" with the total available volume

capacity 1190GB)

4.6.2 Physical disk

"**Physical disk**" allows the users to view the status of inserted hard drives in the iSCSI RAID subsystem. Besides, when moving mouse to the gray button next to the number of slot, the users will find that an submenu will be automatically pulled down, on which, functions that can be executed will not shown in gray color.

<u>AL-8161i</u>	/ Volun	/ Volume configuration / Physical disk 🔤 占 🖪									• • •
Quick installation * 🖬 System configuration	Local										
 iSCSI configuration iscolume configuration 	Slot	Size (GB)	RG name	Status	Health	Usage	Vendor	Serial	Туре	Write cache	Standby
Volume creation wizard Physical disk	1	148		Online	Good	Free disk	WDC	WD-WMAP41314417	SATA	Enabled	Disabled
RAID group Victual disk	Set I Set (•	Good	Free disk	WDC	WD-WMAM9P850645	SATA2	Enabled	Disabled
	Set I Set i)edicat propert		are e	Good	Free disk	WDC	WD-WMAP41301756	SATA	Enabled	Disabled
* 🛅 Enclosure management	More	inforn	nation	е	Good	Free disk	WDC	WD-WMAP41313053	SATA	Enabled	Disabled
* 🔁 Maintenance Logout	6.	148		Online	Good	Free disk	WDC	WD-WMAP41314278	SATA	Enabled	Disabled

- 1. Set PD slot number 9 to Ddicated spare disk.
- Step 1: Mouse moves to the gray button of PD 9, select "Set Dedicated spare".

Chapter 4.	Web	Browser-based	Configuration

<u>AL-8161i</u>	/ Volun	ne con	figura	tion / Ph	ysical dis	sk.			111		\$ 0			
Quick installation	Local													
iSCSI configuration Volume configuration	Slot	Size (GB)	RG name	Status	Health	Usage	Vendor	Serial	Туре	Write cache	Standb			
Volume creation wizard Physical disk	1	148	RG1	Online	Good	RAID disk	WDC	WD-WMAP41314417	SATA	Enabled	Disable			
	2	74	RG1	Online	Good	RAID disk	WDC	WD-WMAM9P850645	SATA2	Enabled	Disableo			
	3	148	RG1	Online	Good	RAID disk	WDC	WD-WMAP41301756	SATA	Enabled	Disable			
Logical unit Enclosure management	5	148	RG2	Online	Good	RAID disk	WDC	WD-WMAP41313053	SATA	Enabled	Disabled			
Maintenance .ogout	6	148	RG2	Online	Good	RAID disk	WDC	WD-WMAP41314278	SATA	Enabled	Disable			
	7.	148	RG2	Online	Good	RAID disk	WDC	WD-WMAP41314910	SATA	Enabled	Disabled			
	9	148		Online	Good	Free disk	WDC	WD-WMAP41314348	SATA	Enabled	Disabled			
	Set P Set 0			e	Good	Free disk	WDC	WD-WMAJ91561912	SATA	Enabled	Disabled			
	► Set I	Set Dedicated spare Set presents				Free disk	WDC	WD-WMAP41314932	SATA	Enabled	Disabled			
	More			e	Good	Free disk	WDC	WD-WMAP41314506	SATA	Enabled	Disabled			

Step 2: Maybe there are some existing RG(s); select one existing RG that will use your created Dedicated spare, then click "Confirm ,"

	Availa	ble RG	for slot 9 o	n Local :								
System configuration		No.	Name	Total (GB)	Free (GB)	#PD	#VD	Status	Health	RAID	Enclosu	·e
Volume configuration	C	1	RG1	148	148	3	0	Online	Good	RAID 5	Local	
Volume creation wizard	C	2	RG2	297	297	3	0	Online	Good	RAID 5	Local	
								į	<< Back	0	Confirm	

2. Set PD slot number 1 to Global spare disk.

Step 1: Mouse moves to the gray button of PD 1, select "Set Global".

Software Operation Manual

stallation m configuration	Local	Local													
configuration ne configuration	Slot	Size (GB)	RG name	Status	Health	Usage	Vendor	Serial	Туре	Write cache	Standby				
e creation wizard	1	148		Online	Good	Free disk	WDC	WD-WMAP41314417	SATA	Enabled	Disabled				
	Set P	iree di Global	sk spare	e	Good	Free disk	WDC	WD-WMAM9P850645	SATA2	Enabled	Disabled				
	Set I			are <mark>e</mark>	Good	Free disk	WDC	WD-WMAP41301756	SATA	Enabled	Disabled				
	More	inforn	-7 nation	e	Good	Free disk	WDC	WD-WMAP41313053	SATA	Enabled	Disabled				
	6	148		Online	Good	Free disk	WDC	WD-WMAP41314278	SATA	Enabled	Disabled				
	7	148		Online	Good	Free disk	WDC	WD-WMAP41314910	SATA	Enabled	Disabled				
	9	148		Online	Good	Free disk	WDC	WD-WMAP41314348	SATA	Enabled	Disabled				
	10	74		Online	Good	Free disk	WDC	WD-WMAJ91561912	SATA	Enabled	Disabled				
	13	148		Online	Good	Free disk	WDC	WD-WMAP41314932	SATA	Enabled	Disabled				
	14	148		Online	Good	Free disk	WDC	WD-WMAP41314506	SATA	Enabled	Disabled				

Step 2: Confirm or not

Quick installation * 🗃 System configuration	<u>Local</u>										
 iSCSI configuration iSCSI configuration 	Slot	Size (GB)	RG name	Status	Health	Usage	Vendor	Serial	Туре	Write cache	Standby
Volume creation wizard	1	148		Online	Good	Free disk	WDC	WD-WMAP41314417	SATA	Enabled	Disabled
RAID group	Set F		sk spare		Microsoft I	nternet Explore	<u> </u>	WD-WMAM9P850645	SATA2	Enabled	Disabled
	Set I			are e	•	Make slot: 1 as G	lobal spares ?	WD-WMAP41301756	SATA	Enabled	Disabled
Logical unit * 🚘 Enclosure management	– Set p More	inform	y Nation	e		OK Ca	ncel	WD-WMAP41313053	SATA	Enabled	Disabled
Maintenance	6	148		Online	Good	Free disk	WDC	WD-WMAP41314278	SATA	Enabled	Disabled
	7	148		Online	Good	Free disk	WDC	WD-WMAP41314910	SATA	Enabled	Disabled
	9	148		Online	Good	Free disk	WDC	WD-WMAP41314348	SATA	Enabled	Disabled
	10	74		Online	Good	Free disk	WDC	WD-WMAJ91561912	SATA	Enabled	Disabled
	13	148		Online	Good	Free disk	WDC	WD-WMAP41314932	SATA	Enabled	Disabled
	14	148		Online	Good	Free disk	WDC	WD-WMAP41314506	SATA	Enabled	Disabled

- 3. Show the information of hard drive 1 in detail.
- Step 1: Move mouse to the gray button next to the number of slot 1, and select "More information".

	(insta	llation	oal												
🖬 Sy		configuration	cal												
ist Vo	CSI co olume	nfiguration configuration	Slot	Size (GB)	RG name	Status	Heal	th l	Jsage	Vendo	r Serial	Туре	Wri	te cache	Standby
Vo Ph	lume (Ivsica	creation wizard	1	148		Online	Goo	d Fr	ee disk	WDC	WD-WMAP413	14417 SATA	Er	nabled	Disable
		up				е	Goo	d Fr	ee disk	WDC	WD-WMAM9P8	50645 SATA	2 Er	nabled	Disable
		t	Set			are e	Goo	d Fr	ee disk	WDC	WD-WMAP413	01756 SATA	Er	nabled	Disable
Lo En		e management	More	e infor	mation	е	Goo	d Fr	ee disk	WDC	WD-WMAP413	13053 SATA	Er	nabled	Disable
l Ma ogo		ince	6	148		Online	Goo	d Fr	ee disk	WDC	WD-WMAP413	14278 SAT/	E	nabled	Disable
-		7。	148		Online	Goo	d Fr	ee disk	WDC	WD-WMAP413	14910 SATA	Er	nabled	Disable	
		9.	148		Online	Goo	d Fr	ee disk	WDC	WD-WMAP413	14348 SATA	Er	nabled	Disable	
		10_0	74		Online	Goo	d Fr	ee disk	WDC	WD-WMAJ915	61912 SATA	Er	nabled	Disable	
			13_0	148		Online	Goo	d Fr	ee disk	WDC	WD-WMAP413	14932 SATA	Er	nabled	Disable
			14	148		Online	Goo	d Fr	ee disk	WDC	WD-WMAP413	14506 SATA	Er	habled	Disable
Volu	me co	onfiguration / Physic	al dis	sk / M	lore in	formati	on		_	_	_		5		* 0
sica	l disk	:	Cizo	PC			Error	Poad						Write	
. ID	Slot	WWN	(GB)	name	Status	Health	alert	errors	Usage	Vendor	Serial	Model	Туре	cache	Standb
0	1	20c4001378a6d0da	148		Online	Good	No	No	FR	WDC	WD- WMAP41314417	WD1600ADFD 60NLR	SATA	Enabled	Disable

4. Set hard drive 1 as free disk.

Step 1: Move mouse to the gray button next to the number of slot 1, and select **"Set free disk"**.

<u>AL-8161i</u>	/ Volu	ne con	figura	ation / P	hysical d	isk		_	(())		\$ 0
Quick installation	Local										
 iscs1 configuration isource isour	Slot	Size (GB)	RG name	Status	Health	Usage	Vendor	Serial	Туре	Write cache	Standby
Volume creation wizard	1	148		Online	Good	Global spare	WDC	WD-WMAP41314417	SATA	Enabled	Disabled
RAID group Virtual disk	► Set i Set i	Free di Slobal	sk spare		Good	Free disk	WDC	WD-WMAM9P850645	SATA2	Enabled	Disabled
	Set i	Set Dedicated spare - Set property -				Free disk	WDC	WD-WMAP41301756	SATA	Enabled	Disabled
🖲 🔁 Enclosure management	More	e inforn	nation		Good	Free disk	WDC	WD-WMAP41313053	SATA	Enabled	Disabled
 Maintenance Logout 	6	148		Online	Good	Free disk	WDC	WD-WMAP41314278	SATA	Enabled	Disabled
	7	148		Online	Good	Free disk	WDC	WD-WMAP41314910	SATA	Enabled	Disabled
	9	148		Online	Good	Free disk	WDC	WD-WMAP41314348	SATA	Enabled	Disabled
	10	74		Online	Good	Free disk	WDC	WD-WMAJ91561912	SATA	Enabled	Disabled
	13	148		Online	Good	Free disk	WDC	WD-WMAP41314932	SATA	Enabled	Disabled
	14	148		Online	Good	Free disk	WDC	WD-WMAP41314506	SATA	Enabled	Disabled

5. Set hard drive 1 property.

Step 1: Move mouse to the gray button next to the number of slot 1, and select **"Set property"**.

<u>AL-8161i</u>	/ Volun	ne con	figura	tion / Pl	iysical dis	sk			and a	I & E ≩	* 0
Quick installation System configuration	<u>Local</u>										
 iscs1 configuration is volume configuration 	Slot	Size (GB)	RG name	Status	Health	Usage	Vendor	Serial	Туре	Write cache	Standby
Volume creation wizard Physical disk	1	148		Online	Good	Free disk	WDC	WD-WMAP41314417	SATA	Enabled	Disabled
RAID group Virtual disk	Set i Set i			в	Good	Free disk	WDC	WD-WMAM9P850645	SATA2	Enabled	Disabled
Snapshot	Set i	Dedical proper	edisp :v	are e	Good	Free disk	WDC	WD-WMAP41301756	SATA	Enabled	Disabled
* 🔁 Enclosure management	More	e inforn	nation	e	Good	Free disk	WDC	WD-WMAP41313053	SATA	Enabled	Disabled
 Maintenance Logout 	6	148		Online	Good	Free disk	WDC	WD-WMAP41314278	SATA	Enabled	Disabled
	7	148		Online	Good	Free disk	WDC	WD-WMAP41314910	SATA	Enabled	Disabled
	9	148		Online	Good	Free disk	WDC	WD-WMAP41314348	SATA	Enabled	Disabled
	10	74		Online	Good	Free disk	WDC	WD-WMAJ91561912	SATA	Enabled	Disabled
	13	148		Online	Good	Free disk	WDC	WD-WMAP41314932	SATA	Enabled	Disabled
	14	148		Online	Good	Free disk	WDC	WD-WMAP41314506	SATA	Enabled	Disabled

Write cache options:

- 1. Enabled \rightarrow Enable disk write cache.
- 2. Disabled \rightarrow Disable disk write cache.

Standby options:

- 1. Disabled \rightarrow Disable spin down.
- 2. 30 sec / 1 min / 5 min / 30 min → Enable hard drive auto spin down to save power in the period of time.

<u>AL-8161i</u>	/ Volume configurat	ion / Physical disk / Set property				. 0
Quick installation Quick installation Volume configuration Volume creation wizard Physical disk RAID group Virtual disk Snapshot Logical unit Logical unit Logicul	Slot 1 : Write Cache : Standby :	Enabled I Disabled 30 Sec 1 min 5 min 30 min	<< Back	•	Confirm	•

PD column description :
Slot	The position of hard drives. The button next to the number of slot shows the functions which can be executed.
Size (GB)	Capacity of hard drive.
RG Name	Shows the RAID group of the hard drives
Status	The status of hard drive.
	"Online" \rightarrow the hard drive is online.
	"Rebuilding" \rightarrow the hard drive is being rebuilt.
	"Transition" \rightarrow the hard drive is being migrated or is replaced by another disk when rebuilding occurs.
	"Missing" \rightarrow the hard drive has already joined a RG but not plugged into the disk tray of current system.
Health	The health of hard drive.
	"Good" \rightarrow the hard drive is good.
	"Failed" \rightarrow the hard drive is failed.
	"Error Alert" \rightarrow S.M.A.R.T. error alert.
	"Read Errors" \rightarrow the hard drive has unrecoverable read errors.
Usage	"RD" \rightarrow RAID Disk. This hard drive has been set to RAID.
	"FR" \rightarrow FRee disk. This hard drive is free for use.
	"DS" \rightarrow Dedicated Spare. This hard drive has been set to the dedicated spare of the RG.
	"GS" \rightarrow Global Spare. This hard drive has been set to a global spare of all RGs.
	"RS" \rightarrow ReServe. The hard drive contains the RG information but cannot be used. It may be caused by an uncompleted RG set, or hot-plug of this disk in the running time. In order to protect the data in the disk, the status changes to reserve. It can be reused after setting it to "FR" manually.
Vendor	Hard drive vendor.
Serial	Hard drive serial number.
Туре	Hard drive type.
	"SATA" → SATA disk.

	"SATA2" → SATA II disk. "SAS" → SAS disk.
Write cache	Hard drive write cache is enabled or disabled.
Standby	HDD auto spin down to save power. The default value is disabled.

PD operations description :

Set Free disk	Make the selected hard drive to be free for use.
Set Global spare	Set the selected hard drive to global spare of all RGs.
Set Dedicated spares	Set hard drive to dedicated spare of selected RGs.
Set property	Change the status of write cache and standby.
	Write cache options:
	"Enabled" \rightarrow Enable disk write cache.
	"Disabled" \rightarrow Disable disk write cache.
	Standby options:
	"Disabled" → Disable spin down.
	"30 sec / 1 min / 5 min / 30 min" \rightarrow Enable hard drive auto spin down to save power in the period of time.
More information	Show hard drive detail information.

4.6.3 RAID group

"**RAID group**" can allow the users to create RG and view the status of each RAID group. The following is an example to create a RG.

Step [•]	1: Cli	ck "	С	reate		• "	enter	"Name",	choose	e "RAID I	evel",
click	"		Select	t PD	•	"	to	select	PD.	Then	click
"	P	vext >>		"							

/ Volume configurat	ion / RAID group / Create
Name :	RG-R0
RAID level :	RAID 0
RAID PD slot :	5678
Write Cache :	Enabled 💌
Standby :	Disabled Disabled
	30 sec 1 min
	5 min 30 min



No.		Name	Total (GB)	Free (GB)	#PD	#VD	Status	Health	RAID	Enclosure
1	>	RG-R0	135	135	4	O	Online	Good	RAID 0	Local
2	2 RG-R5		931	931	з	o	Online	Good	RAID 5	Local
Mij										
Ad										
De										Create •
Sc										
De										
Se										
Me										

(There is a RAID 0 with 4 physical disks, named "RG-R0", total capacity is 135GB. Another is a RAID 5 with 3 physical disks, named "RG-R5")

RAID group submenu:

AL-8161i	/ Volume configur	ation / RAID gr	oup						8	6 B 4 4
Quick installation System configuration System configuration	N0.	Name	Total (GII)	Free (GB)	#PD	#VD	Status	Health	RAID	Enclosure
 Volume configuration 	1	peta	668	668	9	0	Online	Good	RAID 0	Local
Volume creation wizard	Activity									Create
Physical disk RAID group	Deadovat Scrub	•								
Virtual disk Spapshot	Delete									
Logical unit	More info	rmation								
management										
Logout										

1. Deactivate

Deactivating a RAID group allows the users to array roam the whole RAID group to another iSCSI RAID subsystem without powering off this iSCSI RAID subsystem.

2. Activate

Activating a RAID group allows the users to restore the off-line status RAID group. After a RAID group is array roamed to another iSCSI RAID subsystem, the users have to execute this function to activate the moved RAID group.

AL-8161i	/ Volume configur	ation / RAID	group							5 E 4 % 0
Quick Installation	No.	Nome	Total (GB)	Free (CB)	#PD	#VD	Status	Health	RAID	Enclosure
 Volume configuration 	1 Microto	peta /	avaScript					Good	RAID 0	Local
Volume creation wizard Physical disk RAID group	Attisuta Deactivata Scrub	•	(192) Start	168,1.100> o deevtivete peta '						Create .
Virtual disk Snapshot Logical unit	Delete Set disk p More infor	roperty mation	Etop coscuting :	cripts on this pag		OK	Cancel			
 Enclosure management Maintenance Logout 										

3. Scrub.

Scrubbing a RAID group in order to remap bad blocks; this function is to make parity regeneration, supporting RAID 3 / 5 / 6 / 30 / 50 / 60 only.

AL-8161i	/ Volume configur	ation / RAID gr	onb						010	6 H é
Quick installation	No.	Name	Total (GD)	Free (60)	#PD	#VD	Status	Health	RAID	Enclo
Volume configuration	1 Marsta	peta Java	Script					Good	RAID 0	Lo
Wizard Physical disk RAID group	Activate Deactivate Scrub		*192.1 Scrub J	68.1.100» RO: pets ?						Cre
Virtual disk Snapshot Logical unit	Delete Set disk p More infor	roperty mation	Stop executing at	riph on Đải pag		OK	Cancel			
 Enclosure management Maintenance Logout 										

4. Set disk property

<u>AL-8161i</u>	/ Volume configuration / RAID group / Set disk property		6		i i	* (3
Quick installation Guick instal	RG QUICK21620 : Write Cache : Enabled Standby : Disabled Disabled 30 sec 1 min 5 min 30 min 30 min	•		Ci	onfirn	ז	0

Write cache options:

1. Enabled \rightarrow Enable disk write cache.

2. Disabled \rightarrow Disable disk write cache.

Standby options:

- 1. Disabled \rightarrow Disable spin down.
- 2. 30 sec / 1 min / 5 min / 30 min → Enable hard drive auto spin down to save power in the period of time.

5. Delete

Delete existing RAID groups.



If the RAID group contains VD (Virtual Disk), the VD has to be deleted prior to the deletion of RAID group.

6. More information

Display the RAID group information in detail

/ Vo	Securing Yo Iume configurati group :	ur Dat	a thro group	D ugh / More	Us!	nation					_		0	•	•	•	* •	000
No.	Name	Total (GB)	Free (GB)	#PD	#VD	Status	Health	RC	RAID	Enc No.	Enclosure		р	D			D	-SP
1	QUICK21620	742	0	10	1	Online	Good	1	RAID 0	0	Local	2 10 1 3 5	679	9 13	14			

7. Migrate

To migrate the RAID level, please follow the steps below:

- 1. Select "/ Volume configuration / RAID group".
- Mouse moves to the gray button next to the RG number; click "Migrate".
- 3. Change the RAID level by clicking the down arrow to "RAID 5". There will be a pup-up which indicates that HDD is not enough to RAID level, click support the new setting of Select PD " " to increase hard drives, then click Confirm " to go back to setup page. When doing "

migration to lower RAID level, for example the original RAID level is RAID 6 and the user wants to migrate to RAID 0, the RAID subsystem will evaluate whether this operation is safe or not, and appear a message of **"Sure to migrate to a lower protection array?"** to give user warning.

Name : RAID level :	RG-RO->R5							
RAID PD slot :	1234		l		Select PI	D •		
			<< Ba	ack	•	Next	:>>	

- Double check the setting of RAID level and RAID PD slot. If there is no problem, click " Next >> • ".
- 5. Finally a confirmation page shows the detail of RAID information. If there is no problem, click " Confirm " to start migration. System also pops up a message of "Warning: power lost during migration may cause damage of data!" to give user warning. When the power is abnormally off during the migration, the data is in high risk.
- Migration starts and it can be seen from the "status" of a RG with "Migrating". In "/ Volume configuration / Virtual disk", it displays a "Migrating" in "Status" and complete percentage of migration in "R%".

No.	Name	Total (GB)	Free (GB)	#PD	#VD	Status	Health	RAID	Enclosure
1	RG-R0->R5	1396	1386	4	1	Migrating	Good	RAID 5	Local

(A RAID 0 with 4 physical disks migrates to RAID 5 with 5 physical disks)

No.	Name	Size (GB)	Right	Priority	Bg rate	Status	Health	R %	RAID	#LUN	Snapshot (MB)	#Snapshot	RG name
1	VD-RO- >R5	10	WB	HI	4	Migrating	Optimal	6	RAID 5	0	0/0	0	RG-RO- >R5

(A RAID 0 migrates to RAID 5, the complete percentage is 14%)

To do migration, the total size of RG must be larger or equal to the original RG. It does not allow expanding the same RAID level with the same hard disks of original RG.

When RG is being migrated, the iSCSI RAID subsystem would reject following operations:

- 1. Add dedicated spare.
- 2. Remove a dedicated spare.
- 3. Create a new VD.
- 4. Delete a VD.
- 5. Extend a VD.
- 6. Scrub a VD.
- 7. Perform yet another migration operation.
- 8. Scrub entire RG.
- 9. Take a new snapshot.
- 10. Delete an existing snapshot.
- 11. Export a snapshot.
- **12**. Rollback to a snapshot.



RG Migration cannot be executed during rebuild or VD extension.

RG column description :

No.	Number of RAID group. The button next to the No. shows the functions which can be executed.
Name	RAID group name.
Total(GB)	Total capacity of this RAID group.
Free(GB)	Free capacity of this RAID group.
#PD	The number of physical disks in RAID group.
#VD	The number of virtual disks in RAID group.
Status	The status of RAID group.
	"Online" \rightarrow the RAID group is online.
	"Offline" \rightarrow the RAID group is offline.
	"Rebuild" \rightarrow the RAID group is being rebuilt.
	"Migrate" \rightarrow the RAID group is being migrated.
	"Scrub" \rightarrow the RAID group is being scrubbed.
Health	The health of RAID group.
	"Good" \rightarrow the RAID group is good.
	"Failed" \rightarrow the hard drive is failed.
	"Degraded" \rightarrow the RAID group is not completed.
	The reason could be lack of one disk or disk failure.
RAID	The RAID level of the RAID group.
Enclosure	RG locates on local or JBOD enclosure.

RG operations description :

Create	Create a RAID group.
Migrate	Migrate a RAID group to different RAID level
Activate	Activate a RAID group; it can be executed when RG status is offline. This is for online roaming purpose.
Deactivate	Deactivate a RAID group; it can be executed when RG status is online. This is for online roaming purpose.
Scrub	Scrub a RAID group. It's a parity regeneration. It supports RAID 3 / 5 / 6 / 30 / 50 / 60 only.

Delete		Delete a RAID group.
Set property	disk	Change the disk status of write cache and standby. Write cache options: "Enabled" → Enable disk write cache. "Disabled" → Disable disk write cache. Standby options: "Disabled" → Disable spin down. "30 sec / 1 min / 5 min / 30 min" → Enable hard drive
		auto spin down to save power in the period of time.
More information	n	Show RAID group detail information.

4.6.4 Virtual disk

"Virtual disk" (VD) can allow the users to create VD, snapshot, and view the status of each existing VD. The following is an example to create a VD.

Step 1: Click " Create , enter "Name", choose "RG name", "Stripe height (KB)", "Block size (B)", "Read/Write" mode, "Priority", "Bg rate" (Background task priority), change "Capacity (GB)" if necessary. Then click " Confirm .".

/ Volume configuration / Vi	rtual disk / Create
Name :	VD-01
RG name :	RG-R0
Capacity (GB) :	30
Stripe height (KB) :	64
Block size (B) :	512 💌
Read/Write :	C Write-through cache 💿 Write-back cache
Priority :	${\ensuremath{ \bullet }}$ High priority ${\ensuremath{ \circ }}$ Middle priority ${\ensuremath{ \circ }}$ Low priority
Bg rate :	4
by face .	



correct.

N	0.	Name	Size (GB)	Right	Priority	Bg rate	Status	Health	R %	RAID	#LUN	Snapshot (™B)	#Snapshot	RG name
-	1	VD-01	30	WB	HI	4	Online	Optimal		RAID 0	0	0/0	0	RG-RO
2	2	VD-02	20	WB	HI	4	Initiating	Optimal	12	RAID 5	0	0/0	0	RG-R5
E	Exter	nd												
9														
0	Delet												Create	
5	Get p	roperty												
Ā	\ttac	h LUN												
C														
L														
9	Get s	napsho	t spac	e										
C														
Т														
Æ														
L														
N	lore	informa	ation											

(Create a VD named "VD-01", related to "RG-R0", size is 30GB. The other VD is named "VD-02", initializing to 12%)

Virtual disk express menu:

AL-8161i	/ Volu	ume configura	tion ,	/ Virtu	al disk								6 B	A * 0	int space		RG
Quick installation	No.	Name	Size (GB)	Right	Priority	Bg rate	Status	Health	R	RAID	#LUN	Snapshot space (HE)	#Snapshot	RG name	(8))/0	#Snapshot	peta
Volume creation wizard	1 Exte	QUICK22542	742	WB	HL	4	Online	Optimal		RAID	1	0/0	0	QUICK21620		Creat	
Mysical disk RAD group Virtual disk Snapshot Logical unit ■ Maintenance Logicut	Stri Dek Set Atta Det Ust Set Chi Tak Mor	ib ste property ich LUN LUN snapshot spat into snapshot o snapshot o snapshot o snapshot e information	3										0	oute •			

1. Extend

To extend VD (Virtual Disk) capacity, please follow the steps below:

- 1. Select "/ Volume configuration / Virtual disk".
- 2. Mouse moves to the gray button next to the VD number; click "Extend".

3.	Change	the size.	The size	must be	larger than	the origina	al, and then
Ο.	onunge	0120.	1110 0120	, mast be	larger that	i ule oligina	al, and then

	click "		Confirm	 " to start e	extension.		
Size :		20					
Free :		1386 (GB)				
					<< Back	Confirm	

Step 4: Extension starts. If VD needs initialization, it will display an "Initiating" in "Status" and complete percentage of initialization in "R%".

No.	Name	Size (GB)	Right	Priority	Bg rate	Status	Health	R %	RAID	#LUN	Snapshot (MB)	#Snapshot	RG name
1	VD-RO- >R5	20	WB	HI	4	Initiating	Optimal	69	RAID 5	0	0/0	O	RG-RO- >R5

(Extend VD-R5 from 20GB to 40GB)



1.The capacity of VD extension must be larger than original one.

2.VD Extension cannot be executed during rebuild or migration.

2. Scrub

Scrubbing a VD in order to remap bad blocks; this function is to make parity regeneration, supporting RAID 3 / 5 / 6 / 30 / 50 / 60 only.

AL-8161i	/ Volume	configurat	ion / Vi	irtual dis	k							1		* 0
Quick installation	No.	Name	Size (60)	Right	Priority	Bg rate	Status	Health	R	RAID	#LUN	Snapshot space (HII)	#Snapshot	RG
 Solution Volume Configuration 	1	ipeta	300	JavaSer	işt						1	523/61443	1	peta
Volume creation wizard Physical disk RAID group Virtual disk Snapshot Logical unit Bridosure management Maintenance Logicut	Enton Scrub Delet Set p Attac Detai Ust L Set s Clean Take Auto List s More	nd roperty h LUN ch LUN th LUN UN napshot sp snapshot snapshot napshot information	iace iot		(192.16 Scrub VI	8.1.100+ D: speta 7 ipts on this page		OK	Cancel				Creat	20 e

3. Delete

Delete existing VD; when deleting VD, the attached LUN(s) related to this VD

will be detached automatically.



Change the VD name, right, priority and bg rate. Right options:

"WT" \rightarrow Write Through.

* 📜 Enclosure management * 📜 Maintenance

"WB" → Write Back.

"RO" \rightarrow Read Only.

Write-Back Cache: When the system writes to a memory location that is currently held in cache, it only writes the new information to the appropriate cache line. When the cache line is eventually needed for some other memory address, the changed data is "written back" to system memory. This type of cache provides better performance than a write-through cache, because it saves on (time-consuming) write cycles to memory.

Write-Through Cache: When the system writes to a memory location that is currently held in cache, it writes the new information both to the appropriate cache line and the memory location itself at the same time. This type of caching provides worse performance than write-back, but is simpler to implement and has the advantage of internal consistency, because the cache is never out of sync with the memory the way it is with a write-back cache.

Priority options:

"HI" \rightarrow HIgh priority.

"MD" \rightarrow MiD priority.

"LO" \rightarrow LOw priority.



This function is used to set the priorities of RAID level initialization and I/O accessing for the case of multiple VDs.

Bg rate options:

"4/3/2/1/0" \rightarrow Default value is 4. The higher number the background priority of a VD has, the more background I/O will be scheduled to execute.

5. Detach LUN



To detach LUN from a VD, please follow the steps below:

- Mouse moves to the gray button next to the Host; click "Detach". There will be a confirmation page coming out.
- 2. Choose "OK".

3. Done.

6. Attach LUN

<u>AL-8161i</u>	/ Volume configuration / Virtual di	isk / Attach		-	6	8	4	*	0
Quick installation	VD :	QUICK22542 (742GB) 💙							
SCSI configuration Volume configuration	Host (iSCSI node name) :	*							
Volume creation wizard Physical disk	Target (iSCSI node name) :	amd		~					
RAID group	LUN :	20- 1							
Virtual disk Snapshot Logical unit	Permission :	O Read-only							
• 🗀 Enclosure management			<< Back			C	Confir	m	0
Maintenance Logout									

To attach LUN to a VD, please follow the steps below:

- 1. Select a VD.
- 2. Input "**Host**" name, or fill-in wildcard "*", which means every host can access to this volume.
- Choose LUN and permission for the VD to be read only or be able to be read and written.
- 4. Finally, then click "Confirm .

7. Set snapshot space

Set up the size for snapshot. The minimum size is suggested to be **20%** of VD size, then click "Confirm • ". For more details, please refer to 4.6.5



8. More information

Show the properties of VD, Logical LUN, and Snapshot

Virtu	al dist	C:																
NO.	Name	WWN	Size (GB)	Right	Priority	Bg rate	Status	Health	96	Stripe height (KB)	RAID	#LUN	Snapshot space (HB)	#Snapshot	Туре	RG	Block size (B)	
1	ipeta	20f9001378a6d0da	300	WB	н	4	Online	Optimal		64	RAID	1	523/61443	1	RAID	peta	512	
tion costor Logical unit :																		
	Host	t Targ	et		LU	N		Pe	mis	sion		1	/D name			Sessi	n	
•		asus			0		Read w	rite			ipeta			1				
Snap	shot :																	
N	0.	Name		Used (HD)	н	ealth	1	xported		Right	#LUN			Created t	ime			
1	\$1	hopshot1	97		Good		No			N/A N	/A	Tue	Sep 30 14:06:5	4 2008				
	No. 1 Logi * Snap N 1	No. Name 1 ipota Logical uni Host * Snapshot : No. 1 \$9	No. Name WWW 1 locta 20f9001378a6d0da Logical unit: — Targ Mast asus Snapthot:	No. Name VWN Size (rs) 1 ipeta 209001378a6d0da 300 Logical unit: Target asus Snapshot: No. Name No. Name 1000/0000	No. Name WWN Size (n) Name 1 ipota 2019001378a6dbda 300 W6 Logical unit : Target - - * asus - - Snapskot Name Used - 1 snopphot1 97 -	No. VMV Size sight Priority (c) sight Priority 1 peta 20f9001378a6d0da 300 WB H Logical smit : asus 0 State sight Priority LUB Snapsthet Neme Used (mB) H Used H 1 snopshot1 07 God H H	No. Name VWVN Size (c): (c): (c): (c): (c): (c): (c): (c):	No. Name VWN Size sight Priority Bg Status 1 total 20f90013783640da 300 W6 HI 4 Online Logical unit: asus 0 W6 HI 4 Online Sametric Size size size size size size size size s	No. Name WWN Size Right Priority flig Realth Status Health 1 ipota 2090/01378a6dbda 300 WB HI 4 Online Optimal Logical curit: Target LUN Person Perso	No. Very Size (c) Right Priority Right Priorit Right Priority Rig	No. Nume VWN Size sight Priority Bg Status Headth % Stripe height (KB) 1 iorda 2090013783600da 300 W6 Hi 4 Online Optimal 64 Logical unit : Yost Target Priority Bg asus 0 Priority Priority Priority Colspan="4">Status Status Colspan="4">Status Colspan="4">Status Priority Priority Priority Online Online <td colspa="</td"><td>No. Name VWN Size sight Priority Sig (N) Size sight Priority Sig (N) Size sight Priority Sig (N) Size sight Priority Sig (N) Size sight Priority Size sight Priority Size sight Priority Size sight Priority RaiD (R) Priority Priorit Priority Priority</td><td>New WWN Size Right Priority Rg rate Status Health % Stripe height (KB) PLIN 1 total 205001378a6dbda 300 WB HI Online Optimal 64 PalDA 1 Logical unit : asus 0 WB HI N Online Optimal 64 PalDA 1 Logical unit : asus 0 VB HI V Permitsion 1 1 pota 1 pota 1 pota 1</td><td>No. Nume VVVN Size Right Priority Bg Status Health 4 Stripe height (KS) PAID (KS) PAID PLO PAID PLO<</td><td>New Var Size Right Priority Bg Status Health % Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % Stripe height % Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % Stripe height %</td><td>New Vitro Size Right Priority Big (NS) Size Right Prior Big (NS) Siz</td><td>New Vitro Size Sight Priority Sign Sight Priority Sight Priority Sign Sight Priory</td></td>	<td>No. Name VWN Size sight Priority Sig (N) Size sight Priority Sig (N) Size sight Priority Sig (N) Size sight Priority Sig (N) Size sight Priority Size sight Priority Size sight Priority Size sight Priority RaiD (R) Priority Priorit Priority Priority</td> <td>New WWN Size Right Priority Rg rate Status Health % Stripe height (KB) PLIN 1 total 205001378a6dbda 300 WB HI Online Optimal 64 PalDA 1 Logical unit : asus 0 WB HI N Online Optimal 64 PalDA 1 Logical unit : asus 0 VB HI V Permitsion 1 1 pota 1 pota 1 pota 1</td> <td>No. Nume VVVN Size Right Priority Bg Status Health 4 Stripe height (KS) PAID (KS) PAID PLO PAID PLO<</td> <td>New Var Size Right Priority Bg Status Health % Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % Stripe height % Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % Stripe height %</td> <td>New Vitro Size Right Priority Big (NS) Size Right Prior Big (NS) Siz</td> <td>New Vitro Size Sight Priority Sign Sight Priority Sight Priority Sign Sight Priory</td>	No. Name VWN Size sight Priority Sig (N) Size sight Priority Sig (N) Size sight Priority Sig (N) Size sight Priority Sig (N) Size sight Priority Size sight Priority Size sight Priority Size sight Priority RaiD (R) Priority Priorit Priority Priority	New WWN Size Right Priority Rg rate Status Health % Stripe height (KB) PLIN 1 total 205001378a6dbda 300 WB HI Online Optimal 64 PalDA 1 Logical unit : asus 0 WB HI N Online Optimal 64 PalDA 1 Logical unit : asus 0 VB HI V Permitsion 1 1 pota 1 pota 1 pota 1	No. Nume VVVN Size Right Priority Bg Status Health 4 Stripe height (KS) PAID (KS) PAID PLO PAID PLO<	New Var Size Right Priority Bg Status Health % Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % Stripe height % Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % RAID Stripe height % Stripe height % RAID Stripe height % Stripe height %	New Vitro Size Right Priority Big (NS) Size Right Prior Big (NS) Siz	New Vitro Size Sight Priority Sign Sight Priority Sight Priority Sign Sight Priory

10. List LUN

Display the attached LUNs.

AL-81611	/ Volume co	mfiguration / Virtual disk / List LUN			* ¥ @
Quick Instalation Guick Instalation Guick Instalation Guick Instalation	Host *	l arget Ign.2004–08.tw.com.amdi:p210c-000a6d0da:target0	LUN	Permission Read write	#Session 0
Volume contiguration Volume creation ward Physical disk RAD yrusp Virtual disk Snapshat Inginal usit Endosure monacomont Mainterrance Legout				~	< Nack a

VD column description:

No.	Number of this Virtual disk. The button next to the VD No. shows the functions which can be executed.
Name	Virtual disk name.
Size(GB)	Total capacity of the Virtual disk.
Right	 "WT" → Write Through. "WB" → Write Back. "RO" → Read Only.
Priority	 "HI" → HIgh priority. "MD" → MiD priority. "LO" → LOw priority.
Bg rate	Background task priority. "4 / 3 / 2 / 1 / 0" → Default value is 4. The higher number the background priority of a VD has, the more background I/O will be scheduled to execute.
Status	The status of Virtual disk.

	"Online" \rightarrow the Virtual disk is online.
	"Offline" \rightarrow the Virtual disk is offline.
	"Initiating" \rightarrow the Virtual disk is being initialized.
	"Rebuild" \rightarrow the Virtual disk is being rebuilt.
	"Migrate" \rightarrow the Virtual disk is being migrated.
	"Rollback" \rightarrow the Virtual disk is being rolled back.
	"Scrub" \rightarrow the Virtual disk is being scrubbed.
Health	The health of Virtual disk.
	"Optimal" \rightarrow the Virtual disk is operating and has experienced no failures of the disks that comprise the RG.
	"Degraded" → At least one disk which comprises space of the Virtual disk has been marked as failed or has been plugged.
	"Missing" \rightarrow the Virtual disk has been marked as missing by the system.
	"Failed" \rightarrow the Virtual disk has experienced enough failures of the disks that comprise the VD for unrecoverable data loss to occur.
	"Part optimal" \rightarrow the Virtual disk has experienced disk failures.
R %	Ratio of initializing or rebuilding.
RAID	The levels of RAID that Virtual disk is using.
#LUN	Number of LUN(s) that Virtual disk is attaching.
Snapshot (MB)	The Virtual disk size that used for snapshot. The number means "Used snapshot space" / "Total snapshot space". The unit is in megabytes (MB).
#Snapshot	Number of snapshot(s) that Virtual disk is taken.
RG name	The Virtual disk is related to the RG name

VD operations description:

Extend	Extend a Virtual disk capacity.
Scrub	Scrub a Virtual disk. It's a parity regeneration. It supports RAID 3 / 5 / 6 / 30 / 50 / 60 only.

Delete	Delete a Virtual disk.
Set property	Change the VD name, right, priority and bg rate.
	Right options:
	"WT" \rightarrow Write Through.
	"WB" → Write Back.
	"RO" → Read Only.
	Priority options:
	"HI" \rightarrow HIgh priority.
	"MD" \rightarrow MiD priority.
	"LO" → LOw priority.
	Bg rate options:
	"4 / 3 / 2 / 1 / 0" → Default value is 4. The higher number the background priority of a VD has, the more background I/O will be scheduled to execute.
Attach LUN	Attach to a LUN.
Detach LUN	Detach to a LUN.
List LUN	List attached LUN(s).
Set snapshot space	Set snapshot space for executing snapshot. Please refer to 4.6.5 for more detail.
Cleanup snapshot	Clean all snapshot VD related to the Virtual disk and release snapshot space.
Take snapshot	Take a snapshot on the Virtual disk.
Auto snapshot	Set auto snapshot on the Virtual disk.
List snapshot	List all snapshot VD related to the Virtual disk.
More information	Show Virtual disk detail information.

4.6.5 Snapshot

Snapshot-on-the-box captures the instant state of data stored in the target volume in a logical sense. The underlying logic is Copy-on-Write -- moving out the data which would be written to certain location where a write action occurs since the time of data capture. The certain location, named as "Snap VD", is essentially a new VD.which can be attached to a LUN provisioned for a host as a disk like other ordinary VDs in the system. Rollback restores the data back to the state of any time which was previously captured in case for any unfortunate reason it might be (e.g. virus attack, data corruption, human errors and so on). Snap VD is allocated within the same RG in which the snapshot is taken, we suggest to reserve 20% of RG size or more for snapshot space. Snapshot / rollback features need **512MB** RAM at least.

AL-8161i	/ Volume config	puration / Snapshot						2	6 E A 5 0
Quick installation	Linked snapshot	for VD: -ipeta - 💌	1						
 SCSI configuration 	No.	Name	Used (HD)	Health	Exported	Right	#LUN	Created t	lime
 Volume configuration 	1	snopshot1	0	Good	No	N/A	N/A	Tue Sep 30 14:0	6:54 2008
Volume creation witzerd Physical disk RAID group Virtual disk Snapshot Logical unit Enclosure management Maintenance Logout					<< Back (Cleanup e	Auto snapshot #	Take snapshot. •

Create snapshot volume

To take a snapshot of the data, please follow steps below:

- 1. Select "/ Volume configuration / Virtual disk".
- Mouse moves to the gray button next to the VD number; click "Set snapshot space".
- Set up the size for snapshot. The minimum size is suggested to be
 20% of VD size, then click "Confirm . It will go back to the VD page and the size will show in snapshot column. It may not be the same as the number entered because some size is reserved for snapshot internal usage. There will be 2 numbers in

"Snapshot (MB)" column. These numbers mean "Used snapshot space" and "Total snapshot space".

- 4. There are two methods to take snapshot. In "/ Volume configuration / Virtual disk", mouse moves to the gray button next to the VD number; click "Take snapshot". Or in "/ Volume configuration / Snapshot", click "Take snapshot ".
- 5. Enter a snapshot name, then click "Confirm . A snapshot VD is created.
- Select "/ Volume configuration / Snapshot" to display all snapshot VDs related to the VD.

	No.	Name	Used (MB)	Exported	Right	#LUN	Created time			
	1	SnapVD-01	O	No	N/A	N/A	Wed May 28 15:22:50 2008			
	Export									
_										
	Delete		<< Back	• 0	Cleanup		Auto snapshot 🔹 💿	Take snapshot		

(This is Snap VD, but it is not exported)

7. Mouse moves to the gray button next to the Snapshot VD number; click "Export". Enter a capacity for snapshot VD. If the size is zero, the exported snapshot VD will be read only. Otherwise, the exported snapshot VD can be read/written, and the size will be the maximum capacity to read/write.

AL-81611	/ Volume configuration / !	inapshot / Set quota		2	8 4	5	0
Quick installation System configuration System configuration System configuration System configuration Volume creation Molume creation Molume creation Molume Configuration Physical disk Shappshot Logical unit Shappshot Logical unit Maintenance Logout	Sire : Available :	192 59 (08)	<< Back		Conf		•

- Attach a LUN for snapshot VD. Please refer to 4.6.6 for attaching a LUN.
- 9. Done. It can be used as a disk.

Lir	Linked snapshot for VD: -VD-01 - 💌									
	No. Name		Used (MB)	Exported	Right	#LUN	Created time			
	1	SnapVD-01	0	Yes	RO	o	Wed May 28 15:22:50 2008			
	2	SnapVD-02	0	Yes	RW	o	Wed May 28 15:26:40 2008			
		ort								
		k								
	Delete		< Back	• C	leanup	•	Auto snapshot			

(This is the list of "VD-01". There are two snapshots in "VD-01". Snapshot VD "SnapVD-01" is exported to read only, "SnapVD-02" is exported to read/write)

- There are two methods to clean all snapshots. In "/ Volume configuration / Virtual disk", mouse moves to the gray button next to the VD number; click "Cleanup snapshot". Or in "/ Volume configuration / Snapshot", click "Cleanup .".
- 11. Cleanup will delete all snapshots related to the VD and release snapshot space.

Snapshot has some constraints as follows:

- 1. Minimum RAM size of enabling snapshot is **512MB**.
- For performance and future rollback, the RAID subsystem saves snapshot with names in sequences. For example, three snapshots has been taken and named "SnapVD-01"(first), "SnapVD-02" and "SnapVD-03"(last). When deleting "SnapVD-02", both of "SnapVD-02" and "SnapVD-03" will be deleted because "SnapVD-03" is related to "SnapVD-02".
- For resource management, maximum number of snapshots in the RAID subsystem is 32.

4. If the snapshot space is full, system will send a warning message of space full and the new taken snapshot will replace the oldest snapshot in rotational sequence by executing auto snapshot, but new snapshot can not be taken by manual because system does not know which snapshot VDs can be deleted.

Auto snapshot

The snapshot copies can be taken manually or by schedule such as hourly or daily. Please follow the steps:

- There are two methods to set auto snapshot. In "/ Volume configuration / Virtual disk", mouse moves to the gray button next to the VD number; click "Auto snapshot". Or in "/ Volume configuration / Snapshot", click "Auto snapshot ".
- 2. The auto snapshot can be set monthly, weekly, daily, or hourly.
- 3. Done. It will take snapshots automatically.

Months to take snapshots :	☑ All ☑ 01 ☑ 02 ☑ 03 ☑ 04 ☑ 05 ☑ 06 ☑ 07 ☑ 08 ☑ 09 ☑ 10 ☑ 11 ☑ 12
Weeks to take snapshots :	□ All □ 1 □ 2 □ 3 □ 4 □ 5
Days to take snapshots :	□ All □ Sun □ Mon □ Tue □ Wed □ Thu □ Fri □ Sat
Hours to take snapshots :	All 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

<< Back

Confirm

(It will take snapshots every month, and keep the last 32 snapshot copies)



Daily snapshot will be taken at every 00:00. Weekly snapshot will be taken every Sunday 00:00. Monthly snapshot will be taken every first day of month 00:00.

Rollback

The data in snapshot VD can rollback to the original VD. Please follow the steps below:

- 1. Select "/ Volume configuration / Snapshot".
- 2. Mouse moves to the gray button next to the Snap VD number which user wants to rollback the data; click "**Rollback**".

AL-8161i	/ Volume configu	iration / Snapshot			8	6 8 4 × 0
Quick Installation	Linked snapshot f	or VD: - ipota - 💌				
ISCSI configuration	No.	Nam JavaScript		#LUN	Created tin	ne
Volume configuration Volume creation wizard Physical disk RAID group Virbual disk Snapshot Logical unit Enclosure management Maintenance Logout	1 Export Pollback	snopsh	*192.168.1.100> Roll back Stapphot YD: 1 with No.1?	N/A	Tue Sep 30 14:06	:54 2008
	Delete	Day i	OK Cuard	Banup e	Auto snapshot e	Take snapshot +

3. Done, the data in snapshot VD will rollback to the original VD.

Rollback has some constraints as described in the followings:

- 1. Minimum RAM size of enabling rollback is **512MB**.
- When making rollback, the original VD cannot be accessed for a while. At the same time, the system connects to original VD and snaps VD, and then starts rollback.
- During rollback, data from snap VD to the original VD, the original VD can be accessed and the data in VD just like it has finished rollback. At the same time, the other related snap VD(s) can not be accessed.
- 4. After rollback, the other snapshot VD(s) after the VD which is doing rollback will be deleted.



Before executing rollback, it is better to dismount file system for flushing data from cache to disks in OS first. System sends pop-up message when user executes rollback function.

The following is an example to take a snapshot:

- Step 1: Create snapshot space. In "/ Volume configuration / Virtual disk", Mouse moves to the gray button next to the VD number; click "Set snapshot space".
- Step 2: Set snapshot space. Then click " Confirm ". The snapshot space is created.

/ Volume configuration / Virtual disk / Set snapshot space								
Size :	15	(GB)	Maximun	: 105 (GB)				
Free :	105 (GB)							

No.	Name	Size (GB)	Right	Priority	Bg rate	Status	Health	R %	RAID	#LUN	Snapshot (MB)	#Snapshot	RG name
1	VD-01	30	WB	HI	4	Online	Optimal		RAID 0	0	263/15360	0	RG-RO
2	VD-02	20	WB	HI	4	Online	Optimal		RAID 5	0	0/0	0	RG-R5

("VD-01" snapshot space has been created, snapshot space is 15360MB, and used 263MB for saving snapshot index) $\,$

Step 3: Take a snapshot. In "/ Volume configuration / Snapshot", click

" Take snapshot • ". It will link to next page. Enter a snapshot

name.

Lin	Linked snapshot for VD: - VD-01 - 💌									
	NO.	Name	Used (MB)	Exported	Right	#LUN	Created time			
		SnapVD-01	0	No	N/A	N/A	Wed May 28 15:22:50 2008			
_										
	Rollback									
	Delete		<< Back	• C	leanup		Auto snapshot • Take snapshot •			

Step 4: Export the snapshot VD. Mouse moves to the gray button next to the

Snapshot VD number; click "**Export**". Enter a capacity for snapshot VD. If the size is zero, the exported snapshot VD will be read only. Otherwise, the exported snapshot VD can be read/written, and the size will be the maximum capacity to read/write.

1	/ Volume configuration / Snapshot / Set quota							
	Si	ize :		14				
	A	vailable :		14 (GB)				
Lin	nked snaps	shot for VD: 🔤 🗸	-01 - 💌					
	No.	Name	Used (MB)	Exported	Right	#LUN	Created time	
	1	SnapVD-01	0	Yes	RO	o	Wed May 28 15:22:50 2008	
	2	SnapVD-02	0	Yes	RW	ο	Wed May 28 15:26:40 2008	
		ort						
		k						Ĩ
	Delete	s	< васк	• 0	leanup	•	Auto snapshot Iake snapshot	ł
	Attach							

(This is the list of "VD-01". There are two snapshots in "VD-01". Snapshot VD "SnapVD-01" is exported to read only, "SnapVD-02" is exported to read/write)

Step 5: Attach a LUN to snapshot VD. Please refer to 4.6.5.4 for attaching a LUN.

Done: Snapshot VD can be used.

Snapshot column description:

No.	Number of this snapshot VD. The button next to the snapshot VD No. shows the functions which can be executed.
Name	Snapshot VD name.
Used (MB)	The amount of snapshot space that has been used.
Exported	Snapshot VD is exported or not.
Right	"RW" → Read / Write. The snapshot VD can be read / write.

	"RO" → Read Only. The snapshot VD can be read only.
#LUN	Number of LUN(s) that snapshot VD is attaching.
Created time	Snapshot VD created time.

Snapshot operations description:

Export / Unexport	Export / unexport the snapshot VD.				
Rollback	Rollback the snapshot VD to the original.				
Delete	Delete the snapshot VD.				
Attach	Attach to a LUN.				
Detach	Detach to a LUN.				
List LUN	List attached LUN(s).				

Logical unit

"Logical unit" can view the status of attached logical unit number of each VD.

AL-8161i	/ Volume configuration /	Logical unit				E & E 4 % 0
Quick installation	Host	Target	LUN	Permission	VD name	#Session
 System configuration 		amd	0	Read write	ipeta	0
 Volume configuration Volume creation wizard Physical disk RAID group Virtual disk Snapshot Logical unit Enclosure management Maintenance Logout 	Detach					Attach •

The users can attach LUN to a VD or snapshot VD by clicking the

"<u>Attach</u>". "**Host**" must enter an iSCSI node name for access control, or fill-in wildcard "*", which means every host can access the volume. Choose LUN number and permission, then click "<u>Confirm</u>".

VD:	VD-01 (30GB)
Host (iSCSI node name) :	*
Target (iSCSI node name) :	iqn.2004-08.tw.com. amd :p210c-000a6d021:target0 💌
LUN :	-0-
Permission :	O Read-only • Read-write

Host	Target	LUN	Permission	¥D name	#Session
*	iqn.2004-08.tw.com.amd :p210c- 000a6d021:target0	O	Read write	VD-01	0
iqn.1991- 05.com.microsoft:demo	all	1	Read write	VD-02	0
Detach					
Permission :	O Read-only @ Read-write				

(VD-01 is attached to LUN 0 and every host can access. VD-02 is attached to LUN 1)

LUN operations description:

Attach	Attach a logical unit number to a Virtual disk.
Detach	Detach a logical unit number from a Virtual disk.

The matching rules of access control are inspected from top to bottom in sequence. For example: there are 2 rules for the same VD, one is "*", LUN 0; and the other is "iqn.host1", LUN 1. The other host "iqn.host2" can login successfully because it matches the rule 1. The access will be denied when there is no matching rule.

4.7 Enclosure management

"Enclosure management" allows the users to manage and observe the enclosure information that include "SES configuration", "Hardware monitor", "S.M.A.R.T." and "UPS".

AL-8161i	/ Enclosure managemen	ŧ	3 J B A × O
Quick installation System configuration SCSI configuration Volume configuration	SES configuration	Access control for SES management	
	Hardware monitor	System monitored voltage, temperature and battery backup module	
Enclosure management	S.H.A.R.T.	Self-monitoring analysis and reporting technology for physical disks	
SES configuration Hardware monitor S.M.A.R.T. UPS	UPS	Uninterruptible power supply	
 Maintenance Logout 			

To have the enclosure management work correctly, there are many sensors deployed inside of this iSCSI RAID subsystem for different purposes, such as temperature sensors, voltage sensors, hard disks, fan sensors, power sensors, and LED status. Depending on different hardware characteristics, the sensors have different polling intervals.

Below are the details of polling time intervals:

- 1. Temperature sensors: 1 minute.
- 2. Voltage sensors: 1 minute.
- 3. Hard disk sensors: 10 minutes.
- 4. Fan sensors: 10 seconds . When there are 3 errors consecutively, controller sends ERROR event log.
- 5. Power sensors: 10 seconds, when there are 3 errors consecutively, controller sends ERROR event log.
- 6. LED status: 10 seconds.

4.7.1 SES configuration

Most recent SCSI enclosure products support a protocol called **SCSI Enclosure Services** (SES). The initiator communicates with the enclosure using a specialized set of SCSI commands to access power, cooling, and other non-data characteristics. To enable or disable the SES support, give "**SES Configuration**" a click.

(Enable SES in LUN 0)

The SES client software is also available at the following web site:

SANtools: http://www.santools.com/

4.7.2 SES Hardware monitor

"Hardware monitor" allows the users to view all the information about the current status of voltages and temperatures read from the monitored components.

AL-81611	/ Enclosure management / Hardware monitor	■ 6 目 4 % O						
Quick installation	Local							
System configuration IsOSI configuration Volume configuration Volume configuration Endosure management SES configuration Hardware monitor S.M.A.R.T. UPS Maintenance Logout	item	Information						
	+1.2V;	+1.20 V (min = +1.14 V, max = +1.28 V)						
	+3.3V:	+3.34 V (min = +3.10 V, max = +3.55 V)						
	+5V:	+5.02 V (min = +4.80 V, max = +5.35 V)						
	+12V:	+11.85 V (min = +10.80 V, max = +13.20 V)						
	+1.8V:	+1.81 V (min = +1.71 V, max = +1.93 V)						
	+5V(Backplane):	+5.10 V (min = +4.75 V, max = +5.25 V)						
	+12V(Backplane):	+12.08 V (min = +10.80 V, max = +13.20 V)						
	+3.3V(Backplane):	+3.42 V (min = +3.13 V, max = +3.53 V)						
	Core Processor:	+46.5 (C) (hyst = +0.0 (C), high = +80.0 (C))						
	Onboard SAS Device 1:	+45.5 (C) (hyst = +0.0 (C), high = +80.0 (C))						
	Onboard SAS Device 2:	+40.0 (C) (hyst = +0.0 (C), high = +80.0 (C))						
	Location 1(Backplane):	+31.0 (C) (hyst = +0.0 (C), high = +58.0 (C))						
	Location 2(Backplane):	+31.0 (C) (hyst = +0.0 (C), high = +58.0 (C))						
	Location 3(Backplane):	+29.0 (C) (hyst = +0.0 (C), high = +58.0 (C))						
	PSU1 (Backplane):	good						
	PSU2 (Backplane):	good						
	FAN1(Backplane):	good (4066 RPM)						
	FAN2(Backplane):	good (4017 RPM)						
	Auto shutdown :							
		Confirm						



If "Auto shutdown" has been checked, this RAID subsystem will shutdown automatically when monitored voltage or temperature is out of the normal range. For securer system and data protection, please check "Auto Shutdown". To avoid the possibility of system auto shutdown that is triggered by any single short period of high temperature or abnormal voltage, this iSCSI RAID subsystem uses multiple condition judgments for auto shutdown.

Below are the details about the conditions under which the auto shutdown will be triggered automatically:

 There are 3 sensors deploayed on the RAID controllers for monitoring temperature; one is on the core processor, another is on the PCI-X bridge, and the final one is on the daughter board. The RAID controller will check each sensor every 30 seconds. When one of these sensor is over high temperature for 3 minutes continuously, auto shutdown will be triggered immediately.

- The core processor temperature limit is 85℃. The PCI-X bridge temperature limit is 80℃. The daughter board temperature limit is 80℃.
- 3. If the high temperature situation doesn't last for 3 minutes continuously, the RAID controller will not launch auto shutdown.

4.7.3 S.M.A.R.T.

S.M.A.R.T. (Self-Monitoring Analysis and Reporting Technology) is a diagnostic tool for hard drives to deliver warning of drive failures prior to the occurrence of serious hard drive failure. Thus S.M.A.R.T. provides the users with the chances to take data saving actions before possible drive failure.

Quick Installation	Local								
System configuration	Slot	HDD type	Read error	Spin up	Reallocated sector	Seek error	Spin up	Calibration	Temperature
ISCSI configuration	1	SATA	200(51)	169(21)	200(140)	200(51)	100(51)	100(51)	37
Volume configuration	5	SATA	200(51)	163(21)	200(140)	200(51)	100(51)	100(51)	38
management	3	SATA	200(51)	172(21)	200(140)	200(51)	100(51)	100(51)	33
SES configuration	5	SATA2	200(51)	168(21)	200(140)	200(51)	100(51)	100(51)	31
Hardware monitor	6	SATA	200(51)	172(21)	200(140)	200(51)	100(51)	100(51)	37
SMART	7	SATA	200(51)	168(21)	200(140)	200(51)	100(51)	100(51)	36
UPS Maintenance	9	SATA	200(51)	171(21)	200(140)	200(51)	100(51)	100(51)	36
	10	SATA	200(51)	101(21)	200(140)	200(51)	100(51)	100(51)	35
anna d	13	SATA	200(51)	166(21)	200(140)	200(51)	100(51)	100(51)	38
decosts.	14	SATA	200(51)	166(21)	198(140)	200(51)	100(51)	100(51)	36

How S.M.A.R.T. works is to measure many attributes coming from the hard drive and inspects the properties of hard drives all the time. The advanced notice of possible hard drive failure can allow the users to back up the hard drive data or replace the hard drive prior to the occurrence of serious hard drive failure.

Clicking "**S.M.A.R.T.**" to view the current S.M.A.R.T. information of each hard drives. The number out of the parenthesis is the current value; the number inside of the parenthesis is the threshold value. Depending on the hard drive vendors, the threshold values will be some different; please refer to hard drive vendors' specification for details.



S.M.A.R.T. only supports SATA drive. SAS drive does not have this function, and will be displayed as "N/A.

Local								
Slot	HDD type	Read error rate	Spin up time	Reallocated sector count	Seek error rate	Spin up retries	Calibration retries	Temperature (C)
1	SATA	59(6)	98(0)	100(36)	87(30)	100(97)	N/A	32
2	SATA	N/A	220(63)	180(63)	253(0)	253(157)	253(223)	37
З	SATA	N/A	227(63)	253(63)	253(0)	253(157)	253(223)	32
4	SATA	100(51)	100(25)	98(11)	100(51)	100(51)	100(0)	29
5	SATA	100(60)	147(24)	100(5)	100(67)	100(60)	N/A	33
6	SATA	100(60)	149(24)	100(5)	100(67)	100(60)	N/A	31
7	SATA	N/A	220(63)	253(63)	253(0)	253(157)	253(223)	36
8	SATA	100(51)	100(25)	100(11)	100(51)	100(51)	100(0)	23
9	SATA	100(60)	140(24)	100(5)	100(67)	100(60)	N/A	33
10	SATA	100(51)	100(25)	100(11)	100(51)	100(51)	84(0)	30
11	SATA	100(51)	100(25)	100(11)	100(51)	100(51)	100(0)	30
12	SATA	57(6)	98(0)	100(36)	80(30)	100(97)	N/A	34
13	SATA	100(51)	100(25)	100(11)	100(51)	100(51)	100(0)	29
14	SATA	61(6)	98(0)	100(36)	82(30)	100(97)	N/A	33
15	SATA	69(6)	98(0)	100(36)	81(30)	100(97)	N/A	34
16	SATA	65(6)	98(0)	100(36)	81(30)	100(97)	N/A	30

4.7.4 UPS

The item **"UPS"** allows the users to setup UPS (**U**ninterruptible **P**ower **S**upply) support for specific UPS models.

AL-8161i	/ Enclosure management / UPS		= b H A + O
Quick installation System configuration SISCSI configuration Co	UPS type : Shutdown battery level (%) : Shutdown delay (s) : Shutdown UPS : Status : Battery level :	None financial and and and and and and and and and and	
SES configuration Hardware monitor S.M.A.R.T. UPS Maintenance Logout		-	Confirm +

Presently, this iSCSI RAID subsystem merely supports and communicates with the smart-UPS of APC (American Power Conversion Corp.). Please check out the details from the website: <u>http://www.apc.com/</u>. Below are the procedures about how to quickly setup the APC UPS:

Step1: First, connect the system and APC UPS via RS-232 for communication.

Step2: Setup the shutdown values when power is failed.

UPS Type	Select UPS Type. Choose Smart-UPS for APC, None for other vendors or no UPS.
Shutdown	When below the setting level, the system will shutdown.

UPS column descriptions:

Battery Level (%)	Setting level to "0" will disable UPS.
Shutdown Delay (s)	If power failure occurred, and system can not return to value setting status, the system will shutdown. Setting delay to "0" will disable the function.
Shutdown UPS	Select ON, when power is gone, UPS will shutdown by itself after the system shutdown successfully. After power comes back, UPS will start working and notify system to boot up. OFF will not.
Status	The status of UPS. "Detecting" "Running" "Unable to detect UPS" "Communication lost" "UPS reboot in progress" "UPS shutdown in progress" "Rattering failed. Plagge shange them NOW!!"
Battery Level	Current percentage of battery level.
Battery Level (%)	"UPS reboot in progress" "UPS shutdown in progress" "Batteries failed. Please change them NOW!" Current percentage of battery level.

4.8 System maintenance

"Maintenance" allows the users to take the following operations that include "System information" to view this iSCSI RAID subsystem main information, "Upgrade" to upgrade the ISCSI firmware version, "Reset to factory default" to reset all the RAID controller configurations to the factory configurations, "Import and export" to import and export this iSCSI RAID subsystem configurations, "Event log" to view system event logs, and "Reboot and shutdown" to either reboot or shutdown this iSCSI RAID subsystem.

AL-8161i	/ Maintenance	-	E & E & + + 0
Quick installation + System configuration	System information	System information	
 SCSI configuration Volume configuration 	Upgrade	Remote upload firmware	
 Enclosure management 	Reset to factory default	Reset to factory default	
System Information	Import and export	Import/export configurations	
Reset to factory	Event log	System event log to record critical events	
Import and export	Reboot and shutdown	Reboot or shutdown system	
Reboot and shutdown Logout			

4.8.1 System information

"**System information**" can display this iSCSI RAID subsystem system information that include firmware version, CPU type, system memory size, and controller serial number.

AL-8161i	/ Maintenance / System information	Ĭ	6	8	Å.	5	0
Quick installation System configuration System configuration Valume configuration Configurat	System Information At-81611.0.2 build 200809191500) CPU Uype XSC3-05091344 Family rev 9 (r5) Installed system memory ECC Unbefored DOR:II 102448 Controller serial no. 001378A60000A						

4.8.2 Upgrade

"Upgrade" allows the users to upgrade the firmware version. Please prepare new firmware file named "xxxx.bin" in local hard drive, then click "Browse...", to select the firmware file. Once the firmware files is selected, click "Confirm •,"

AL-8161i	/ Maintenance / Upgrade		
Quick installation	Browse the firmware to upgrade : Export configuration	Choose	
 Volume configuration Volume configuration Enclosure 			Confirm =
management - - Maintenance System information			
Upgrade Reset to factory default			
Import and export Event log			
Reboot and shutdown Logout			

Then there will be a pop-up message as follows:



Click "**Cancel**" to export this iSCSI RAID subsystem configurations in advance, or click "**OK**" to start to upgrade firmware. When upgrading firmware starts, there will be a progress bar showing the upgrading process. When the firmware upgrading is completed, this iSCSI RAID subsystem must be rebooted manually in order to make the new firmware upgrading effective.

4.8.3 Reset to factory default

"**Reset to factory default**" allows the users to reset this iSCSI RAID subsystem configurations to the factory default configurations.

Sure to reset to factory default?

4.8.4 Import and export

"Import and export" allows the users to backup this iSCSI RAID subsystem configurations into a file.

- 1. **Export:** Export this iSCSI RAID subsystem configurations into a file.
- 2. **Import:** Import this iSCSI RAID subsystem configurations excluding volume configuration.

AL-8161i	/ Maintenance / Import and export		2084*0
Quick installation Quick installation Quick installation Quick installation	Import/Export : Import file :	Import • Import Choose	
 Development Development 			Confirm e
 Maintenance System information Ungrade 			
Reset to factory default Import and export Event log			
Reboot and shutdown Logout			

Confirm



For the volume configuration setting, the values are available in Export and not available in Import to avoid confliction/date-deleting between two RAID controllers. That is, if a RAID controller already keeps valuable data in the disks and the users may forget to overwrite it, using Import could get all the original configurations back. But if the volume setting is also imported, the user's current data will be overwritten.

4.8.5 Event log

"**Event log**" can view the event messages. Check the checkbox of INFO, WARNING, and ERROR to choose the event log level of display event log.

- 1. Click "<u>Download</u>" button to save the whole event log as a text file.
- 2. Click " Clear " button to clear event log.
- 3. Click "<u>Mute</u>" button to stop alarm if this iSCSI RAID subsystem alerts.

AL-8161i	/ Maintenance ,	Fvent log	= 6 H 4 % 0
Quick Installation	Show events :	VI.	
 System configuration 	Type Tie	ne	Content
ISCSI configuration	INFO 2008/09/3	0 14:19:20	ISCSI login from ign.1991-05.com.microsoft:win-lqt7nr3vw49.edsor (192.168.2.106:62389) succeeds.
Volume configuration	INFO 2008/09/3	0 14:19:05	iSCSI logout from ign.1991-05.com.microsoft:win-lqt7nr3vw49.edsor (192.168.2.106.62386) was received, reason [close the session]
	INFO 2008/09/3	0 14:19:05	ISCSI login from ign.1991-05.com.microsoft:win-lqt7nr3vw49.edsor (192.168.2.106:62386) succeeds.
Maintenance	INFO 2008/09/3	0 14:18:00	ISCSI logout from ign.1991-05.com.microsoft:win-lgt7nr3vw49.edsor (192.168.2.106:62384) was received, reason [close the session]
System information	INFO 2008/09/3	0 14:18:00	iSCSI lagin from iqn.1991-05.com.microsoft:win-lqt7nr3vw49.edsor (192.168.2.106:62304) succeeds.
	INFO 2008/09/3	0 14:16:49	admin login from 192.168.1.33 via Web UI
	INFO 2008/09/3	0 14:06:54	A snapshot on VD ipeta has been taken.
default	INFO 2008/09/3	0 14:05:31	Set the snapshot space of VD ipeta to 61443 MB.
Import and export	INFO 2008/09/3	0 14:03:45	VD ipeta has been created.
Event log	INFO 2008/09/3	0 14:02:03	RG peta has been created.
	INFO 2008/09/3	0 13:51:30	RG QUICKBSBSS has been deleted.
	INFO 2008/09/3	13:50:03	VD QUICK39188 has been deleted.
	INFO 2008/09/3	0 13:44:53	admin login from 192.168.1.33 via Web UI
	INFO 2008/09/3	0 13:44:52	admin login from 192.168.1.33 via Web UI
	INFO 2008/09/3	0 13:43:20	ISCSI logout from ign.1991-05.com.microsoft:win-lqt7nr3vw49.edsor (192.168.2.106:62307) was received, reason [close the session]
	INFO 2008/09/3	0 13:43:20	ISCSI lagin from ign.1991-05.com.microsoft:win-lqt?nr3vw49.edsor (192.168.2.106:62307) succeeds.
	INFO 2008/09/3	0 13:43:04	ISCSI logout from ign.1991-05.com.microsoft:win-lqt7nr3vw49.edsor (192.168.2.106:62306) was received, reason [close the session]
	INFO 2008/09/3	0 13:43:04	ISCST login from ign.1991-05.com.microsoft:win-lqt7nr3vw49.edsor (192.168.2.106:62306) succeeds.
	INFO 2008/09/3	0 13:42:56	iSCSI logout from ign.1991-05.com.microsoft:win-lqt7nr3vw49.edsor (192.168.2.106:62305) was received, reason [close the session]
	INFO 2008/09/3	0 13:42:56	ISCSI lagin from ign.1991-05.com.microsoft:win-lgt7nr3vw49.edsor (192.168.2.106:62305) succeeds.
	INFO 2008/09/3	0 13:42:05	ISCSI logout from ign.1991-05.com.microsoft:win-lat7nr3vw49.edsor (192.168.2.106:62304) was received, reason [close the session]
	INFO 2008/09/3	0 13:42:05	iSCSI login from ian.1991-05.com.microsoft.win-lot7nr3vw49.edsor (192.168.2.106:62304) succeeds.

The event log is displayed in reverse order which means the latest event log is always listed on top of the first page. The event logs are actually saved in the first four hard drives; each hard drive has one copy of the complete event logs. For one controller, there are four copies of event logs to ensure the users can check event log any time even though there is one or two hard drives fail simultaneously.

4.8.6 Reboot and shutdown

"**Reboot and shutdown**" allows the users to safely reboot or shutdown this iSCSI RAID subsystem. Making use of "**Shutdown**" to power off this iSCSI RAID subsystem is a good way to prevent any data loss, because **Shutdown** execution gets this iSCSI RAID subsystem to flush the data from the cache memory to the physical disks first, a necessity for data protection.



4.9 Logout

For security reason, "**Logout**" allows users to logout when no user is operating this iSCSI RAID subsystem. To re-login, please enter username and password again



Chapter 5.

Console Port-base RAID

Management

This iSCSI RAID subsystem console port-based configuration menu is mainly designed to be used as a RAID manage interface for the users who have no web browsers and want to quickly configure the RG (RAID group), VD (Virtual Disk), iSCSI settings, and so on.

5.1 Login

The users must login as administrator. The default User Name is "**admin**" and the Password is "**0000**".

AL-8161i login: admin Password:

After the login, the main configuration menu as below will pop up automatically.



5.2 Quick Installation

It is easy to use "**Quick installation**" to create RG (RAID group) and VD (Virtual disk). Quick installation takes the whole physical disks to create a RG and VD; Quick installation itself will calculate the maximum space of RAID levels 0/1/3/5/6/0+1 respectively, depending on the number of physical disk. Quick installation will occupy all residual RG space for one VD, and it has no space for
snapshot and spare. If snapshot is needed, please create RG and VD by manual, and refer to snapshot configuration for more details. If some physical disks are already being used by other RGs, "Quick installation" can not be executed because Quick installation is valid only when all physical disks in RAID subsystem are free. Below is one example of Quick Installation.

Step 1: Click "**Quick installation**", then choose the RAID level. After RAID level choosing, press the enter key.

11		 	-	 •••	
Quick installation System configuration iSCSI configuration Volume configuration Enclosure management Maintenance Logout	Select protect RAID 0 (742 GB) RAID 1 (74 GB) RAID 3 (668 GB) RAID 5 (668 GB) RAID 6 (594 GB) RAID 0+1 (371 GB)			 	
+-Path:/Quick installation <u>QuickInstall: Select Prot</u> 	/ <u>ect</u>	 		 	

Step 2: On Confirm page, if all setups are correct, select Yes.

Then a RG and VD will be created. Now you can start to use the RAID subsystem.

O <mark>uick installa</mark> System configur iSCSI configur Volume configu Enclosure mana Maintenance Logout	ion Protect: RAID 5 on Local enclosure Volume (VD) size: 668 6B VD created on new RG Attach VD to LUN=0 Install with the above setting ?
	< 405 > < 10 >
+-Path:/Quick in QuickInstall: S	stallation/

5.3 System configuration

"System configuration" is designed to setup the "System Name", "Data and Time", "IP address", "Login configuration", "Password", and "System log server".

+	+1
System name Date and time IP address Login configuration Password System Log conver	
System log server	
	ł
	I
	1
1	İ
 +-Path:/Sustam.configuration/	ļ
* Trading system configuration	ī
	İ
+	+

5.3.1 System name

"System name" allows the users to name the RAID subsystem. Default system name composes of model name of this RAID subsystem.

+ System name		#
IP address Login configuration		i
Password		1
System log server	System name: AL-816111	
	++	1
		1
		1
+-Path:/System config	uration/System name/	ار ++
<u>Change</u> system name		1
 +		"+

5.3.2 Data and time

Check "Change date and time" to setup the system date and time.

System name Date and time IP address Login configuration Password System log server +- I +-	CT 02 2008 16:40:05	
+-Path:/System_configuration/Da	ate and time/	ا ++
TAB: switch, Enter: setup, ESC	<mark>) or '<': give up</mark>	

5.3.3 IP address

On this setting page, the users can change this iSCSI RAID subsystem IP

address
DNS address, even the HTTP
HTTPS, and SSH port number when the default port numbers are not allowed on the host or server.

Name	Value	
DHCP IP address Netmask Gateway DNS MAC address HTTP port HTTPS port	192.168.1.100 255.255.255.0 192.168.1.254 127.0.0.1 00:13:78:A6:D0:DA 80 443	
SSH port	22	
¦ +- <mark>Path:/System</mark> <u>ENTER: list a</u> +	configuration/IP add vailable operations.	ress/

SSH (secure shell) is required when the users want to login this iSCSI RAID subsystem from the remote side. The SSH client software is available at the following web site:

SSHWinClient WWW: http://www.ssh.com/

Putty WWW: http://www.chiark.greenend.org.uk/

5.3.4 Login configuration

"Login configuration" allows the users to enable or disable "Auto Logout and Login lock".



Auto logout: The options are (1) Disable; (2) 5 minutes; (3) 30 minutes; (4) 1 hour. The system will log out automatically when this iSCSI RAID subsystem console port-based configuration menu is inactive over 5 minutes \ 30 minutes \ I hour, depending on the Auto Logout setting.

Login lock: Disable/Enable. When the login lock is enabled, this iSCSI RAID subsystem console port-based configuration menu allows merely only one user to login or modify the RAID subsystem settings.

5.3.5 Password

The users can change the password. Below are the steps:

Step 1: Type the old password



Step 2: Type the new password







Step 4: Done

System name Date and time IP address Login configuration P <mark>assword</mark> System log server	Change password+ Password is changed.
+- <mark>Path:/System_configuratio</mark> <u>Change_password</u>	N/Password/

5.3.6 System log server

Using "**System log server**", the users can choose the facility and the event log level. The default port of syslog is 514. The default setting enables event log level: WARNING and ERROR.

System name Date and time IP add+ Login IP/hostname : Passwo UDP port: System Facility: Event level:	<mark>192.16</mark> 514 <u>User</u> WARNIN	Setup sy 8.1.101 G ERROR	vstem log server	-+
Path:/System confi Change IP address	guratio	0K > n/System	<cancel></cancel>	-+ -+

There are some syslog server tools. The following web sites are for your reference:

WinSyslog: http://www.winsyslog.com/

Kiwi Syslog Daemon: http://www.kiwisyslog.com/

5.4 iSCSI Configuration

"iSCSI configuration" is designed to setup the "Entity Property", "NIC", "Node", "Session", and "CHAP account".

Entity property
INIC
Node
Session
CHAP_account
-Path:/iSCSI_configuration/
India nonertu

5.4.1 Entity property

"Entity property" can view the entity name of this iSCSI RAID subsystem, and setup the "iSNS IP" for iSNS (Internet Storage Name Service). The iSNS protocol is designed to facilitate the automated discovery, management, and configuration of iSCSI devices on a TCP/IP network environment. iSNS provides intelligent storage discovery and management services comparable to those found in Fibre Channel networks, allowing a commodity IP network to function in a similar capacity as a storage area network. To use iSNS, it needs to install a iSNS server. Add an iSNS server IP address into the iSNS server lists so that a iSCSI initiator service can send queries.

)+ a¦ <mark>Entity name</mark> : ¦iSNS IP:	test	§	Getup enti	ty property	
+ 	<	0 K	>	<cancel></cancel>	



The server that functions as ISNS server must not be installed with iSCSI initiator.

5.4.2 NIC

"NIC" can change the IP addresses of iSCSI host ports. This iSCSI RAID subsystem has four Gb/s LAN ports working as the host ports to transmit data. Each port must be assigned with a unique IP address unless the link aggregation or Trunking mode has been selected. If any two or more ports are set in link aggregation or Trunking mode, they will display the same IP.

Select a LAN port, and press the enter key.

Name	LAG	LAG No	DHCP	IP address	Netmask	Gateway	Def
LAN2 LAN3 LAN4	No No No	NZA NZA NZA NZA	No No No No	$\begin{array}{c} 192.168.1.1\\ 192.168.2.1\\ 192.168.3.1\\ 192.168.4.1 \end{array}$	255.255.255.0 255.255.255.0 255.255.255.0 255.255.0 255.255.0 255.255.0	192.168.1.254 192.168.2.254 192.168.3.254 192.168.4.254	No Yes No No
- <mark>Path:</mark> / ENTER:	iSCSI d list av	configu vailable	ation e opera	/NIC/			

Then a submenu will pop up.

Name	LAG L	AG No	DHCP	IP address	Netmask	Gateway Def
LAN2 LAN3 LAN4	No No No No	NZA NZA NZA NZA	No No No	+NIC operations Static IP DHCP Add link aggregation Delete link aggregatior Set jumbo frame Default gateway	(g) (c) (d) (1) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	192.168.1.254 No 192.168.2.254 No 192.168.3.254 No 192.168.4.254 No
Pathe/I ENTER:	iSCSI co list ava	nfigur ilable	ation e oper	/MC/ations.		

Below are the descriptions about this submenu:

1. Select "**Static IP**"; then the users now can change the static IP address of the selected host port.

Name	LAG	LAG No DHCP	IP	address	Netmask	Gateway	Def
LAN1 LAN2 LAN3 LAN4	No No No	N/A No N/+ N/ IP addr N/ Netmask Gateway	192. Set ess: :	168.1.1 tup stati	255.255.255.0 c IP 192.168.1.1 255.255.255.0 192.168.1.254	192.168.1.254 • 192.168.2.254 192.168.3.254 192.168.4.254	No No No No
		I	< 0K	>	<cancel></cancel>		
+-Path	:/ <mark>iSCSI c</mark> dress	•onfiguration/	NIC/				

2. Select "**DHCP**"; then the users now can decide to use DHCP or not for the selected host port.

Name	LAG L	AG No	DHCP	IP	address		Netmask	Ga	teway	Def
LAN1 LAN2 LAN3 LAN4	No No No No	NZA N/A N/A N/A	No Sure	to ena	.168.1.1 <mark>DHCP</mark> - able DHC	255.25 P?	5.255.0 +0 0 0	192.168. 192.168. 192.168. 192.168.	1.254 2.254 3.254 4.254	No No No No
+-Path:/	iscst co	nfigur	+	(Yes)	, 		+			
ENTER:	list ava	ilable	opera	tions.						

3. Select **"Add link aggregation"**; then the users can select "Trunking" or "LCAP" to increase the data transfer speed beyond the limits of any one single cable/port, or increase the redundancy for higher availability by paralleling multiple Ethernet network cables/ports.

Name	LAG LAG No DHCP	IP address	Netmask	Gateway Def
LAN2 LAN2 LAN3 LAN4	No N/A No N+ N Aggregation t N IP address: Netmask: Gateway: NIC:	192.168.1.1 2 Link aggregati Aggregation typ Irunking LACP 	255.255.255.0 192 on	.168:1.254 No → 8.2.254 No 18.3.254 No 8.4.254 No
	<	0 K >	<cancel></cancel>	
lenter to s	select type			
INFO: 200 INFO: 200 INFO: 200	08/10/03 10:35:55 08/10/03 10:40:47 08/10/03 10:44:41	CST admin logout CST admin logout CST admin login f	from SSH via Consol from SSH via Consol rom 192.168.1.101 v	le UI le UI via Web UI

Descriptions of Trunking /LACP:

Trunking: It is defined as combining multiple ports in order to form faster logical communication links between devices. For example, connect all four data ports to the Gb/s Ethernet switch to form a single logical 4 Gb/s path.

LACP: The Link Aggregation Control Protocol (LACP) is part of IEEE specification 802.3ad that allows bundling several physical ports together to form a single logical channel. LACP allows a network switch to negotiate an automatic bundle by sending LACP packets to the peer. The advantages of LACP are (1) increases the bandwidth. (2) failover when link status fails on a port.

Select "Aggregation type". Then press the enter key to select Trunking or LCAP.

Name	LAG LAG No DHCP	IP address	Netmask	Gateway Def
lan1 Lan2 Lan3 Lan4	No N/A No N+	192.168.1.1 Link aggrega Aggregation t runking ACP	255.255.255.0 1	92.168.1.254 No +8.2.254 Yes 8.3.254 No 8.4.254 No
	INIC:	Select	· · · · ·	<u> </u>
	+	0K >	Cancol	+

Select "**NIC**". Then press the enter key to select the host ports for Trunking or LCAP.

Name	LAG	LAG No	DHCP	IP address	Netmask	Gateway De
		Name	DHCP	IP address	Def Jumbo frame	Link .254 N
LAN3 LAN4		LAN1 LAN2 LAN3 LAN4	No No No No	192.168.1.1 192.168.2.1 192.168.3.1 192.168.4.1	No Disabled Yes Disabled No Disabled No Disabled	Down .254 N Down .254 N Down Down Down
	1		< 0K	>	<cancel></cancel>	

4. Select "**Delete link aggregation**" to get the host ports that are assigned as Trunking or LACP back to the without-aggregation status.

Name	LAG	LAG No	DHCP	IP addres	s	Netmask	Gateway	Def
LAN1 LAN2 LAN3 LAN4	<mark>Irunking</mark> Trunking No No	0 0 N/A N/A	No Sur agg	192.168.2 -Delete link a e to delete li regation 0? <yes></yes>	1 255.2 aggregatic nk <no></no>	255.255.0 m+0 0 0	192.168.2.254 192.168.2.254 192.168.3.254 192.168.4.254	No No No No
+-Pati ENTE	n:/ <mark>iSCSI (</mark> ?: list av	configur vailable	ation	/NCC/				

5. Select **"Set jumbo frame"**; then the users now can enable or disable jumbo frame.

lame	LAG	LAG No	DHCP IP	address	Netma	sk G	ateway Def	l.
AN1 -AN2 -AN3 -AN4	No No No No	NZA NZA NZA NZA	No 192 See Sure to end <yes:< th=""><th>.168.1.1 t jumbo fr able jumbo</th><th>255.255.255 ame frame? No ></th><th>$\begin{array}{c c} & 192.168 \\ \hline & 192.168 \\ \hline & 192.168 \\ \hline & 192.168 \\ \hline & 192.168 \\ \hline & \end{array}$</th><th>1.254 No .2.254 No .3.254 No .4.254 No</th><th></th></yes:<>	.168.1.1 t jumbo fr able jumbo	255.255.255 ame frame? No >	$\begin{array}{c c} & 192.168 \\ \hline & 192.168 \\ \hline & 192.168 \\ \hline & 192.168 \\ \hline & 192.168 \\ \hline & \end{array}$	1.254 No .2.254 No .3.254 No .4.254 No	
-Path: NTER:	/ <mark>iSCSI c</mark> list av	configur Vailable	ration/NIC/					

Jumbo Frame is designed to enhance Ethernet networking throughput and

largely lower the CPU consumption of large file transfers by enabling more efficient larger payloads per packet. Conventionally, jumbo frames can carry up to 9,000 bytes of payload. Basically, a data transfer path from this iSCSI RAID subsystem to the server includes at least a NIC and this iSCSI RAID subsystem itself. To prove jumbo frame really work on this path, the jumbo frame function of both this iSCSI RAID subsystem and the NIC must be enabled. If a Ethernet switch is involved in this path, please enable the jumble frame function of this switch, too, and ensure MTU (maximum transmission unit) are all identical. "Wireshark "can be used to obtain the current MTU of any devices supporting jumbo frame.

6. Select "**Default gateway**"; then this iSCSI RAID subsystem's gateway address will be reset to the factory default IP address.

Name	LAG LA	AG No	DHCP	IP addr	ess	Netmas	k	Gateway	/ Def
LAN1 LAN2 LAN3 LAN4	No No No No	NZA N/A N/A N/A	No Sure gatew	192.168. <u>Default</u> to become ay? <yes></yes>	1.1 255 gateway default <no></no>	.255.255.	$\begin{array}{c c} 0 & 19 \\ 0 & 19 \\ 0 & 19 \\ 0 & 19 \\ 0 & 19 \\ \end{array}$	9 2.168.1.25 4 92.168.2.254 92.168.3.254 92.168.4.254 92.168.4.254	No No No No
+- <mark>Path:</mark> / ENTER:	iSCSI con list ava:	nfigur ilable	ation/N	0 / ions.					

5.4.3 Node

"**Node**" allows the users to setup the target name and CHAP for the iSCSI initiator. This iSCSI RAID subsystem supports multiple nodes, and there is no default node name on This iSCSI RAID subsystem; it is empty, and must be created first.

1	Name	Auth	Portal
+	amd	None	192.168.1.1:3260
		••	
ENTER: list available operations	•		

Select any created node, and press the enter key. Then a submenu will pop up as below.

1	Name	Auth	Portal
iqn.2004-08.tw.com.qsan:p2+Node Create no Delete no Rename no Change Au List user Add user Remove us	operations- ode ode ode uth to node ser from node	(c) (d) (r) (a) (1) (u) (f)	192.168.1.1:3260 192.168.2.1:3260 192.168.3.1:3260 192.168.4.1:3260
Path:/iSCSI configuration/Node/ ENTER: list available operations.			

Below are the descriptions about this submenu:

1. Select "Create node"; then the users now can create new node.

1		Name A	luth	Portal
+	Cre	amd N asus N ate node	one <u>192.1</u> one <u>192.1</u>	68.1.1:3260 68.4.1:3260 +
Auth: Portal:	None Select < NK >		·	
+				+
+-Path:/iSUSI_com <u>Node_name</u> 	nfiguration/Node/			

Step 1: Type a new node name.

Step 2: Choose to apply "Auth" (CHAP) or not (None).

Step 3: Choose host ports, from which the created new node can be detected.

2. Select "Delete node" to delete the existing nodes.

Name	Auth	Portal
amd +Delete node Sure to delete node amd	None	192.168.1.1:3260 192.168.4.1:3260
۲۹۵۶ (Ves)		
Path:/iSCSI configuration/Node/ ENTER: list available operations.		

3. Select "Rename node to rename the existing node names.

1							Na	me	Auth		Portal
							a as	md us	None None	192.16 192.16	8.1.1:3260 8.4.1:3260
	+ Name:	amd				-Rename	e node				-+
	+ +		<	0 K	>			<ca< td=""><td>ncel></td><td></td><td>-+ -+ </td></ca<>	ncel>		-+ -+
+- <mark>Path:</mark> / <u>Rename</u>	iSCSI con node name	figura	tic	n/Nc	ode/						

4. Select "Change Auth" to re-decide whether to use CHAP or not.

+ 	Name	Auth	Portal
	amd asus +Change Auth+ Auth: None	None None	192.168.1.1:3260 192.168.4.1:3260
	<pre>< OK > <cancel> </cancel></pre>		
- Dath ViSCSI configuration			
Select authentication mode	for iSCSI node		

5. Select "List user" to display the user name (CHAP accounts).



6. Select "Add user to node" to add new user to node

1		Name	Auth	Portal
	+Add user	to node User	+ne ¦ne	192.168.1.1:3260 192.168.4.1:3260
	(X)	alnico	+	
	<pre></pre>	<cancel></cancel>	 + 	
 +-Path:/iSCSI_configura Select_user_to_insert	+ ation/Node/ to_node		+ 	

7. Select "Remove user from node" to remove the existing users from node



5.4.4 Session

"Session" can display iSCSI session and connection information

No	TSIH	Initiator name
1		
+-Pai	th:/iSCSI_configuration/Sess	ion/
		<u>. </u>
IINE	0: 2008/10/03 10:35:55 CST	admin logout from SSH via Console UI
	D: 2008/10/03 10:44:41 CST	admin logout from 55n via Console UL admin login from 192.168.1.101 via Web UL

5.4.5 CHAP account

"CHAP account" can allow the users to create multiple CHAP accounts for node authentication.

User		Node name
alnico	User operations Create user (c) Delete user (d) Change secret (s) Add user to node (u) Remove user from node (f)	amd
Path:/iSCSI configu ENTER: list availabl	ration/CHAP_account/ e_operations.	

Below are the descriptions about this submenu:

1. Select "Create user"; then the users now can create new CHAP accounts.

+ +	User		Node name
User: Secret: Confirm: Node:	geo ************************************	ate user	+C
+	<pre>configuration/CH8P_acco</pre>	<cancel></cancel>	+
The node when	re user add		

Step 1: Type a user name for a new CHAP account.

Step 2: Type Secret (password); the min is 12; the max is 16.

Step 3: Re-type the Secret.

Step 4: Select a node for the newly created CHAP account.

2. Select "Delete user"; then the users now can delete existing CHAP accounts.

User	Node name
alnico	amd Sure to delete user alnico ? <yes> <no></no></yes>
Path:/iSCSI configur ENTER: list available	ation/CHAP_account/

3. Select "Change secret" to change secret.

User		Node name
alnico	+Change secret+	amd
	New secret: ************************************	
	<pre></pre>	
Path:/iSCSI configur	ation/CHAP_account/	

4. Select "Add user to node" to add existing CHAP accounts to nodes.



5. Select "Remove user from node" to do anti-add-users-to-node.



5.5 Volume configurations

"Volume configuration" is designed to setup the volume configuration which includes "Volume create wizard", "Physical disk", "RAID group", "Virtual disk", "Snapshot", and "Logical unit".

V <mark>olume creation wizard</mark> Physical disk RAID group Virtual disk Snapshot Logical unit	-+
- <mark>Path:/Volume_configuration</mark> / Volume_creation_wizard	-+

5.5.1 Volume creation wizard

"Volume create wizard" has a smarter policy. When this iSCSI RAID subsystem is inserted with some hard disks, "Volume create wizard" will list all the possible RAID level and capacities that the users can choose. For example, the users choose RAID 5 and the controller has 12*200G + 4*80G hard disks inserted. If the users want to make use of all the 16 hard disks for a RAID 5, the maximum capacity of the volume is 1200G (80G*15). Taking advantage of "Volume create wizard, this iSCSI RAID subsystem will take a smarter check and find out the most efficient way of using all the available hard disks; thus, in this case, the wizard will only uses the 200G hard disks, making a RAID 5 volume consisted of 200G*11=2200G. The volume capacity, by doing so, becomes bigger, and the maximum hard disk capacity is fully used, too. The smarter policy gives the users:

- 1. Biggest capacity of RAID level for user to choose.
- 2. The fewest disk number for RAID level / volume size.

Step 1: Select "Volume creation wizard" and then select an enclosure.

Volume creation wiza Physical disk [RAID group Virtual disk Snapshot Logical unit	rd Select_enclosure Local	-+ -+
+-Path:/Volume_config Quick_installation	uration/Volume creation wizard/	

Step 2: Select RAID level.

V <mark>olume creation wizard</mark> Physical disk RAID group Virtual disk Snapshot Logical unit	Select protect RAID 0 (1190 GB) RAID 1 (148 GB) RAID 3 (1041 GB) RAID 5 (1041 GB) RAID 6 (892 GB) RAID 0+1 (595 GB)
+- <mark>Path:/Volume_configur/ Select_Protect</mark>	ation/Volume creation wizard/

Step 3: Select the combination of the RG (RAID Group) capacity, or "Use default algorithm"

for maximum RG capacity.

+	
Volume creation wizard	+Belect algorithm+
Physical disk	Use default algorithm
RAID group	-new 3 disks(148 GB)-
¦Virtual disk	-new 3 disks(297 GB)-
Snapshot	-new 4 disks(222 GB)-
¦Logical unit	-new 4 disks(446 GB)-
	-new 5 disks(297 GB)-
	-new 5 disks(595 GB)-
	-new 6 disks(371 GB)-
	-new 6 disks(743 GB)-
	-new 7 disks(445 GB)-
	-new 7 disks(892 GB)-
l	-new 8 disks(519 GB)-
+-Path:/Volume_configura	-new 8 disks(1041 GB)
<u> Select algorithm</u>	-new 9 disks(594 GB)-
	++

Step 4: Decide VD (Virtual Disk) capacity. User can enter a number less or equal to the default capacity.

V <mark>olume creation wizard</mark> Physical disk RAID group Virtual disk Snapshot Logical unit	+Volume size 104	
Path:/Wolume_configura QuickInstall: Get_volume	<u>(VD) size</u>	

Step 5: Assign the volume with a LUN.

Volume creation wizard Physical disk RAID group Virtual disk Snapshot Logical unit	+Map L LUN 0 LUN 1 + LUN 2 LUN 3 + LUN 4 LUN 5 LUN 6 LUN 7 LUN 8	∭+ + + + +	
+- <mark>Path:/Volume configura</mark> M <u>ap LUN for *</u> +			

Step 6: Final confirm.

V <mark>olume creation</mark> Physical disk RAID group Virtual disk Snapshot Logical unit	Wizard Protect: RAID 5 on Loc Volume (VD) size: 104 VD created on new RG Attach VD to LUN=0 Install with the above	cal enclosure GB e setting ?	
<mark>Path:</mark> /Volume d Map LUN for <u>*</u>	<yes></yes>	<no></no>	+

5.5.2 Physical disk

"**Physical disk**" can view the status of hard disks in the RAID subsystem, set spare disks, and standby mode.

1. View hard disk status and call up a submenu to setup hard spare and standby mode.

Step 1: Select enclosure.

olume creation w hysical disk AID group irtual disk hapshot aricolumit	izard +Select enclosure Local	
	÷÷	
Path Avolume cor		
nysical disk		

Step 2: Select any hard disk "slot".

Slot	Size(GB)	RG name	Status	Health	Usage	Vendor	Serial	Туре
	143 74 148 148 148 148 148 74 148 148 148 148 148 148 148 148 148 14	QUICK22329 QUICK22329 QUICK22329 configurativailable ope	Online Online Online Online Online Online Online Online Erations.	Good Good Good Good Good Good Good Good	FR RD FR FR FR FR FR (Local	WDC WDC WDC WDC WDC WDC WDC WDC WDC	WD=WMAP41314417 WD-WMAM9P850645 WD-WMAP41301756 WD-WMAP41314278 WD-WMAP41314278 WD-WMAP41314314348 WD-WMAP41314348 WD-WMAJ91561912 WD-WMAP41314932 WD-WMAP41314506	SATA2 SATA2 SATA2 SATA SATA SATA SATA SA
Step :	3. FIESS		; у.					i
Slot	Size(GB)	RG name	Status	Health	Usage	Vendor	Serial	Type
1 2 3 5 5 6 7 9 10 13 14	143 74 148 148 148 148 148 148 74 148	QUICK22329 QUICK22329 QUICK22329	Online On+ On Set On Set On Set On Set On More On+ Online Online	Good -PD opera dedicateo global sp PD property informat Good Good	FR spare are ion FR FR	WDG +WDC (g) WDC (f) WDC (p) WDC (m) WDC (m) WDC +WDC WDC WDC	UD-WMAP413014417 WD-WMAP49850645 WD-WMAP41301756 WD-WMAP41314053 WD-WMAP41314278 WD-WMAP41314278 WD-WMAP41314348 WD-WMAP41314348 WD-WMAP41314506	SATA SATA2 SATA2 SATA1 SATA1 SATA1 SATA1 SATA1 SATA1 SATA1 SATA1

Path:/Volume configuration/Physical disk (Local)/ ENTER: list available operations.

Below are the descriptions about this submenu:

1. Select "Set dedicated spare" to create a dedicated spare.



Dedicated spare can be created only when there are multiple RGs (RAID group) created before.

Select one RG that you wan to have the created dedicated spare used for. By doing so, the dedicated spare will only work for the selected RG.

Slot	Size	(GB)	RG i	name Sta	tus	Health	n Usag	ie	Vendor		Serial	Туре
+ 	No.		Name	Total(GB) Free	elect (GB)	RG #PD	₩VD	Status	Health	RAID	+
(X)	1	QUICK	22329	14	8	44	Э	1	Online	Good	RAID 5	+
	Good	DC	ITD 5-	< 0 <u>K</u> >) 1	QUICK	(22329		148	44	3	1 0n
+-Pat	hi/Vol	lume c	onfig	uration/P	hysica	ıl disk	(Loc	al)/	/			
<u>Sele</u>	<u>ct RG</u>											

lot	Size(GB)	RG name	Status	Health U	Jsage	Vendor	Serial	Туре
1 2 3 5 6 7 9 10 13 14	148 74 148 148 148 148 148 148 74 148 148	QUICK22+ QUICK22 Su g1 QUICK22329	Online Set obal spar <yes> Online Online Online</yes>	Good global sp e slot 1 e? Good Good Good Good	FR pare as a <no> RD FR FR</no>	WDC	MD-WMAP41314417 WD-WMAP9850645 WD-WMAP41301755 WD-WMAP41313053 WD-WMAP41314278 WD-WMAP41314910 WD-WMAP41314910 WD-WMAP41314348 WD-WMAP41314932 WD-WMAP41314506	SATA2 SATA2 SATA2 SATA SATA SATA SATA SA
Pat NTE	n:/ <mark>Volume</mark> ?: list av	configurati vailable ope	on/Physic rations.	al disk	(Local)	l/		i

2. Select "Set global spare" to create a global spare.



Unlike dedicated spare, global spare can be used for any created RG. Thereby, there is no need to create RGs before creating global spare.

3. Select "Free PD" to set the selected hard disk as a free disk.

Slot	Size(GB)	RG na	ame Status	Health Us	age Ven	dor	Serial	Туре
1 2 3 5 6 7 9 10 13 14 +-Patl ENTEF	148 74 148 148 148 148 148 148 74 148 148 148 148 148 148 148	QUICK22 QUICK22 QUICK22 QUICK22 QUICK22	The PD has by RAID gro Sure to mak disk? <u>(Yes</u>) Online Online ation/Physic operations.	Good Good Good Good Good	en used s a free o > FR S FR S ocel)/	WDC	WD-WMAP41314417 WD-WMAP41301756 WD-WMAP41313053 WD-WMAP41313053 WD-WMAP41314278 WD-WMAP41314278 WD-WMAP41314348 WD-WMAP41314348 WD-WMAP41314932 WD-WMAP41314506	SATA SATA SATA SATA SATA SATA SATA SATA

4. Select "Set property" to setup standby mode or enable\ disable write cache.

Slot	Size(GB)	RG nam	e Status	Health	Usage	Vendor	Serial	Туре
1 3 5 6 7 9 10 13 13 14 +-Pat	143 74 148 148 148 148 148 148 148 148 148 14	QUICK2232 QUICK2232 QUICK2232 QUICK2232	9 Unline 9 Write ca Standby: Standby: Standby: Standby: Standby: 9 Online 0nline tion/Physi	Good Set prop ache: M Good Good Good Good	FR Enty Inabled Cancel> RD FR FR (Local)	**************************************	WD=WMAP41314417 WD-WMAM9P850645 WD-WMAP41301756 WD-WMAP41313053 WD-WMAP41314278 WD-WMAP41314278 WD-WMAP41314348 WD-WMAP41314348 WD-WMAP41314932 WD-WMAP41314506	SATA SATA2 SATA2 SATA SATA SATA SATA SAT

Write cache options:

1. Enabled \rightarrow Enable disk write cache.

2. Disabled \rightarrow Disable disk write cache.

Standby options:

1. Disabled \rightarrow Disable spin down.

2. 30 sec / 1 min / 5 min / 30 min \rightarrow Enable hard disk auto spin down to save power in the period of time.

3. Select "PD information" to view detailed hard disk information.

1					 	
Slo	t Size(GB)	RG	Slot:	1 200/001278064040	Serial	Туре
1	$\frac{1}{2}$ $\frac{148}{76}$	OUTCK	RG name:		-WMAP41314417	SATA SOTO2
	$\frac{148}{5}$	QUICK	Health:	Good	-WMAP41301756	SATA
	$5 140 \\ 6 148 \\ 7 1/9$		Read errors:		-WMAP41314278	SATA
1	$\frac{140}{9}$ 148		Write cache:	Enabled	-WMAP41314348	SATA
		QUICK	Standby:	Disabled	-WMAP41314932	SATA
	4 <u>1</u> 48			<0🛛	-WMHP41314306	ын
ENT	unn∕volume ER: list a	vailabl	e operations.		 	t I
i +					 	·

5.5.3 RAID group

"**RAID group**" can allow the users to create RG, view the status of each RAID group, migrate RAID group, and so on.

1. To create a RG (RAID group), please take the steps as below:

Step 1: Give the new RG a name.

Step 2: Select a RAID Level.

Step 3: Select hard disks to be used for RG.

Step 4: Setup write cache and standby mode policy.

Finally select **OK**.

No.	Name	Total(GB)	Free(GB)	#PD	₩VD	Status	Health	RAID	Enclosure
1	QUICK22329	RG RA RA Wri Sta	name: [D level: [D PD slot ite cache: andby:	Crea	te RG- one RAID Ø Select nable Disabl	d ed	+ood	RAID 5	Local
		Į	< 0K	>	<ca< th=""><th>ncel></th><th></th><th></th><th></th></ca<>	ncel>			
Pa inp	th: <mark>/Volume c</mark> ut a unique	configurati name	ion/RAID g	aroup/	/				

Write cache options:

- 1. Enabled \rightarrow Enable disk write cache.
- 2. Disabled \rightarrow Disable disk write cache.

Standby options:

1. Disabled \rightarrow Disable spin down.

2. 30 sec / 1 min / 5 min / 30 min \rightarrow Enable hard disk auto spin down to save power in the period of time.



RG can be created only when there are free hard disks available.

Below are the descriptions about this submenu of RG:

10. 1	Name test	Total(GB) 446	Create R Delete R Activate Deactiva Scrub RG Migrate Query li List RG Set disk More inf	RG op G G RG te RG nked s RAI s Prop ormat	erati VD D PD erty ion	ons	(c) (d) ood (a) (o) (s) (g) (q) (r) (i) (m)	RAII) Enclosure
-Pat -NTE	h:/ <mark>Volume c</mark> R: list ava	onfigurati ilable ope	on/RAID g rations.	iroup/					
1. S	elect " Dele	te RG" to	delete cre	ated I	RG.				
No.	Name	Total(GB)	Free(GB)	#PD	#VD	Status	Health	RAID	Enclosure
	QUICK22329 one	148 + Si	44 ure to del	Э - <mark>Delet</mark> lete R	1 e RG- G one	Online ?	Good + <mark>ood</mark> 	RAID 5 RAID Ø	Local Local



RG can be deleted only when there is no created VD (Virtual disk) inside of the going-to-be-deleted RG.

2. Select "Activate RG" to re-activate the deactivated RG. Activating a RAID group allows the users to restore the off-line status RAID group. After a RAID group is array roamed to another iSCSI RAID subsystem, the users have to execute this function to activate the moved RAID group.

No.	Name	Total(GB)	Free(GB)	#PD	₩VD	Status	Health	RAID	Enclosure
1	QUICK22329	148 Si Ql	44 	3 Ictiva ivate 193?	1 te RG RG <n< td=""><td>Offline</td><td>Good</td><td>RAID 5</td><td>Local</td></n<>	Offline	Good	RAID 5	Local
+- <u>Pa</u> <u>ENT</u>	th:/Volume c ER: list ava	configurati	ion/RAID cerations.	roup/			-		
INF INF d.	D: 2008/10/ D: 2008/10/	/03 14:10:5 /03 14:12:5	53 CST RO 52 CST RO	G one QUIC	 has b K2232	een del 91193 h	eted. as been	manually	deactivate

3. Select "**Deactivate RG**" to deactivate the active RGs. Deactivating a RAID group allows the users to array roam the whole RAID group to another iSCSI RAID subsystem without powering off the system.

No.	Name	Total(GB)	Free(GB)	#PD	#VD	Status	Health	RAID	Enclosure
	QUICK22329	148 S Q	4/ ure to de UICK22325 <yes< th=""><th>9 Deactiv Pactiva P1193? ⊳</th><th>1 vate R ate RG <n< th=""><th>Online G</th><th><u>Good</u></th><th>RAID 5</th><th>Loca]</th></n<></th></yes<>	9 Deactiv Pactiva P1193? ⊳	1 vate R ate RG <n< th=""><th>Online G</th><th><u>Good</u></th><th>RAID 5</th><th>Loca]</th></n<>	Online G	<u>Good</u>	RAID 5	Loca]
+-Pa <u>ENT</u>	th:/ <mark>Volume d</mark> ER: list ava	configurat ailable op	ion/RAID erations.	group/	/				

4. Select "**Scrub RG**" to scrub a RAID group in order to remap bad blocks; this function is to make parity regeneration, supporting RAID 3 / 5 / 6 / 30 / 50 / 60 only.

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No.	Name	Total(GB)	Free(GB)	#PD	₩VD	Status	Health	RAID	Enclosure
	QUICK22329	148	44 crub RG QU <¥es>	3 Scrub JICK22	1 <u>RG</u> 32911 <n< th=""><th>Online 93? o ></th><th>Good</th><th>RAID 5</th><th>Local</th></n<>	Online 93? o >	Good	RAID 5	Local
+-Pa ¦ENTI	th:/Volume ER: list ava	configurat ailable op	ion/RAID <u>c</u> erations.	iroup/					

5. Select "Migrate RG" to migrate the RAID level.

No.	Name	Total(GB)	Free(GB)	#PD	#VD	Status	Health	RAID	Enclosure
	QUICK22329	148 RG RA RA	44 name: [D level: [D PD slot	3 ligrat [1 1 E RG 101CK2 10 3 2 10 3	Online 23291193	Good	RAID 5	Local
		+ +	< 0 <mark>K</mark>	>	<ce< th=""><th>incel></th><th>+ +</th><th></th><th></th></ce<>	incel>	+ +		
+- <u>Pa</u> <u>0ri</u>	th:/Volume (ginal RAID	configurat: PD: 2 10 3	ion/RAID_g -	iroup/	/				

To do migration, the total size of RG must be larger or equal to the original RG. It does not allow expanding the same RAID level with the same hard disks of original RG.

The operation is not allowed when RG is being migrated. System would reject following operations:

- 1.Add dedicated spare.
- 2.Remove a dedicated spare.
- 3.Create a new VD.
- 4.Delete a VD.
- 5.Extend a VD.
- 6.Scrub a VD.
- 7.Perform yet another migration operation.

8.Scrub entire RG.

9. Take a new snapshot.

10.Delete an existing snapshot.

11.Export a snapshot.

12.Rollback to a snapshot.



6. Select "Query linked VD" to display the created VD (Virtual disk) that is inside of the selected RG.

No	Name	Total(GB)	Free(GB)	#PD	#VD	Status	Hea]	th	RAID	Enclo	osure
in.). Name	e Size(GB)	Right Pr	nked V i Sta	<mark>D ta</mark> b tus	le Health	%	RAID	#LUN	Snap	spa
	1 QUICK11051	104	WB H	I Onl	ine O	Optimal		RAID 5	1		
+	th:/Volume_c	configurat	ion/RAID	group/							+
ES	;, '"': back	<u>to RG tab</u>	<u>le</u>								

7. Select "List RG's RAID PD" to view which hard disks are used by the selected RG.

No.	Name	Total(GE	3) Free((GB) #PD	₩VD	Status	Health	RAID End	closure
Slot	Size(GB)	Status	Health	R G's cont Vendor	tained	PD Seri	al	Model	Туре
10 3	74 74 148	Online Online Online	Good Good Good	WDC WDC WDC	WD-WM WD-WM WD-WM	AM9P8506 AJ915619 AP413017	45 WD80 12 WD80 56 WD1600	ØJD-ØØLSAØ ØJD-ØØHKAØ Adfd-6ønlr	SATA2 SATA SATA SATA
+- <mark>Path</mark> <u>ESC,</u>	;/ <mark>Volume</mark> ,~`: back	configura to RG ta	tion/RA1 ble	ID group/	/				

8. Select "**Set disk property**" to setup standby mode or enable\ disable write cache.

No.	Name	Total(GB)	Free(GB)	#PD	#VD	Status	Health	RAID	Enclosure
1 QUT	CK81568	148	29 <mark>Set</mark> Write cac Standby:	1 disk he:	1 prope <u>Ena</u> Dis	Online rty bled abled	Good	RAID Ø	Local
			< <u>0</u> R	>	<ca< th=""><th>ncel></th><th>Ì</th><th></th><th></th></ca<>	ncel>	Ì		
- <mark>Path:</mark> / enter_t	Volume d o select	configurat	ion/RAID g	roup/			·		

Write cache options:

- 1. Enabled \rightarrow Enable disk write cache.
- 2. Disabled \rightarrow Disable disk write cache.

Standby options:

1. Disabled \rightarrow Disable spin down.

2. 30 sec / 1 min / 5 min / 30 min \rightarrow Enable hard disk auto spin down to save power in the period of time.

9. Select "More information" to view detailed RG information.

No. Name 1 QUICK81568	No.: Name: Status: Hoaltb:		RAID Enclosure
	Enclosure: RAID cell: PD slot: DS slot: Missing disk:	Local 1 3 0	
		<00	
+- <mark>Path:</mark> /Volume c ENTER: list ava	configuration/Rf milable operation	AID group/	

5.5.4 Virtual disk

"Virtual disk" can allow the users to create VD, view the status of each VD, and so on.

To create a VD (Virtual disk), please take the steps as below:

Step 1: Give the new VD a name.

Step 2: Select an existing RG.

Step 3: Select VD capacity

Step 4: Select stripe size, and block size.

Step 5: Select write back or write through

Step 6: Select priority, and Bg rate.

Finally select **OK**.

No.	Name Size(GB) Right Pri	Status Health	% RAIE) #LUN Snap s
	VD name: <u>peta</u> RG name: <u>one</u> Capacity(GB): <u>30</u> Stripe height(KB): <u>64</u> Block(B): <u>512</u> Read/Write: <u>Writ</u> Priority: <u>High</u> Bg rate: <u>4</u>	e back priority		<u> </u>
	< 0 K	<cancel></cancel>		
+- <mark>Path:</mark> /W enter to	olume_configuration/Virtual select	disk/		

Below are the descriptions about this submenu of RG:

No.	Name S	Size(GB)	Rig+VD_operations		+ %	RAID	#LUN	Snap <u>s</u>
+ ! 1	01170K80006	119	¦Create VD	(c) (d)		RATD Ø	1	>>+ !
	QUICKUUUUU	11/	Scrub VD	(s)		ILITE O		
			Extend VD	(e)				
			HITACN LUN !Detach LUN	(a) (b)				
			Set property	ζ _D)				
1			Set snapshot space	(n)	İ			
			⊺ake snapshot	(t)				
1			Uleanup snapshot	XX				
			Invery IIIN information	6				
+-Pa	th: <mark>/Volume c</mark> o	onfigurat	tion More information	(m)	İ			+
ENTI	ER: list ava:	<u>ilable o</u>	<u> </u>		+			
1								

1. Select "Delete VD" to delete existing VDs.

0.	Name	Size(GB)	Right	Pri	Status	Health	%	RAID	#LUN	Snap s
$\frac{1}{2}$	peta1 peta2	30	WB	HI De	Online	Optimal	+	RAID 5 RAID 5	0 0	
	Jotal	Sur	e to d	elete	VD peta2?			TTTLD 0		
			<	Yes>	<	No >				
		+					+			
Path:/Volume_configuration/Virtual_disk/										

2. Select "**Scrub VD**" to scrub a VD in order to remap bad blocks; this function is to make parity regeneration, supporting RAID 3 / 5 / 6 / 30 / 50 / 60 only.

No.	Name	Size(GB)	Right	Pri	Status	: Health	n %	RAID	#LUN	Snap_s
	peta1	Scr	rub VD	peta < <u>Yes</u> >	Online - <mark>Scrub VD</mark> - 1?	Optimal <no></no>		RAID 5	Ø	
Path: ENTER:	/Volume o list ava	configura ailable op	tion/V peratio	irtua ons.	<u>l disk</u> /					

3. Select "Extend VD" to extend the existing VD capacity.



1. The capacity of VD extension must be larger than original.

2.VD Extension cannot be executed during rebuild or migration.

4. Select "Attach LUN" to attach LUN to a VD. Please follow the steps as below:

Step 1: Input "Host" name, or fill-in wildcard "*", which means every host can access to this volume.

Step 2: Select target name and existing VD.

Step 3: Choose LUN

Step 4: Select permission to make the VD read-only or read /written.

No.	Name Size(GB) Right Pri	Status	Health	% RAID	#LUN	Snap s
1	+Att Host name: <u>*</u> Target name: <u>amd</u> VD name: <u>petal (Size</u> LUN: <u>LUN 0</u> Permission: <u>Read write</u>	ach LUN to VD : 30 GB, Righ	t: WB)		+ E Ø 	
		<	Cancel>		+ +	
- <mark>Path:</mark> input	/Volume_configuration/Virtua the host node_name	<u>l disk</u> /				

5. Select "Detach LUN" to detach LUN from a VD.



6. Select "Set property" to change read/write policy, and priority/ Bg rate configurations.

No.	Name Size(GB)	Right Pri	Status	Health	%	RAID	#LUN	Snap
1	petal 30 VD name: Read/Write: Priority: Bg rate:	WB HI peta1 Write High 4	Online property- back priority	Optimal			1	
	+	< <u>0</u> K>	<	Cancel>		+ 		

A. Read / Write

Write-Back Cache: When the system writes to a memory location that is currently held in cache, it only writes the new information to the appropriate cache line. When the cache line is eventually needed for some other memory address, the changed data is "written back" to system memory. This type of cache provides better performance than a write-through cache, because it saves on (time-consuming) write cycles to memory.

Write-Through Cache: When the system writes to a memory location that is currently held in cache, it writes the new information both to the appropriate cache line and the memory location itself at the same time. This type of caching provides worse performance than write-back, but is simpler to implement and has the advantage of internal consistency, because the cache is never out of sync with the memory the way it is with a write-back cache.

Read Only: VD can is set to "read only".

B. Priority

a. High priority

- b. Mid priority
- c. Low priority



This function is used to set the priorities of RAID level initialization and I/O accessing for the case of multiple VDs.

C. Bg Rate

"4 / 3 / 2 / 1 / 0" \rightarrow Default value is 4. The higher number the background priority of a VD has, the more background I/O will be scheduled to execute.

7. Select "Set snapshot space" to setup the size for snapshot to use. The minimum size is suggested to be 20% of VD size.

	Name	Size(GB)	Right	Pri	Status	Health	%	RAID	#LUN	Snap_s
1	peta1	30	WB	HI	Online	Optimal		RAID 5	1	
			+ Capac	- <mark>Set sna</mark> city(GB)	pshot spa : <u>6</u>	ace+				
			<	(0 K)	<can< td=""><td>cel></td><td></td><td></td><td></td><td></td></can<>	cel>				
			+			+				
¦ +−Path:/	Volume	configura	tion/Vi	rtual d	isk/					
input f	rom key	<u>board</u>		ir tuur u						
ı +										ا ++
8. Selec	t " Take	snapsho	ot" to t	ake a si	napshot.					
No .	Name	Size(GB)	Right	Pri	Status	Health	%	RAID	#LUN	Snap s
										>>+
1	peta1	30	WB	HI	Online	Optimal		RAID 5	1	
1	peta1	30	WB	HI Snaps	Online hot name	Optimal		RAID 5	1	
1	peta1	30 + Name:	WB <u>1003</u>	HI Snaps	Online hot name	Optimal		RAID 5	1	
1	peta1	30 Name: 	WB 1003 <	HI Snaps 0K	Online hot name <ca< td=""><td>Optimal</td><td></td><td>RAID 5</td><td>1</td><td></td></ca<>	Optimal		RAID 5	1	
	peta1	30 Name : 	WB 1003 <	HI Snaps 0K	Online hot name <ca< td=""><td>Optimal</td><td></td><td>RAID 5</td><td>1</td><td></td></ca<>	Optimal		RAID 5	1	
	peta1	30 Name: 	WB 1003 <	HI Snaps 	Online hot name <ca< td=""><td>Optimal</td><td></td><td>RAID 5</td><td>1</td><td></td></ca<>	Optimal		RAID 5	1	
	peta1	30 + Name : +	WB 1003 <	HI Snaps 0K >	Online hot name <ca< td=""><td>Optimal ancel></td><td></td><td>RAID 5</td><td>1</td><td></td></ca<>	Optimal ancel>		RAID 5	1	
-Path://	petal Volume o rom kevi	30 + Name: + +	WB 1003 <	HI Snaps OK Snaps Snaps Snaps Snaps 	Online hot name <co isk/</co 	Optimal ancel>		RAID 5	1	

lo.	Name	Size(GB)	Right	Pri	Status	Health	%	RAID	#LUN	Snap s
1	peta1	Warning snapshot snapshot	This s and space	<mark>Clea</mark> opera their e from	nup snapsh tion will exports, VD petal.	delete al then free	l the	+5	1	
		Sure to	cleanu <y< td=""><td>up sna</td><td>pshot?</td><td><no></no></td><td></td><td></td><td></td><td></td></y<>	up sna	pshot?	<no></no>				
Path:/ NTER:	Volume o list ava	configurat ailable or	tion/Vi peratio	irtual ons.	disk/			+ 		

9. Select "Cleanup snapshot" to clean up the existing snapshots.

10. Select "Query linked snapshot" to view the taken snapshots.

No.	Name Size(GB) Rig	ıht Pri	Status	Health	%	RAID #LUN	Snap s
∎+ No.	Name Used(MB) He	<mark>Linked S</mark> alth Export	napshot ted Right	₩D #LUN		Created	time
	1003 0	Good	No N/A	N/A Fri	Oct	3 16:20:32	2008
<mark>Path:</mark> /\ <u>ESC</u> ,	olume configuratior : back to VD table	/Virtual di	sk/				

11. Select "Query LUN information" to view the LUNs presently used.



12. Select "More information" to view detailed VD information.

ı +	-+WN	information	++
No. Name Siz	e No.: - Name: WWN: Status: Health: Bg rate: Stripe height: Type: RG name: Block size:	1 peta1 2113001378a6d0da Online Optima1 4 64 KB RAID one 512 bytes	RAID #LUN Snap s RAID 5 1
		<0 K >	
+- <mark>Path:/Volume_conf</mark> <u>ENTER: list_availa</u> 	D + ble operations.		

5.5.5 Snapshot

Snapshot-on-the-box captures the instant state of data stored in the target volume in a logical sense. The underlying logic is Copy-on-Write -- moving out the data which would be written to certain location where a write action occurs since the time of data capture. The certain location, named as "Snap VD", is essentially a new VD.which can be attached to a LUN provisioned for a host as a disk like other ordinary VDs in the system. Rollback restores the data back to the state of any time which was previously captured in case for any unfortunate reason it might be (e.g. virus attack, data corruption, human errors and so on). Snap VD is allocated within the same RG in which the snapshot is taken, we suggest to reserve 20% of RG size or more for snapshot space. Snapshot / rollback features need **512MB** RAM at least.

Below are the steps to create a snapshot:

Step 1: Select "Set snapshot space" from "Volume configuration/Virtual disk/".

No.	Name	Size(GB)	Right	Pri	Status	Health	%	RAID	#LUN	Snap s
1	peta1	30	WB	HI	Online	Optimal		RAID 5	1	
			+ Capac	Set snar city(GB)	oshot sp : <u>6</u>	ace				
			ļ ·	< 0K >	<can< th=""><th>cel></th><th></th><th></th><th></th><th></th></can<>	cel>				
İ										İ
+-Pat	h:/Volume o it from kevl	configura <u>poard</u>	110n/V	irtual di	158/					·i
i +										i

Step 2: Select "Take a snapshot" from "Volume configuration/Virtual disk/".

No.	Name	Size(GB)	Right	Pri	Status	Health	%	RAID	#LUN	Snap s
1	peta1	30	WB	HI	Online	Optimal		RAID 5	1	
		+	: <u>1003</u>	Sna	npshot name			-+		
		1	<	0 K >	<c< td=""><td>ancel></td><td></td><td>-</td><td></td><td></td></c<>	ancel>		-		
		+						-+		
Path:	/Volume o	configura	tion∕Vi	rtual	disk/					
input	from keyl	<u>board</u>								

Step 3 Select a VD that has snapshots taken.

√olume crea Physical di RAID group Virtual dis S <mark>hapshot</mark> _ogical uni	tion wiza sk k t	ard peta1 	Select	D	+	
- <mark>Path:</mark> /Volu Snapshot	me config	guration/				
Below are	the des	criptions a	bout this su	ubmenu of	Snapshot:	+
0.	Name Use	d(MB) Healt	h Exported	Right #LUN		Created time
Path:/Volum NTER: list D name: pe	ne config availabl al (Size	uration/Sna i 30 GB. Rf	ig No Snapshot op oort snapsho lback snapsho ete snapsho e a snapsho se a snapsho ipshot/ is: ESC, '~', IID: RAID 5)	Prations t (e. hot (b. t (d. t (t. <u>t (t.</u>		16:20:32 2008
1. Select "I	Export s	napshot" t	o export sna	apshot VD.		
N	ame Used	(MB) Health	Exported F	Right ELUN		Created time
1		∅ Good + Quot < +	No Export snaps (GB): 11 OK > <ca< td=""><td>N/A N/A shot+ ancel> +</td><td>Wed Oct 22</td><td>16:48:23 2008</td></ca<>	N/A N/A shot+ ancel> +	Wed Oct 22	16:48:23 2008
a th:⁄Volu me out from ke	configu yboard	ration/Sna	oshot⁄			

Enter a capacity for the about-to-be exported snapshot VD. If no capacity is entered, the exported snapshot VD will be read only. Otherwise, the exported snapshot VD can be read/written, and the entered capacity will be the maximum capacity to read/write.

2. Select "Rollback snapshot" to get the data in snapshot VD rollbacked to original VD.

No.	Name	Used(MB)	Health	Exported	Right	#LUN		Created	time
	1003	9 Su 10	Good <u>Ro</u> -e to ro)3? < <u>Y</u> e	No 11back sn ollback s	N/A apshot napsho <no></no>	NZA t	Fri Oct	3 16:20:32	2008
+- <mark>Path:</mark> ENTER:	/ <mark>Volume_co</mark> r list_avai]	nfiguratio Lable open	on <mark>/Snap</mark> ations	shot/ ; ESC, ,~	: bacl	k to V	/ <u>D table</u>		

3. Select "Delete snapshot" to delete existing snapshot VD

No.	Name Used	(MB) Health Expor	ted Right #LUN	Created time
	1003	0 Good Delete Sure to delete	No N/A N/A snapshot snapshot 1003?	Fri Oct 3 16:20:32 2008
		<۲ <mark>es</mark> >	<no></no>	+
Path:/W <u>ENTER: 1</u>	olume configu ist available	ration/Snapshot/- operations: ESC.		VD_table

4. Select "Take a snapshot" to take a snapshot from the original VD.

No.	Name	Used(MB)	Heal	th	Exported	Right	#LUN	Created	l time
1	TEST	0	Go	od	No	N/A	N/A	Wed Oct 22 16:48:23	2008
		Name:			Snapshot	name			
		1	<	0 K	>	<0an	cel>	l	
+- <mark>Path:</mark> /V	olume cor	nfiguratio	on/Sn	ар	shot/				
	om keyboa	<u>ara</u>							

Snapshot has some constraints as follows:

1. Minimum RAM size of enabling snapshot is 512MB.

2.For performance and future rollback, system saves snapshot with names in sequences. For example, three snapshots has been taken and named "SnapVD-01"(first), "SnapVD-02" and "SnapVD-03"(last). When deleting "SnapVD-02", both of "SnapVD-02" and "SnapVD-03" will be deleted because "SnapVD-03" is related to "SnapVD-02".

3.For resource management, maximum number of snapshots in system is 32.

4.If the snapshot space is full, system will send a warning message of space full and the new taken snapshot will replace the oldest snapshot in rotational sequence by executing auto snapshot, but new snapshot can not be taken by manual because system does not know which snapshot VDs can be deleted.

5.5.6 Logical unit

"**Logical unit**" can view the status of attached logical unit number of each VD. The users can also attach LUN to or detach LUN from the existing VDs or snapshot VDs.



larget n VD name: LUN: Permissi	ame: <u>amd</u> <u>peta1 (Size:</u> LUN 1 on: <u>Read write</u>	30 GB, Right: WB)	
+	< <u> </u>	<cancel></cancel>	 +

Below are the steps:

Step 1: Input "Host" name, or fill-in wildcard "*", which means every host can access to this volume.

Step 2: Select target name and existing VD.

Step 3: Choose LUN and permission for the VD to be read only or be able to be read and written.

2. Select "Detach VD" to detach LUN from VD.

Host	Target	LUN Permission	VD name #Sessi	on
	amd <u>Detach L</u> Sure to detac < <u>Y</u> es>	0 Read write UN→ ch LUN? <no></no>	petal	Ø
-Path:/Volume_configuration	Logical unit	· /		
ENTER: 11st available opera	itions.			
INF0: 2008/10/03 16:20:32 INF0: 2008/10/03 16:39:41 INF0: 2008/10/03 16:40:01	CST A snapsho CST VD 1003 H CST VD 1003 H	ot on VD petal ha nas been created. nas been deleted.	s been taken.	

5.6 Enclosure management

"Enclosure management" allows the users to enable SES support, and view the current status of kinds of voltages and temperatures read from the monitored components.

S <mark>ES configuration</mark> Hardware monitor	
Path:/Enclosure management/	-
ISES configuration	

To have the enclosure management work correctly, there are many sensors deployed inside of this iSCSI RAID subsystem for different purposes, such as temperature sensors, voltage sensors, hard disks, fan sensors, power sensors, and LED status. Depending on different hardware characteristics, the sensors have different polling intervals.

Below are the details of polling time intervals:

- 1. Temperature sensors: 1 minute.
- 2. Voltage sensors: 1 minute.
- 3. Hard disk sensors: 10 minutes.
- 4. Fan sensors: 10 seconds . When there are 3 errors consecutively, controller sends ERROR event log.
- 5. Power sensors: 10 seconds, when there are 3 errors consecutively, controller sends ERROR event log.
- 6. LED status: 10 seconds.
5.6.1 SES configuration

Most recent SCSI enclosure products support a protocol called **SCSI Enclosure Services** (SES). The initiator communicates with the enclosure using a specialized set of SCSI commands to access power, cooling, and other non-data characteristics.

To enable or disable the SES support, please select "**SES Configuration**", then press the enter key.

Host	Target	LUN
SES operations =nable SES (e) 		
-Path:/Enclosure management/SES configuration/Path:/Enclosure management/SES configuration/Path://enclosure.texter/ ENTER: list available operations.		
Then, select Host name, and Target name.		

+ 	Host		Target	LUN
+ Host name: Target name:	Enable SES * as		+ 	
+ +	< <u> </u>	Cancel>	+ +	
Path:/Enclosure manage	ment/SES configuration/-			
l <u>enter to select</u>				

The SES client software is also available at the following web site:

SANtools: http://www.santools.com/

5.6.2 Hardware monitor

"Hardware monitor" allows the users to view all the information about the current status of kinds of voltages and temperatures read from the monitored components.

Step 1: Select enclosure





Item	Info
+1.2V:	+1.20 V (min = $+1.14$ V, max = $+1.28$ V)
+5.5V:	+5.34 V (min = $+5.10$ V, max = $+5.35$ V) +5.02 V (min = $+4.80$ V, max = $+5.35$ V)
+12V: +1.8V:	+11.85 V (min = +10.80 V, max = +13.20 V) + 1.81 V (min = + 1.71 V, max = + 1.93 V)
+5V(Backplane): +12V(Backplane):	+5.10 V (min = +4.75 V, max = +5.25 V) +12.08 V (min = +10.80 V, max = +13.20 V)
+3.3V(Backplane):	+3.42 V (min = +3.13 V, max = +3.53 V) +47 A (C) (bust = +A A (C) bigb = +8A A (C))
Onboard SAS Device 1:	+45.5 (C) (hyst = +0.0 (C), high = +80.0 (C)) +(0.0 (C) (hyst = +0.0 (C) high = +80.0 (C))
+-Path:/Enclosure manage	ment/Hardware monitor (Local)/



If "Auto shutdown" has been checked, this iSCSI RAID subsystem will shutdown automatically when monitored voltage or temperature is out of the normal range. For securer system and data protection, please check "Auto Shutdown". To avoid the possibility of system auto shutdown that is triggered by any single short period of high temperature or abnormal voltage, this iSCSI RAID subsystem uses multiple condition judgments for auto shutdown; below are the details about the conditions under which the auto shutdown will be triggered automatically:

1. There are 3 sensors deploayed on the RAID controllers for monitoring temperature; one is on the core processor, another is on the PCI-X bridge, and the final one is on the daughter board. The RAID controller will check each sensor every 30 seconds. When one of these sensor is over high temperature for 3 minutes continuously, auto shutdown will be triggered immediately.

2. The core processor temperature limit is 85 \mathcal{C} . The PCI-X bridge temperature limit is 80 \mathcal{C} . The daughter board temperature limit is 80 \mathcal{C} .

3. If the high temperature situation doesn't last for 3 minutes continuously, the RAID controller will not launch auto shutdown.

5.7 Maintenance

"Maintenance" allows the users to take the following operations that include "System information" to view this iSCSI RAID subsystem main information, "Upgrade" to upgrade this iSCSI RAID subsystem firmware version, "Reset to factory default" to reset all the RAID controller configurations to the factory configurations, "Import and export" to import and export all the RAID controller configurations, "Event log" to view this iSCSI RAID subsystem event logs, and "Reboot and shutdown" to either reboot or shutdown this iSCSI RAID subsystem.

+	
System information	ĺ
Upgrade	L
Reset to factory default	Ĺ
Import	İ.
Event log	i.
Rehaat	i.
	Ŀ
	ł
	ł
	ĺ.
1	i.
1	1
1	ł.
I	l
+-Path:/Maintenance/	ŀ
System information	ŀ
	i
•	÷

5.7.1 System information

"System information" can display this iSCSI RAID subsystem used firmware version information.



5.7.2 Upgrade

"Upgrade" allows the users to upgrade the firmware version.

Step 1: Warn the user to export current system configurations before firmware upgrading processes.

Step 2: Upgrading firmware via Serial Port or FTP.

System information Upgrade Reset t Import Event 1 +	+
**	+
	I.
1	i
	ł
	Į.
	Į.
	L
+-Path:/Maintenance/	Ì

Step 3: Wait the user to load in the firmware file that will be used to upgrade the old firmware version.



Step 4: Run "Send File" of HyperTerminal. Then load in the right firmware file. The protocol must be "**Zmodem**" or "**Zmodem with Crash Recovery**".

Send File	? 🗵
Folder: C:\Docum Filename:	ents and Settings\Edsor Chen\Desktop
C:\Documents an	d Settings\Edsor Chen\Desktop Browse
20.00	
Protocol:	

5.7.3 Reset to factory default

"Reset to factory default" allows the users to reset the RAID controller configurations to the factory default configurations.

System informat Upgrade Reset to facto Import Event log Reboot Shutdown	tion WARNING: The system will reboot automatically after resetting! Sure to reset to factory default?	
-	<y<mark>es> <no></no></y<mark>	
Path:/Maintena Reset to factor	nce/ v default	

Resetting to factory default will also get the password and user name back to the factory default ones. The factory default user name is "**admin**", the password is "**0000**".

5.7.4 Import and export

"**Import**": Import all the RAID controller configurations excluding volume configuration back into this iSCSI RAID subsystem.





For the volume configuration setting, the values are not available in Import to avoid confliction/date-deleting between two RAID controllers. That is, if a RAID controller keeps valuable data in the disks and the user may forget to overwrite it, using import could get all the original configuration back. But if the volume setting is also imported, the user's current data will be overwritten.

5.7.5 Event log

"Event log" can view the event messages.

The event log is displayed in reverse order which means the latest event log is always listed on the first page. The event logs are actually saved in the first four hard disks; each hard disk has one copy of the complete event logs. For one controller, there are four copies of event logs to ensure the users can check event log any time even though there is one or two hard disks fail simultaneously.

Press the enter key to call up a submenu

INF0:	2008/10/23	13:38:58	admin login from serial console via Console
INF0:	2008/10/23	13:35:50	Battery backup feature is disabled.
INF0:	2008/10/23	13:35:49	ECC memory is installed
INF0:	2008/10/23	13:33+Eve	ent log operations+ial console via Console
INF0:	2008/10/23	13:32 C <mark>lear</mark>	event log (c) re is disabled.
INFO:	2008/10/23	13:32 Mute	beeper (m) led
INF0:	2008/10/23	13:31 Filter	r (f)
INF0:	2008/10/23	13:20+	+cess
INFO:	2008/10/23	13:17:14	Firmware upgrade start
INF0:	2008/10/23	13:09:13	admin login from serial console via Console
INF0:	2008/10/23	13:04:24	Battery backup feature is disabled.
Path://	laintenance/E	vent log/	
<u>g :go 1</u>	to begin. 6	<u>to to end.</u>	ESU: exit. ENTER: clear event log

Below are the function descriptions of the event log submenu:

1. Select "Clear event log" to clear event log.

+d ure to clear event log+d ure to clear event log? l console via Console is disabled. d d d d d console via Console d d d d d d d d	INFO:	2008/10/23 13:38: 2008/10/23 13:35:	58 admin lo 50 Battery	ogin from s backup fea	erial console via Console ture is disabled.
ure to clear event log? console via Console is disabled. d <\Ves> <\No> 14 Firmware upgrade start 13 admin login from serial console via Console 24 Battery backup feature is disabled	INF0:	2008/10/23 13:+	Clear ever	nt log	+d
is disabled. d ⟨Yes> <no> 14 Firmware upgrade start 13 admin login from serial console via Console 24 Battery backure is disabled</no>	INF0:	2008/10/23 13:1 5	Gure to clear ev	vent log?	l console via Console
<pre>{Yes> <no> d </no></pre>	INF0:	2008/10/23 13:			is disabled.
<yes> <no> i ss 14 Firmware upgrade start 13 admin login from serial console via Console 24 Battery backup feature is disabled</no></yes>	INF0:	2008/10/23 13:			d
+ss 14 Firmware upgrade start 13 admin login from serial console via Console 24 Battery backup feature is disabled	INF0:	2008/10/23 13:	<¥es>	<no></no>	
14 Firmware upgrade start 13 admin login from serial console via Console 24 Battery backup feature is disabled	INF0:	2008/10/23 13:+			+SS
13 admin login from serial console via Console 24 Battery backup feature is disabled	INF0:	2008/10/23 13:17:	14 Firmware	e upgrade s	tart
24 Battery hackun feature is disahled	INF0:	2008/10/23 13:09:	13 admin lo	ogin from s	erial console via Console
	INF0:	2008/10/23 13:04:	24 Battery	backup fea	ture is disabled.
	INFU: INFO: INFO:	2008/10/23 13:17: 2008/10/23 13:09: 2008/10/23 13:04:	14 Firmward 13 admin lo 24 Battery	e upgrade s ogin from s backup fea	tart erial console ture is disabl
	Select e	<u>event levels to dis</u>	splay		

2. Select "Mute beeper" to stop system alarm.

INF0: INF0:	2008/10/23 2008/10/23	13:38:58 13:35:50	admin Batter	login from s v backup fea	erial console via Conso ture is disabled.	le
INF0:	2008/10/23	13:+	Mute b	eeper	+d	
INFO:	2008/10/23	13: Sure	to mute t	he beeper?	<pre>1 console via Conso</pre>	le
ENFO:	2008/10/23	13:			is disabled.	
ENFO:	2008/10/23	13:			d	
ENFO:	2008/10/23	13:	<yes></yes>	< <u>No</u> >		
ENFO:	2008/10/23	13:+			+SS	
ENFO:	2008/10/23	13:17:14	Firmwa	re upgrade s	tart	
ENFO:	2008/10/23	13:09:13	admin	login from s	erial console via Conso	16
ENFO:	2008/10/23	13:04:24	Batter	y backup fea	ture is disabled.	
						2
ath://	<u>laintenance</u> /	<u>-/-Event log</u>				
elect e	event levels	to display	2			

3. Select "**Filter**" to decide the level of display event log. There are three levels: INFO, WARNING, and ERROR.

INFO:	2008/10/23	13:38:58	admin	login fro	m seria	l console via Console
INFU:	2008/10/23	13:+		Iter	+	is disabled.
INFU:	2008/10/23	13:1	Name		i	
INFU:	2008/10/23	13:+			+	I console via Console
INFU:	2008/10/23	13: 12	LNFU		1	is disabled.
LNFU:	2008/10/23	13: (X)	WHRNING		1	d
LNFU:	2008/10/23	13: (X)	ERRUR		1	
LNF0:	2008/10/23	13:+			+	SS
ENFO:	2008/10/23	13:	< 0K >	<cancel< td=""><td>></td><td></td></cancel<>	>	
ENFO:	2008/10/23	13:+			+	l console via Console
ENFO:	2008/10/23	13:04:24	Batte	ry backup	feature	is disabled.
ath://	laintenance/	vent log	/			
elect e	event levels	to displa	<u>ve</u>			

5.7.6 Reboot

"Reboot" allows the users to safely reboot this iSCSI RAID subsystem.



5.7.7 Shutdown

"**Shutdown**" allows the users to power off this iSCSI RAID subsystem with a safe way to prevent any data loss, because **Shutdown** execution gets this iSCSI RAID subsystem to flush the data from cache to physical disks first, a necessity for data protection.



5.8 Logout

For security reason, "**Logout**" allows the users to logout when there is no user is operating this iSCSI RAID subsystem. To re-login this iSCSI RAID subsystem, please enter the user name and password again.

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Quick installation System configuration ISCSI configuration Volume configuration Enclosure management Maintenance Logoul	Sure to logout <yes> <no></no></yes>
Path:/ Logout	

Appendix A.

iSCSI & iSCSI Initiator

iSCSI Overview

iSCSI or Internet SCSI is a TCP/IP-based protocol that is mainly designed to be used for linking data storage devices over a network and enabling the transfer of data. Thereby, iSCSI offers a mechanism for capturing SCSI commands on an IP network, and carries SCSI commands over IP networks. Since iSCSI fully takes advantage of the ubiquitous TCP/IP-based Ethernet environments, it offers enormous potential for low-cost centralization of storage. Accordingly, if the customers want to make use of existing IT network infrastructure expertise to get into storage networking, iSCSI is an easy approach as well.



The main advantages of iSCSI include consolidated data storage systems, remote <u>backup</u> of <u>data</u> with easiness, more flexible and cost-effective <u>server</u> <u>cluster</u>ing deployments, and replication and recovery. Furthermore, since Microsoft released the first version of the iSCSI Software Initiator in June of 2003, storage over IP has accelerated storage area network adoption strikingly. That's because iSCSI offers the benefits of storage area networks (SANs).

IP SANs allow servers to attach to a number of storage volumes by using iSCSI over TCP/IP networks. IP SANs can scale the storage capacity coming from any type and brand of storage system. In addition, using any type of network (Ethernet, Fast Ethernet, Gigabit Ethernet) and combining operating systems within the SAN network. IP-SANs also include mechanisms for security, data replication, multi-path and high availability.

Finally, storage protocol plays a very important role behind iSCSI. Storage protocol in iSCSI, has "two ends" in the connection. The two ends are the initiator and the target. In iSCSI we call them iSCSI initiator and iSCSI target. The iSCSI initiator requests or initiates any iSCSI communication. It requests all SCSI operations like read or write. An initiator is usually located on the host/server side. The iSCSI target is the storage device itself or an appliance which controls and serves volumes or virtual volumes. The target is the device which performs SCSI commands or bridges it to an attached storage device. iSCSI targets can be disks, tapes, RAID arrays, tape libraries, and etc.

iSCSI Initiator Overview

An **initiator** functions as an iSCSI client. An initiator typically serves the same purpose to a computer as a SCSI bus adapter would, except that instead of physically cabling SCSI devices (like hard drives and tape changers), an iSCSI initiator sends SCSI commands over an IP network. An initiator falls into two broad types:

Software initiator

A software initiator uses code to implement iSCSI. Typically, this happens in a kernel-resident device driver that uses the existing NIC and network stack to emulate SCSI devices for a computer by speaking the iSCSI protocol. Software initiators are available for most mainstream operating systems, and this type is the most common mode of deploying iSCSI on computers.

Hardware initiator

A hardware initiator uses dedicated hardware, typically in combination with software (firmware) running on that hardware, to implement iSCSI. A hardware initiator mitigates the overhead of iSCSI and TCP processing and Ethernet interrupts, and therefore may improve the performance of servers that use iSCSI.

Below is an example about how to setup Microsoft iSCSI:

Below are the steps about how to setup Microsoft iSCSI Initiator. Please visit Microsoft website for latest iSCSI initiator. Microsoft iSCSI Initiator Download Linkage:

http://www.microsoft.com/downloads/details.aspx?familyid=12cb3c1a-15d6-45

85-b385-befd1319f825&displaylang=en

1. Run Microsoft iSCSI Initiator version 2.07.

2. Click "Discovery".

CSI Initiator Propertie	5	2
General Discovery Ta	rgets Persistent Targets Bou	nd Volumes/Devices
S The iSCSI prot identify this init	ocol uses the following informati iator and authenticate targets.	on to uniquely
Initiator Node Name:	iqn. 1991-05. com. microsoft: der	no
To rename the initiator n	ode, click Change.	Change
To authenticate targets specify a CHAP secret.	using CHAP, click Secret to	<u>S</u> ecret
To configure IPSec Tun Tunnel	nel Mode addresses, click	Iunnel
	[]	
	OK Cance	el <u>Apply</u>

3. Click "Add". Input IP address or DNS name of iSCSI storage device.

Type the IP address or DNS nam want to add. Click Advanced to session to the portal.	e and socket number select specific setting	of the portal you s for the discovery
P address or DNS name:	Port:	
192.168.11.229	3260	Advanced

4. Click "**OK**".

Address 192.168.11.2	Port 29 3260	Adapter Default	IP Address Default
Add		<u>R</u> emove	Refresh
NS Servers			
	1	D [Patrak

- 5. Click "Targets"...
- 6. Click "Log On". Check "Enable multi-path" if running MPIO.

General Discovery Targets Persistent Targets	Bound Volumes/Devices
Select a target and click Log On to access the stor target. Click details to see information about the se devices for that target. Targets:	age devices for that ssions, connections and
Name	Status
ion 2004-08 tw.cor.amd: p60c-0000000cd:def	Inactive

7. Click "**Advance...**" if CHAP information is needed.



8. Click "OK". The status would be "Connected".

Local <u>a</u> dapter:	Default
Source <u>I</u> P:	Default
<u>T</u> arget Portal:	Default
CRC / Checksur	n
🔲 <u>D</u> ata digest	Г <u>H</u> eader digest
CHAP helps ens	ure data security by providing authentication between
a target and an i specify the same for this initiator.	nitiator trying to establish a connection. To use it target CHAP secret that was configured on the targe
a target and an i specify the same for this initiator. User name:	nitiator trying to establish a connection. To use it target CHAP secret that was configured on the targe iqn.1991-05.com.microsoft.demo
a target and an i specify the same for this initiator. User name: Target secret:	nitiator trying to establish a connection. To use it target CHAP secret that was configured on the targe iqn.1991-05.com.microsoft.demo
a target and an i specify the same for this initiator. User name: Target secret: E Perform mutu	nitiator trying to establish a connection. To use it target CHAP secret that was configured on the targe iqn. 1991-05.com.microsoft:demo lal authentication

9. Done, it can connect to an iSCSI disk.

	rules	
General Discovery	Targets Persistent Target	ets Bound Volumes/Device
Select a target and c target. Click details to devices for that targe	click Log On to access the o see information about the st.	storage devices for that sessions, connections and
<u>T</u> argets:		
Name		Status

The steps below are to log off iSCSI device:

1. Click "Details".



- 2. Check the Identifier, which will be deleted.
- 3. Click "Log off".
- 4. Done, the iSCSI device log off successfully.

Appendix B.

iSCSI Advanced Applications and Configurations

MPIO and MC/S Overview

Storage area networks unlock storage from the server—storage resources are centralized onto a network, and provisioning and management are simplified. But to thoroughly safeguard your stored resources, each path between server and storage must be protected—a single link between the two is also a single point of failure, and if the link goes down, that server's access to storage is lost. With the appropriate software support, however, the administrator can implement a high availability solution through deployment of multiple paths between servers and storage. Multipathing provides an automatic means of persisting I/O without error, failing over the workload to a redundant path should one path fail.

The Microsoft iSCSI Software Initiator provides sophisticated high availability solutions through:

1. Multiple Connections per Session (MC/S)

MC/S allows multiple TCP/IP connections between the initiator (server) and target (storage array) during the same iSCSI session, either on the same or a different physical link. This allows load balancing and failover over among multiple network interface cards (NICs).

2. Microsoft MPIO support

Microsoft MPIO support allows the initiator to log in multiple sessions to

the same target, enabling load balancing and failover among multiple NICs and iSCSI Host Bus Adapters (HBAs).

Both methods support failover only (no load balancing, all other paths on standby), as well as a failover plus I/O load balancing. Load balancing policies include:

A. Round robin (all paths active, I/O sent in round robin fashion).

- B. Round robin with a subset of active paths.
- C. Weighted path, in which I/O is distributed to the path with the lowest assigned weight.
- D. Least Queue Depth, in which I/O is sent on the path with the shortest I/O queue. This is only available for MC/S.

MPIO and MC/S setup instructions

Below are steps to setup MPIO. There are 2 kinds of scenarios for MPIO and MC/S. We suggest use scenario 2 for better performance.



1. Create a RG (RAID group) with RAID 5, using 3 HDDs.

/ Volume con	figuration / R.	AID group					6	8	4	*	Ø
No.	Name	Total (GB) 🗸	Free (GB) 💌	#PD	#VD	Status	Heal	th		RAI	D
1	test	1862	1862	3	0	Online	Goo	d		RAID	5

2. Create a VD (virtual disk) by using RAID 5 RG (RAID group).

/ Volur	ne conf	iguratior	n / Virt	tual disk			-					0 6) %	0
No.	Name	Size (GB) 🗸	Right	Priority	Bg rate	Status	Health	R %	RAID	#LUN	Snapshot (GB)	space	#Snap	shot	RG name
1	TEST	30	WB	HI	4	Initiating	Optimal	58	RAID 5	0	0/0		0		test

3. Run Microsoft iSCSI initiator and check the Initiator Node Name.



4. Attaching LUN to R5 VD (virtual disk). Input the Initiator Node Name in host field.

			0	0	0			0
/ Volume configuration / Virtual disk ,	/ Attach		111	6	-	4	*	0
VD:	TEST (30GB)							
Host (iSCSI node name) :	iqn.1991-05.com.microsft:demo							
LUN:	- 0 -							
Permission :	O Read-only							
		< < Back			C	onfin	m	
	_	a a Duck		_		Or min		

5. The volume config setting is done.

/ Volume configuration / Logical unit			≣ 6	8 4 5 0
Host	LUN	Permission	VD name	#Session
iqn.1991-05.com.microsft:demo	0	Read-write	TEST	0
				Attach .

6. Check iSCSI settings. The IP address of iSCSI data port 1 is 192.168.11.229, port 2 is 192.168.12.229 for example.

Name	LAG	LAG No	DHCP	IP address	Netmask	Gateway	Jumbo frame	MAC address	Link
LAN1	No	N/A	No	192.168.11.229	255.255.255.0	192.168.11.254	Disabled	00:13:78:a8:07:58	Dowr
LAN2	No	N/A	No	192.168.12.229	255.255.255.0	192.168.12.254	Disabled	00:13:78:a8:07:59	Dowr

7. Add Target Portals on Microsoft iSCSI initiator 2.07.

Address	Port	Adapter	IP Address
Add SNS Servers	<u>}</u>	<u>B</u> emove	R <u>e</u> fresh
Name			
Add		Remove	Refresh

8. Input the IP address of iSCSI data port 1 (192.168.11.229 as mentioned in previous page).

CSI Initiator Properties			2
dd Target Portal			×
Type the IP address or DNS name a want to add. Click Advanced to sele session to the portal.	nd socket nu ct specific se	umber of the ettings for th	portal you le discovery
IP address or DNS name:	Port:		
192.168.11.229	3260		Advanced
		ок	Cancel
		M	
iSNS Servers			
Name			
Add	lemove	1 B	efresh
	100	1	490

9. Add second Target Portals on Microsoft iSCSI initiator 2.07.

Address 192.168.11.22	Port 29 3260	Adapter Default	IP Address Default
SNS Servers		<u>R</u> emove	R <u>e</u> fresh
Name			
Add	1	Remove	Refresh

10. Input the IP address of iSCSI data port 2 (192.168.12.229 as mentioned in previous page).

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CSI Initiator Properties		X
Type the IP address or DNS na want to add. Click Advanced to session to the portal.	me and socket number of t o select specific settings for	he portal you the discovery
IP address or DNS name: 192.168.12.229	Port:	<u>A</u> dvanced
	ОК	Cancel
iSNS Servers		
- Tomo		
	- 1	
	Hemove	Refresh

11. The initiator setting is done.

General	Discovery	Targets	Persistent Targets	Bound Volumes/Device
[Iarg	et Portals —			
Ad	dress	Port	Adapter	IP Address
19	2.168.12.229	3260 3260	Default Default	Default Default
	Add		<u>R</u> emove	R <u>e</u> fresh
_iSNS	Servers			
	A <u>d</u> d		Remove	Re <u>f</u> resh

12. Log on.

			2
General Discovery	Targets Persistent Tar	gets Bound Volumes/Dev	ices
Select a target and o target. Click details t devices for that targe	click Log On to access th o see information about th et.	e storage devices for that le sessions, connections ar	nd
<u>T</u> argets:			
Name		Status	
ign.2004-08.tw.cor	n.amo;p60c-b3ca0001e;	def Inactive	
	Details L	og On	

13. Enable "Enable multi-path" checkbox. Then click "Advanced".

CSI Initiator Prope	rties		
og On to Target			×
Target name:			
iqn.2004-08.tw.com	amd:p60c-b3ca0001	e:default-target	
Automatically rest Enable multi-path Only select this (ore this connection w	hen the system b	oots eady installed
on your compute <u>Advanced</u>	r.	ок	Cancel
	<u>D</u> etails	<u>L</u> og On	R <u>e</u> fresh
	OK	Cancel	Apply

14. Select Target Portal to iSCSI data port 1 (192.168.11.229). Then click "OK"

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Connect by using	1
Local <u>a</u> dapter:	Microsoft iSCSI Initiator
Source <u>I</u> P:	192.168.11.34
<u>T</u> arget Portal:	192.168.11.229 / 3260
CRC / Checksun	1
🗂 Data digest	- Header digest
CHAP logon	information
CHAP helps ensi	ure data security by providing authentication between
a target and an i specify the same for this initiator.	target CHAP secret that was configured on the target
a target and an ii specify the same for this initiator.	Inducin (ping to extabilish a commencion, 10 use it target CHAP secret that was configured on the target [qn.1991-05.com microsoft:qa-chrischou3
a target and an in specify the same for this initiator. User name: Target secret:	Interior (print to extension a connection. To use it target CHAP secret that was configured on the target in 1991-05, com microsoft qa-chrischou3
a target and an i specify the same for this initiator. User name: Target <u>s</u> ecret: E Perform mutu	Interior (ping to examine a connection. To use it target CHAP secret that was configured on the target [iqn:1991-05.com.microsoft:qa-chrischou3]

15. Log on "Enable multi-path" again.

	es	and the second second second second second second second second second second second second second second second
eneral Discovery T	argets Persistent Targe	ets Bound Volumes/De
Select a target and clic arget. Click details to s levices for that target.	k Log On to access the see information about the	storage devices for that sessions, connections a
Largets: Name		Status
iqn.2004-08.tw.com.a	umd:p60c-b3ca0001e:de	ef Connected
	Details	g On

16. Enable "Enable multi-path" checkbox. Then click "Advanced...".

CSI Initiator Proper og Op to Target	ties		×
Target name:			
iqn.2004-08.tw.com.	amd:p60c-b3ca	0001e:default-targe	et
 Automatically rest Enable multi-pathi Only select this o on your computer 	ore this connecti ption if iSCSI mu r.	on when the system Iti-path software is	n boots already installed
Advanced	~	ОК	Cancel
	<u>D</u> etails	Log On	R <u>e</u> fresh
	01	< Cancel	

17. Select Target Portal to iSCSI data port 2 (192.168.12.229). Then select "OK"

Lonnect bu using	2
connect by daing	
Local <u>a</u> dapter:	Microsoft iSCSI Initiator
Source <u>I</u> P:	192.168.12.34
Target Portal:	192.168.12.229 / 3260
CRC / Checksur	n
Data digest	🥅 <u>H</u> eader digest
_	
CHAP helps ens a target and an i specify the same for this initiator.	ure data security by providing authentication between initiator trying to establish a connection. To use it rarget CHAP secret that was configured on the target
CHAP helps ens a target and an i specify the same for this initiator.	ure data security by providing authentication between initiator trying to establish a connection. To use it target CHAP secret that was configured on the target iqn.1991-05.com.microsoft:qa-chrischou3
CHAP helps ens a target and an i specify the same for this initiator. User name: Target secret:	ure data security by providing authentication between nitiator trying to establish a connection. To use it target CHAP secret that was configured on the target iqn.1991-05.com.microsoft:qa-chrischou3
CHAP helps ens a target and an i specify the same for this initiator. User name: Target gecret:	ure data security by providing authentication between nitiator trying to establish a connection. To use it target CHAP secret that was configured on the target [iqn.1991-05.com.microsoft:qa-chrischou3] al authentication

18. iSCSI device is connected. Click "Details".

General	Discovery	Targets	Persister	nt Targets	Bound Ve	olumes/Devi	ce
Select target. device:	a target and Click details t s for that targ	click Log (o see info et.	' On to acce rmation ab	ess the stor out the ses	age devici ssions, con	es for that inections and	Ч
Iarget	s:						_
Name)				Status		

19. Click "Device" tab, then click "Advanced".

rget Pro	perties		
essions	Devices	Properties	
These ar Advance multipati	re the dev ed to view h policy.	ices exposed by iSCSI sess information about the devi	sions to the target. Click ice and configure the
	Name		MPIO Capable
iSCSI F	AID	SCSI Disk Device	Multi-Path Support
ISCSI F	AID	SCSI Disk Device	Multi-Path Support
<u> </u>			Advanced
		ок	Cancel Apply

20. Click "MPIO" tab, select "Load Balance Policy" to "Round Robin".

Fail Over O	nly			-
Fail Over O Round Robi	nly in			
Round Robi Least Queu	in With Subse ie Depth	ət	1	45
Weighted P Least Block	aths s			
	24.			
his <u>d</u> evice l	has the follo	wing paths:		
his <u>d</u> evice l Path Id	has the follo	wing paths:	Weight	Session ID
his <u>d</u> evice l Path Id 0x20000	has the follo	wing paths: Type Active	Weight	Session ID ffffffff880e87c-40000
his <u>d</u> evice l Path Id 0x20000 0x20001	has the follow Status Conne Conne	wing paths: Type Active Standby	Weight n/a n/a	Session ID ffffffff880e87c-40000 ffffffff880e87c-40000
his <u>d</u> evice <u>Path Id</u> 0x20000 0x20001	has the follow Status Conne Conne	wing paths: Type Active Standby	Weight n/a n/a	Session ID fffffff880e87c-40000 fffffff880e87c-40000
his <u>d</u> evice l Path Id 0×20000 0×20001	has the follow Status Conne Conne	wing paths: Type Active Standby	Weight n/a n/a	Session ID ffffffff880e87c-40000 ffffffff880e87c-40000
is <u>d</u> evice Path Id)×20000)×20001	has the follo Status Conne Conne	wing paths: Type Active Standby	Weight n/a n/a	Session ID ffffffff880e87c-4000 ffffffff880e87c-4000
nis <u>d</u> evice Path Id 0x20000 0x20001	has the follow Status Conne Conne	wing paths: Type Active Standby	Weight n/a n/a	Session ID fffffff880e87c-40000 ffffffff880e87c-40000
his <u>d</u> evice Path Id 0x20000 0x20001	has the follow Status Conne Conne	wing paths: Type Active Standby	Weight n/a n/a	Session ID ffffffff880e87c-40000 fffffffff880e87c-40000

21. Click "Apply".

vice Detail:	5			
eneral MP	ю			
oad Balanc	e Policy :			
Round Rob	in			
Descriptio	n ———			
The roun	d robin policy	y attempts	to evenly dis	stribute incoming
requests	to all proces	sing paths.		
This <u>d</u> evice	has the follo	wing paths	:	
Path Id	Status	Туре	Weight	Session ID
0x20000	Conne	Active	n/a	ffffffff880e87c-400001
0.20001	Configures	ACUVE	iya	11111110008070-400001
a (
			De	tails <u>E</u> dit
			ок	Cancel Apply

22. Run "**Device Manage**" in Windows. Make sure MPIO device is available. Then the disk can be tested about performance by IOMETER.



The **MC/S** setup instructions are very similar to MPIO, detail steps are in the following figures. For the target side setting, the steps are exactly the same as MPIO. Please refer to **Figure F.1 to Figure F.9**.

- 1. Create a RG (RAID group) with RAID 5, using 3 HDDs.
- 2. Create a VD (virtual disk) by using RAID 5 RG (RAID group).
- 3. Run Microsoft iSCSI initiator 2.07 and check the Initiator Node Name.
- 4. Attaching LUN to R5 VD (virtual disk). Input the Initiator Node Name in Host field.
- 5. The volume config setting is done.
- 6. Check iSCSI settings. The IP address of iSCSI data port 1 is 192.168.11.229, port 2 is 192.168.12.229 for example.
- 7. Add Target Portals on Microsoft iSCSI initiator 2.07.
- Input the IP address of iSCSI data port 1 (192.168.11.229 as mentioned in previous pages). For MC/S, there is only ONE "Target Portals" in the "Discovery" tab.

Ad 19	dress 2 168 11 229	Port 3260	Adapter Default	Default
10.	2.100.11.220	0200	Dordan	Dordak
[Add		<u>R</u> emove	R <u>e</u> fresh
100010	2			·
-isus	Servers			
_				
Na	me			

9. Log on.

CSI Initiator Proper	ties		
General Discovery	Targets Persistent Targe	ets Bound Volum	es/Device:
Select a target and c target. Click details to devices for that targe	ick Log On to access the see information about the t	storage devices fo sessions, connec	or that tions and
Largets: Name	ama	Status	
19/1/2002-08.1W.COM	- and page-bacauure de	n mactive	
J	Details Lo	10n B	efresh
	OK	Cancel	Anniu

10. Then click "Advanced...".

Software Operation Manual

CSI Initiator Propertie	5		
og On to Target			×
Target name:			
iqn.2004-08.tw.com.am	d:p60c-b3ca0	001e:default-targe	t
Automatically restore	this connectio	n when the system	boots
Enable multi-path			
Only select this optio	n if iSCSI mult	i-path software is a	lready installed
on your compacer.			
Advanced		ОК	Cancel
- <u>12</u>			
	<u>D</u> etails	<u>L</u> og On	Refresh
	OK	Cancel	Apply

11. Select set Local Adapter, Source IP, and Target Portal to iSCSI data port 1 (192.168.11.229). Then click "OK".

Source IP:	192 168 11 34
Tarrat Dastal	
<u>raiger foltai</u> .	
CRC / Checksur	n;
Data digest	☐ <u>H</u> eader digest
CHAP helps ens a target and an i specify the same for this initiator.	are data security by providing authentication between nitiator triping to establish a connection. To use it target CHAP secret that was configured on the target [ign 1991-05 com microsoft ga-chrischou 3]
U ser marrie:	India 1997-09-continue de du la consectidad
Target <u>s</u> ecret:	1
- Farget <u>s</u> ecret: 	al authentication

12. After connected, click "Details", then in the "Session" tab, click "Connections".

Select a	target and	click Log On to acces	ss the storage de	vices for that
target. C devices	lick details for that targ	to see information abo jet.	ut the sessions, o	connections and
_				
Largets	r.		[Charles	1
lign.20	04-08.tw.co	m. ama:p60c-b3ca000	D1e:def Conne	s ected
		Details	Log On]	Refresh
		Details	<u>L</u> og On	<u>Re</u> fresh

13. Choose "Round Robin" for Load Balance Policy

Software Operation Manual

Round Robin					~
Fail Over Only					
Least Queue Dep Weighted Paths	ιth ັ				
This session has t	he following <u>c</u>	onnections : Status	Туре	Weight	Conn
This session has t Source Portal 192. 168. 10	he following <u>c</u> Target 192.168	onnections : Status Conne	Type Active	Weight n/a	Conn 0x3

14. "Add" Source Portal for the iSCSI data port 2(192.168.12.229)

onnections	- B				
Round Robin	olicy:				~
Description The round ro requests to	obin policy atte all processing	empts to ev paths.	enly distribu	ute incoming	
This session ha	s the following Target	g <u>c</u> onnection Status	s: Type	Weight	Conne
This session ha Source P 192.168.1	s the following Target 192.168	g <u>c</u> onnection Status Conne	is : Type Active	Weight n/a	Conne 0x3
This session ha	s the following Target 192.168	g connection Status Conne	is : Type Active	Weight n/a	Conne 0x3

Add Connection	. 🖂
Target name:	
iqn.2004-08.tw.com. amd:p6	0c-000a00021:default-target
Advanced	OK Cancel

15. Select Local adapter, Source IP, and Target Portal to iSCSI data port 2 (192.168.12.229). Then select "**OK**".

I JURIPIECE LIQ UNITI	
Local <u>a</u> dapter:	Microsoft iSCSI Initiator
Source <u>I</u> P:	192.168.12.34
Target Portal:	192.168.12.229 / 3260
CRC / Checksur	n
🔲 Data digest	🗖 <u>H</u> eader digest
CHAP helps ens a target and an i specify the same for this initiator.	ure data security by providing authentication between nitiator trying to establish a connection. To use it a target CHAP secret that was configured on the target
CHAP helps ens a target and an i specify the same for this initiator.	ure data security by providing authentication between nitiator trying to establish a connection. To use it target CHAP secret that was configured on the target iqn.1991-05.com.microsoft.qa-chrischou3
CHAP helps ens a target and an i specify the same for this initiator. User name: Target secret:	ure data security by providing authentication between nitiator trying to establish a connection. To use it e target CHAP secret that was configured on the target iqn.1991-05.com.microsoft:qa-chrischou3
CHAP helps ens a target and an i specify the same for this initiator. User name: Target secret:	ure data security by providing authentication between nitiator trying to establish a connection. To use it target CHAP secret that was configured on the target ign.1991-05.com.microsoft:ga-chrischou3

16. The MC/S setting is done.

Trunking / LCAP Overview

LACP: Link Aggregation Control Protocol IEEE specification (802.3ad) Bundle several physical ports together to form a single logical channel Allows a switch to negotiate Trunking: Similar to 802.3ad Protocol-independent

Trunking / LCAP Setup Instructions

Below are the steps to setup Trunking and LACP. There are 2 kinds of scenarios for Trunking/LACP.



Network diagram of Trunking/LACP.

1. Create a RG (RAID group) with RAID 5, using 3 HDDs.

/ Volume con	figuration / R.	AID group	_				8	6 E	4	*	Ø
No.	Name	Total (GB) 💌	Free (GB) 🛩	#PD	#VD	Status	н	ealth		RAI	[D
1	test	1862	1862	3	0	Online	(Good		RAID	5

2. Create a VD (virtual disk) by using the RAID 5 RG (RAID group).

/ Volur	me conf	figuration	n / Virt	tual disk									0 0
No.	Name	Size (GB) 🗸	Right	Priority	Bg rate	Status	Health	R %	RAID	#LUN	Snapshot space	#Snapshot	RG name
1	TEST	30	WB	HI	4	Initiating	Optimal	58	RAID 5	0	0/0	0	test

3. Run Microsoft iSCSI initiator 2.07 and check the Initiator Node Name.

General	Discovery	Targets	Persistent T	argets B	ound Volume	es/Device:
•	The iSCSI j identify this	protocol u initiator a	ises the follow nd authentic	ving inform ate targets.	ation to uniq	uely
Initiator	Node Name:	iqn.'	1991-05.com	.microsoft: c	qa-chrischou	đ.
To rena	me the initiato	or node, c	lick Change.		<u>C</u> ha	ange
To auth specify	enticate targe a CHAP secre	ets using l et.	CHAP, click 9	Secret to	<u></u>	ecret
To conf Tunnel.	igure IPSec T	unnel Ma	ode addresse	s, click	L	unnel

4. Attaching LUN to R5 VD (virtual disk). Input the Initiator Node Name in the Host field.

_			0	0	0		0	0
/ Volume configuration / Virtual disl	< / Attach		1	6	÷	2	*	0
VD :	TEST (30GB)							
Host (iSCSI node name) :	iqn.1991-05.com.microsft:demo							
LUN:	-0- 💌							
Permission :	O Read-only Read-write							
								_
		<< Back			C	Confir	m	0

5. Done, please check the settings.

Host	LUN	Permission	VD name	#Session
iqn.1991-05.com.microsft:demo	0	Read-write	TEST	0

6. Check iSCSI settings. The IP address of iSCSI data port 1 is 192.168.11.229. Using port 1 as Trunking or LACP. Click the blue square in "Aggregation" field to set Trunking or LACP.

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/ iscs	I conf	iguratio	n / NIC	;	_	_			+	4	*	0
Name	LAG	LAG No	DHCP	IP address	Netmask	Gateway	Jumbo frame	м	AC a	ddress		Link
LAN1	No	N/A	No	192.168.11.229	255.255.255.0	192.168.11.254	Disabled	00:1	3:78:	a8:07	58	Down
LAN2	No	N/A	No	192.168.12.229	255.255.255.0	192.168.12.254	Disabled	00:1	3:78:	a8:07	:59	Down

Aggregation •

7. Select "Trunking". If LACP is needed..

Aggregation :	● Trunking OLACP			
Address :	192.168.11.229			
Mask :	255.255.255.0			
Gateway :	192.168.11.254			
NIC :	🗹 LAN1 🔽 LAN2			

8. Now, the setting is in Trunking mode.

Name	LAG	LAG No	DHCP	IP address	Netmask	Gateway	Jumbo frame	MAC address	Link
LAN1	Trunking	0	No	192.168.11.229	255.255.255.0	192.168.11.254	Disabled	00:13:78:a8:07:58	Dowr
LAN2	Trunking	0	No	192.168.11.229	255.255.255.0	192.168.11.254	Disabled	00:13:78:a8:07:58	Dowr

9. Enable switch Trunking function of port 21 and 23. Below is an example of Dell PowerConnect 5324.
| A Dell OpenManage Switch A | dministrator - Microsoft Internet Evolorer | |
|---|--|---|
| File Edit View Favorites | Tools Help | |
| 🔇 Back 🔹 🕘 🗸 🖹 😰 🏠 | · · · · · · · · · · · · · · · · · | |
| Address Address Address | 52/ | 💌 🋃 Go 🛛 Links 🎇 |
| Dell OpenManage Switc | h Administrator | Support Help About Log Out |
| DELL | | PowerConnect 5324 |
| 192.168.10.252 | LAG Membership | |
| Home
System
Witch
Horts
Address Tables
GARP
Spanning Tree
VLAN
Link Agregation
LACP Param
LACP Param
LACP Param
Statistics/RMON
Cuality of Service | LAG Membership | Print Refresh 0 10 11 12 13 14 15 16 17 19 20 21 22 23 24 0 10 11 1 1 1 1 1 Apply Chapmes Toutted char Toutted char 1 |
| javascript:preSubmit(); | | 🖉 🖉 🖉 Trusted sites |

10. Select "LACP". If LACP is needed,

' iSCSI configuration /	NIC / Aggregation		-	6	-	4	*	0
Aggregation :	O Trunking O LACP							
Address :	192.168.11.229							
Mask :	255.255.255.0							
Gateway :	192.168.11.254							
NIC :	LAN1 LAN2							
		<< Back			C	onfirr	n	

11. Now, the setting is LACP mode.

Name	LAG	LAG No	DHCP	IP address	Netmask	Gateway	Jumbo frame	MAC address	Link
LAN1	LACP	0	No	192.168.11.229	255.255.255.0	192.168.11.254	Disabled	00:13:78:a8:07:58	Down
LAN2	LACP	0	No	192.168.11.229	255.255.255.0	192.168.11.254	Disabled	00:13:78:a8:07:58	Down

12. Enable switch LACP function of port 21 and 23. Below is an example of Dell PowerConnect 5324.

<u>Eile E</u> dit <u>V</u> iew F <u>a</u> vorites <u>T</u> ools	Help sarch 🛠 Favorites 🚱 🙆 🗞 🔙 🖵 🎎	
	əarch 👷 Favorites 🕢 😥 - 🍹 🚍 🛄 🚉	
🔇 Back 🔹 🕘 👻 🖹 😰 🏠 🔎 Se		
Address Address http://192.168.10.252/		▼ 🗦 Go Links »
Dell OpenManage Switch Adm	inistrator	Support Help About Log Out
D¢LL		PowerConnect 5324
192.168.10.252 LAG	Membership	
Home System System System Network Securit Ports Address Tables GARP Spanning Tree VLAN Link Aggregation LACP Param LAC Membre Multicast Suppo Statistics/RMON Quality of Service	C Membership	Print Refresh 13 14 15 16 17 18 10 20 21 22 23 24 1 1 1 1 1 1 1 anges

13. Add Target Portals in Microsoft iSCSI initiator 2.07.

Address	Port	Adapter	IP Address
1 1 1 1 1 1		<u>R</u> emove	R <u>e</u> fresh
iSNS Servers			
 bbA	1	Remove	Refresh

14. Input the IP address of iSCSI data port 1 (192.168.11.229 as mentioned in previous page).

CSI Initiator Properties		
dd Target Portal		×
Type the IP address or DNS nam want to add. Click Advanced to s session to the portal.	e and socket number of the portal you select specific settings for the discovery	
IP address or DNS name:	Port:	
192.168.11.229	3260 Advanced	
	OK Cancel	
	45	
iSNS Servers		
Name		1
	Parray Defeat	
	Helliove Hellesu	
	OK Cancel Ann	lu:
		20

15. Click "Targets" to log on.

Iarg	et Portals	1			
Ad	dress 2.168.11.22	Port 29 3260	Adapter Default	IP Address Default	
	Add		<u>R</u> emove	Refresh	
Na	Servers -]
	Add		Remove	Refresh	

16. Log on.

CSI Initiator P	roperties		
General Disco	very Targets Persistent Ta	argets Bound Vo	olumes/Devices
Select a target target. Click de devices for that	and click Log On to access t tails to see information about I t target.	he storage device the sessions, con	es for that nections and
<u>T</u> argets:			
Name		Status	
	<u>D</u> etails	Log On	R <u>e</u> fresh
	ОК	Cancel	Apply

17. Click "Advanced".

SCSI Initiator Prope	rties		2
Log On to Target			×
Target name:			
ign.2004-08.tw.com	amo::p60c-b3ca000	1e:default-target	
Automatically res	tore this connection v	when the system bo	oots
Enable multi-path			
Only select this on your compute	option if iSCSI multi-pa er.	ath software is alre	ady installed
Advanced	[ок	Cancel
1.	f6	1	
	<u>D</u> etails	<u>L</u> og On	Refresh
	OK	Cancel	Apply

18. Select Target Portal to iSCSI data port 1 (192.168.11.229). Then click "OK".

Connect by using	9
Local <u>a</u> dapter:	Microsoft iSCSI Initiator
Source <u>I</u> P:	192.168.11.34
<u>T</u> arget Portal:	192.168.11.229 / 3260
CRC / Checksur	n
Data digest	I <u>H</u> eader digest
CHAP logon	information
CHAP logon CHAP helps ens a target and an i specify the same for this initiator.	information ure data security by providing authentication between nitiator trying to establish a connection. To use it target CHAP secret that was configured on the target
CHAP logon CHAP helps ens a target and an specify the same for this initiator. User name:	information ure data security by providing authentication between inition rujing to establish a connection. To use it starget CHAP secret that was configured on the target ign.1991-05.com.microsoft:qa-chrischou3
CHAP logon CHAP helps ens a target and an i specify the same for this initiator. User name: Target <u>s</u> ecret:	information — ure data security by providing authentication between initiator trying to establish a connection. To use it a target CHAP secret that was configured on the target iqn.1991-05.com.microsoft:qa-chrischou3
CHAP logon CHAP helps ens a target and an i specify the same for this initiator. User name: Target secret: E Eerform mutt	information ure data security by providing authentication between initiator trying to establish a connection. To use it a target CHAP secret that was configured on the target iqn.1991-05.com.microsoft.qa-chrischou3 ral authentication

19. The setting is completed.

CSI Initiator Properties			
General Discovery Targets Pers	sistent Targets	Bound V	olumes/Device:
Select a target and click Log On to target. Click details to see informatic devices for that target.	access the sto on about the so	orage device essions, con	es for that inections and
Largets: Name		Status	
ign.2004-08.tw.com.a.md:p60c-b3	3ca0001e:def.	Connecti	ed
Details		<u></u>	R <u>e</u> fresh
	סוג	Cancel	Apolu

20. Run "Computer Management" in Windows. Make sure the disks are available. Then the disks can be tested for performance by IOMETER.

Software Operation Manual

📮 Computer Management			_			
📃 Eile Action View Window H	elp					<u>_8×</u>
← → € 10 2 € × ≦	' 🖻 🔍 😼					
Computer Management (Local) System Tools System Tools System Tools System Folders Computer System Folders Computer System Computer Computer	Volume (E:) QA TOOLS (F:) WINDOWS2003 (D:)	Layout Partition Partition Partition	Type Basic Basic Basic	File System NTF5 FAT32 FAT32	Status Healthy Healthy Healthy (Boot)	Capacity 19.53 GB 15.88 GB 19.52 GB
Constant of the set of the s	Windows 2000 (C:)	Partition	Basic	NTFS	Healthy (System)	19.53 GB
1775 3 47 52.50 379 8679 882 4932 100	CPDisk 0 Basic 74.50 GB Online	i ndows : .53 GB N althy (Sy	WINI 19.53 Healt	DOW: 3 GB F hy (Br Healt	GBN 15.90 GB Healthy	
	Oisk 1 Basic 9.6 GB Online	i GB allocated	∑}			
	Unallocated Prim.	ary partition	Ext	ended partitio	n 📘 Logical drive	

Appendix C

Firmware Upgrading & SNMP

SNMP Overview

(Simple Network Management Protocol) A widely used network monitoring and control protocol. Data are passed from SNMP agents, which are hardware and/or software processes reporting activity in each network device (hub, router, bridge, etc.) to the workstation console used to oversee the network. The agents return information contained in a MIB (Management Information Base), which is a data structure that defines what is obtainable from the device and what can be controlled (turned off, on, etc.). Originating in the Unix community, SNMP has become widely used on all major platforms.

The Definition SNMP



SNMP Installation

Step 1: Installing the SNMP Manager software on the client server.

Step 2: Placing a copy of the management information base (MIB) in a directory which is accessible to the SNMP management application

Step 3: Compiling the MIB description file with the SNMP management

application

Below is one example of PowerSNMP working with this iSCSI RAID subsystem 's SNMP configurations:

1. Set SNMP Trap address for the AL-8161i

192.168.1.105:162	
public	
me 1: 192.168.1.105 me 2:	
192.168.1.105 10514 Local0 ■ ☑INFO ☑WARNING ☑ERROR	
	MINFO WWARNING MERROR me 1: 192.168.1.105 me 2: MINFO WWARNING MERROR 192.168.1.105 10514 Local0 ↓ MINFO WWARNING MERROR MINFO WWARNING MERROR MINFO WWARNING MERROR

2. PowerSNMP detects a VD (Virtual Disk) has been deleted

1 新增頁紙 Fittp://192.168.1.100/ 1 PowerTCP SNMP Agent	
System Info sysDescr. [vircion 4.433 Portmaster 2000, v43b sysDiject]D. [1.2.3.4.5.6.7.8.9.10 secondart: [Fiona DuathWrite]e	Listening on Pott 161 Stop Agent
AL-3161 Quick installation	Ig Detination: 255:255:255 Send Source Tree
Status Deno no port 162 Status Deno no port 162 Status Stop Manager Available Agents sysDescr 192.168.1.105 sysDescr 192.168.1.105 sysDescr 192.168.1.100 sysDescr	Y Trap Log Trap received @ 2008/9/11 T+F 01:35:38 from host 192.1681.100 1.36.1.41.22274.180001NF0 2008/09/11 13:35:47 CST Set the imapricit appear of VD test to 1600197 MB. 2.34.01 The is Value 0 1.2.34.11 The is Value 0 1.2.34.11 The is Value 0 1.2.34.21 The is Value 0 1.2.34.21 The is Value 0 1.2.34.21 The is Value 1 1.2.34.22 The is Value 1 1.2.34.21 The is Value 1 1.2.34.21 The is Value 1 1.2.34.21 The is Value 1 1.2.34.22 The is Value 1 1.2.34.22 The is Value 1 1.2.34.21 The is Value 1 1.2.34.22 The is Value 1 </td

MIB Compilation and Definition File creation

Before the SNMP manager application accesses the RAID controller, user needs to integrate the MIB into the SNMP management application's database of events and status indicator codes. This process is known as compiling the MIB into the SNMP application. This process is highly vendor-specific and should be well-covered in the User's Guide of your SNMP application.

Upgrading Firmware

Since the RAID controller features flash firmware, it is not necessary to change the hardware flash chip in order to upgrade the RAID firmware. The user can simply re-program the firmware through the RS-232 port or 10/100 Ethernet port.

Upgrading Firmware Through Web Browser Management

1. To upgrade the RAID subsystem firmware, move the mouse cursor to **"Maintenance"**, then click **"Upgrade"**



2. Click Browse. Look in the location where the new firmware is located. Select the file "Firmware" Then click "**open**".

3. Click the **"Confirm."** Then a warning dialogue box as below will pop up. Click **"OK"** to continue the firmware upgrading process.

- 4. The new firmware file is being uploaded to the RAID subsystem.
- 5. The firmware version is being upgraded.

<u>AL-6120i</u>	/ Maintenance / Upgrade	
Quick install	Progra	amming
System config	110910	5296
iSCSI config		5270
Volume config		
Enclosure management		
Maintenance		
Upgrade		
Info		
Reset to default		
Config import & export		
Shutdown		
Logout		

6. When the upgrading is completed, there will be a dialogue box as below.

Microso	ft Internet Explorer 🛛 👔
<u>.</u>	Upgrade successfully! Please reboot system to make the upgraded firmware work

Appendix D

Installation Steps for Greater Than 2TB Volume

Overview:

This iSCSI RAID subsystem is capable of supporting greater than 2TB volumes. When connecting the RAID controller to 64bit OS installed host/server, the host/server is inherently capable for greater than 2TB volumes from the 64bit address. On the other side, if the host/server is installed with 32bit OS, the user has to change the block size to 1KB, 2KB or 4KB to support volumes up to 4TB, 8TB or 16TB, for the 32bit host/server doesn't support LBA (Logical Block Addressing) 64bit. But if the 32bi OS supports LBA 64bit, for example, Windows Serve 2003 with SP1, Linux kernel 2.6.x, or FreeBSD 5.2.1, there is no need to make use of changing the block size mentioned above to support greater than 2TB volumes. For detail installation steps, please refer to following steps below:

Step A: configure your target

1. Create a RG (RAID group) which is large than 2TB .

No.	Name	Total	Free (GB) V	#PD	#VD	Status	Health	RAID
1	TEST	2793	2793	3	0	Online	Good	RAID 0

2. Create a VD (virtual disk).



3. Setup capacity, stripe height, and block size for VD (virtual disk).



4. When the capacity (GB) is greater than 2TB, there will be a dialogue box as below pops up capacity.

Microsof	t Internet Explorer 🔀
?	LBA 64 support? Choose OK if using OS such as Windows 64 bits, Windows Server 2003 SP1, Linux kernel 2.6.x, FreeBSD 5.2.1 or latter. Choose Cancel. It will change the sector size to 4K. The maximun capacity is up to 16 TB. This volume can not be Dynamic Disk.
	Cancel

/ Volur	ne confi	iguration	/ Virtu	ual disk							0 0 E 6		0
No.	Name	Size	Right	Priority	Bg rate	Status	Health	R %	RAID	#LUN	Snapshot space	#Snapshot	RG name
1	test	2793	WB	HI	4	Online	Optimal		RAID 0	0	0/0	0	TEST

A 2793G VD (virtual disk) is created.

5. Check the detail information.

With LBA 64 supporting, block size = 512B.

Volume	configuration / Virtu	ial disk / N	Aore in	forma	ition										1	B	-	4-	0
tual disk	:		_			_				_		_	_						
o. Name	WWN	Size (MB)	Size (GB)	Right	Priority	Bg rate	Readahead	Status	Health	96	Stripe height (KB)	RAID	#LUN	Snapshot space (MB)	#Snapsl	hot 1	ype	RG	Block size (8)
test	2018001378a8a391	2860032	2793	WB	ні	4	Enabled	Online	Optimal		64	RAID 0	0	0/0	0	F	RAID	TEST	512

Without LBA 64 supporting, block size = 4K.

ual disk																		
. Name	WWN	Size (HD)	Size (GB)	Right	Priority	Bg rate	Readahead	Status	Health	96	Stripe height (KB)	RAID	#LUN	Snapshot space (MB)	#Snapshot	Туре	RG	Block size (8)
test	2019001378a8a391	2860032	2793	WB	нt	4	Enabled	Online	Optimal		64	RAID 0	0	0/0	0	RAID	TEST	4096

6. Attach LUN.

														0.0	0	0
	/ Vol	lume	confi	guration	/ Virte	ual disk							≡ 4		*	0
	No.	N	lame	Size	Right	Priority	Bg rate	Status	Health	R %	RAID	#LUN	Snapshot space	e #Snaps	shot	RG name
	1	, t	test	2793	WB	ні	4	Online	Optimal		RAID 0	0	0/0	0		TEST
	Ext Sci														_	
l	De Se	lete t prop	perty											Creat	e	0
	De	tach I	LUN													
/	Volum	ie coi	nfigur	ation /	Virtual	disk / A	.ttach						○		4	6
v	'D :					t	est (2793	BGB) 🔽								
Н	lost (is	SCSI	node	name)	:	i	qn.1991-(05.com.	microsoft:	der	no					
L	UN :					-	0-									
P	ermis	sion	•			<	2-3-4-	• Re	ad-write							
						-	5 - 6 -					<< B	ack •	Confiri	m	0

Step B: configure your host/server

Below is the configuration for Windows Server 2003 with Microsoft iSCSI initiator. Please install the latest Microsoft iSCSI initiator from following link :

<< Back

http://www.microsoft.com/downloads/details.aspx?familyid=12cb3c1a-15d6-45 85-b385-befd1319f825&displaylang=en

1. Run MS iSCSI initiator, go to "Discovery" tab, add target portal (iSCSI data).

iSCSI Initiator Properties			×
Add Target Portal			×
Type the IP address or DNS name want to add. Click Advanced to s session to the portal.	e and socket numbe elect specific settin	er of the porta gs for the disc	il you covery
IP address or DNS name:	Port:		
192.168.11.229	3260	Adva	nced
	ОК	Ca	ncel
iSNS Servers			
Name			
Add	Remove	Re <u>f</u> rest	
	ок (Cancel	Apply

2. Go to "Targets" tab, click "Refresh", and then "Log On..." the target

	unt Taxanta Ì Baumdi (alumas /Dau
Select a target and click Log On to acc arget. Click details to see information a devices for that target.	ess the storage devices for that bout the sessions, connections an
Largets: Name	Status
<u>D</u> etails	Log On Refresh
<u>D</u> etails	Log On Refresh
Details	Log On Refresh

		100ce:default-targe	
Automatically rest	ore this connection	when the system l	poots
Only select this on your compute	ption if iSCSI multi- r.	path software is al	ready installed
Advanced	No.	ок	Cancel
		L	
i.	Details	Log On	Befresh
	Details	Log on	nenesn

3. Status is "Connected", the initiator setting is done

SI Initiator Prop	erties 📃		
General Discovery	Targets Persiste	ent Targets Boun	d Volumes/Devices
Select a target and target. Click details devices for that tar	I click Log On to acc to see information a get.	cess the storage de bout the sessions,	vices for that connections and
Targets:			
Name		Statu	s
		1	Dobook
	Details	I IOGUN I	Dettesti

Step C: Initialize/Format/Mount the disk

 Go to Start → Control Panel → Computer Management → Device Manger → Disk drives



Disk drive status of the iSCSI RAID controller

2. Go to Start → Control Panel → Computer Management → Disk Management, it displays a new disk.

🛃 Computer Management											
🛃 Eile Action Yiew <u>W</u> indow H	elp										
← → 🗈 📧 😤 💵 🔮 🖆	1 😼										
📃 Computer Management (Local)	Volume	Layout	Туре	File System	Status	Capacity	Free Space	e % Free	Fault Tolerance	Overhead	
🖃 🌇 System Tools	🗩 (C:)	Partition	Basic	FAT32	Healthy (System)	19.52 GB	17.01 GB	87 %	No	0%	
Event Viewer	🗇 (D:)	Partition	Basic	FAT32	Healthy (Boot)	19.52 GB	16.32 GB	83 %	No	0%	
E Shared Folders	🗇 (E:)	Partition	Basic		Healthy	19.53 GB	19.53 GB	100 %	No	0%	
Local Users and Groups	🗐 (F:)	Partition	Basic	NTFS	Healthy	18.08 GB	16.40 GB	90 %	No	0%	
Performance Logs and Alerc Device Manager	April 2939.2 (G:)	Partition	Basic	UDF	Healthy	3.20 GB	0 MB	0%	No	0%	
Bemovable Storage											
Disk Defragmenter											
Disk Management											
🗉 🌆 Services and Applications					-						_
	🖓 Disk 0 📃										
	Basic	(C:)			(D:)			(E:)		(F:)	
	Online 1	9.53 GB FA Faithy (Syst	132 tem)		19.53 GB FATS Healthy (Boot)	52 1		9.53 GB lealthy		18.08 GB NTF Healthy	. Э
		calary (by s	.cany		Theoremy (book)	10. 		loakity		Theaterly	-
	🔁 Disk 1										
	Unknown										
	2/92.99 GB 2	792.99 GB	///	ew Disl	kl////////////////////////////////////						
	Not middledd								1		
	🖄 CD-ROM 0 📕									(
	DVD	N_05_293	9.2 (0	:)							
	3.20 GB 3	.20 GB UDF									
		eaiuny									

3. Initialize disk.

ealchy (bystein)	Healthy (Boot)	Healthy	18.08 GB NTFS Healthy
itialize Disk			
operties			
	tialize Disk	pperties	balize Disk operties Ip

4. Convert to GPT disk for over 2TB capacity. For more detail information about GPT, please visit

http://www.microsoft.com/whdc/device/storage/GPT_FAQ.mspx

Disk 0 Basic 76.68 GB Online	(C:) 19,53 GB FAT32 Healthy (System)	(D:) 19.53 GB FAT32 Healthy (Boot)	(E:) 19.53 GB Healthy	(F:) 18.08 GB NTFS Healthy
Disk 1 Basic 2792.92 GB Online	<u>Convert to Dynamic Disk</u> C <u>o</u> nvert to GPT Disk			744.96 GB Unallocated
CD-ROM 0	Properties			
3.20 GB Online	Hep Healthy			

5. Format disk.

CDISK 0 Basic 76.68 GB Online	(C:) 19.53 GB FAT32 Healthy (System)	(D:) 19.53 GB FAT32 Healthy (Boot)	(E:) 19.53 GB Healthy	(F:) 18.08 GB NTFS Healthy
Disk 1 Basic 2792.88 GB Online	2792.88 GB	New Partition		
	Unallocated	Properties		
DVD 3.20 GB Online	EN_05_2939.2 (G:) 3.20 GB UDF Healthy	Help		

6. Format disk is done.

Contraction Contractico Contra	(C:) 19.53 GB FAT32 Healthy (System)	(D:) 19.53 GB FAT32 Healthy (Boot)	(E:) 19.53 GB Healthy	(F:) 18.08 GB NTFS Healthy
Contraction Contractico Contra	New Yolume (H:) 2792.87 GB NTF5 Healthy			
DVD 3.20 GB Online	EN_05_2939.2 (G:) 3.20 GB UDF Healthy			

7. The new disk is ready to go, available size = 2.72TB.

Sile Edit View	Severites Teals Help		
G Back + 🕤 +	Pavorices Tools Help Pavorices Tools Help Polders	- 🕼 🕑 🗙 🍤 🕻	•
Address 😼 My Com	puter		
Name	Туре	Total Size	Free Space
Hard Disk Drives			
Secol Disk (C:)	Local Disk	19.5 GB	17.0 GB
Local Disk (D:)	Local Disk	19.5 GB	16.2 GB
🍛 Local Disk (E:)	Local Disk		
Local Disk (F:)	Local Disk	18.0 GB	16.4 GB
New Volume (H:)	Local Disk	2.72 TB	2.72 TB
Devices with Re	Free Space: 2,72 TB		
31/2 Floppy (A;)	Total Size: 2.72 TB		
LEN OS 2939.2 (G	:) CD Drive	3.20 GB	0 bytes

Appendix E.

Event Notifications (Logs)

PD events

Level	Туре	Description
INFO	Disk inserted	Disk <slot> is inserted into system.</slot>
WARNING	Disk removed	Disk <slot> is removed from system.</slot>
ERROR	HDD failure	Disk <slot> is disabled.</slot>

HW events

Level	Туре	Description
WARNING	ECC error	Single-bit ECC error is detected.
ERROR	ECC error	Multi-bit ECC error is detected.
INFO	ECC info	ECC memory is installed.
INFO	ECC info	Non-ECC memory is installed.
INFO	SCSI info	Received SCSI Bus Reset event at the SCSI Bus <number>.</number>

EMS events

Level	Туре	Description
INFO	Power installed	Power <number> is installed.</number>
ERROR	Power absent	Power <number> is absent.</number>
INFO	Power work	Power <number> is restored to work.</number>
ERROR	Power warning	Power <number> is out of work.</number>
WARNING	Power detect	PSU signal detection <number>.</number>
INFO	Fan work	Fan <number> is restored to work.</number>

ERROR	Fan warning	Fan <number> is out of work.</number>
INFO	Fan installed	Fan <number> is installed.</number>
ERROR	Fan not present	Fan <number> is not present.</number>
WARNING	Thermal warning	System temperature <location> is a little bit higher.</location>
ERROR	Thermal critical	System Overheated <location>!!!</location>
ERROR	Thermal critical shutdown	System Overheated <location>!!! The system will do the auto shutdown immediately.</location>
WARNING	Thermal ignore value	Unable to update thermal value on <location>.</location>
WARNING	Voltage warning	System voltage <location> is a little bit higher/lower.</location>
ERROR	Voltage critical	System voltages <location> failed!!!</location>
ERROR	Voltage critical shutdown	System voltages <location> failed!!! The system will do the auto shutdown immediately.</location>
INFO	UPS info	UPS detection succeeded.
WARNING	UPS error	UPS detection failed.
ERROR	UPS error	AC loss for the system is detected.
ERROR	UPS error	UPS Power Low!!! The system will do the auto shutdown immediately.
WARNING	SMART T.E.C.	Disk <slot> S.M.A.R.T. Threshold Exceed Condition occurred for attribute <item>.</item></slot>
WARNING	SMART failure	Disk <slot>: Failure to get S.M.A.R.T information.</slot>

RMS events

Level	Туре	Description
INFO	Console Login	 <username> login from <ip li="" or="" serial<=""> console> via Console UI. </ip></username>
INFO	Console Logout	<username> logout from <ip console="" or="" serial=""> via Console UI.</ip></username>
INFO	Web Login	<username> login from <ip> via Web UI.</ip></username>
INFO	Web Logout	<username> logout from <ip> via Web UI.</ip></username>

LVM3 events

Level	Туре	Description
INFO	RG created	RG <name> has been created.</name>
INFO	RG creation failed	Failed to create RG <name>.</name>
INFO	RG deleted	RG <name> has been deleted.</name>
INFO	VD created	VD <name> has been created.</name>
INFO	VD creation failed	Failed to create VD <name>.</name>
INFO	VD deleted	VD <name> has been deleted.</name>
INFO	VD renamed	Name of VD <name> has been renamed to <name>.</name></name>
INFO	Read-only caching enabled	Cache policy of VD <name> has been set as read only.</name>
INFO	Writeback caching enabled	Cache policy of VD <name> has been set as write-back.</name>
INFO	Write-through caching enabled	Cache policy of VD <name> has been set as write-through.</name>
INFO	VD extended	Size of VD <name> extends.</name>
INFO	VD initialization started	VD <name> starts initialization.</name>
INFO	VD initialization finished	VD <name> completes the initialization.</name>
WARNING	VD initialization failed	Failed to complete initialization of VD <name>.</name>
INFO	VD rebuild started	VD <name> starts rebuilding.</name>
INFO	VD rebuild finished	VD <name> completes rebuilding.</name>
WARNING	VD rebuild failed	Failed to complete rebuild of VD <name>.</name>
INFO	VD migration	VD <name> starts migration.</name>

	started	
INFO	VD migration finished	VD <name> completes migration.</name>
ERROR	VD migration failed	Failed to complete migration of VD <name>.</name>
INFO	VD scrubbing started	VD <name> starts scrubbing.</name>
INFO	VD scrubbing finished	VD <name> completes scrubbing.</name>
INFO	RG migration started	RG <name> starts migration.</name>
INFO	RG migration finished	RG <name> completes migration.</name>
INFO	RG activated	RG <name> has been manually activated.</name>
INFO	RG deactivated	RG <name> has been manually deactivated.</name>
INFO	VD rewrite started	Rewrite at LBA <address> of VD %s starts.</address>
INFO	VD rewrite finished	Rewrite at LBA <address> of VD %s completes.</address>
WARNING	VD rewrite failed	Rewrite at LBA <address> of VD %s failed.</address>
WARNING	RG degraded	RG <name> is under degraded mode.</name>
WARNING	VD degraded	VD <name> is under degraded mode.</name>
ERROR	RG failed	RG <name> is failed.</name>
ERROR	VD failed	VD <name> is failed.</name>
WARNING	Recoverable read error occurred	Recoverable read error occurred at LBA <address>-<address> of VD <name>.</name></address></address>
WARNING	Recoverable write error occurred	Recoverable write error occurred at LBA <address>-<address> of VD <name>.</name></address></address>
ERROR	Unrecoverable read error occurred	Unrecoverable read error occurred at LBA <address>-<address> of VD <name>.</name></address></address>
ERROR	Unrecoverable write error	Unrecoverable write error occurred at LBA <address>-<address> of VD <name>.</name></address></address>

	occurred	
INFO	Dedicated spare configured	PD <slot> has been configured to RG <name> as a dedicated spare disk.</name></slot>
INFO	Global spare configured	PD <slot> has been configured as a global spare disk.</slot>
WARNING	PD read error occurred	Read error occurred at LBA <address>-<address> of PD <slot>.</slot></address></address>
WARNING	PD write error occurred	Write error occurred at LBA <address>-<address> of PD <slot>.</slot></address></address>
WARNING	Parity wrong when scrubbing	The parity data is wrong at LBA <address>-<address> when scrubbing VD <name>.</name></address></address>
WARNING	Data recovered when scrubbing	Data at LBA <address>-<address> has been recovered when scrubbing VD <name>.</name></address></address>
INFO	PD freed	PD <slot> has been removed from RG <name>.</name></slot>
INFO	RG imported	Configuration of RG <name> has been imported.</name>
INFO	RG restored	Configuration of RG <name> has been restored.</name>
INFO	VD restored	Configuration of VD <name> has been restored.</name>

• Snapshot events

Level	Туре	Description
INFO	Snapshot deleted	The snapshot VD <name> has been deleted.</name>
INFO	Snapshot auto deleted	The oldest snapshot VD <name> has been deleted to obtain extra snapshot space.</name>
INFO	Snapshot taken	A snapshot on VD <name> has been taken.</name>
INFO	Snapshot space	Set the snapshot space of VD <name> to</name>

	configured	<number> MB.</number>
INFO	Snapshot rollback started	Snapshot rollback of VD <name> has been started.</name>
INFO	Snapshot rollback finished	Snapshot rollback of VD <name> has been finished.</name>
WARNING	Snapshot quota reached	The quota assigned to snapshot <name> is reached.</name>

iSCSI events

Level	Туре	Description
INFO	iSCSI login succeeds	iSCSI login from <ip> succeeds.</ip>
INFO	iSCSI login rejected	iSCSI login from <ip> was rejected, reason [<string>]</string></ip>
INFO	iSCSI logout	iSCSI logout from <ip> was received, reason [<string>].</string></ip>

Battery backup events

Level	Туре	Description
INFO	BBM sync data	Abnormal shutdown detected, start flushing battery-backuped data (<number> KB).</number>
INFO	BBM sync data	Abnormal shutdown detected, flushing battery-backuped data finishes.
INFO	BBM detected	Battery backup module is detected.
INFO	BBM is good	Battery backup module is good.
INFO	BBM is charging	Battery backup module is charging.
WARNING	BBM is failed	Battery backup module is failed.
INFO	BBM	Battery backup feature is <item>.</item>

JBOD events

Level	Туре	Description
INFO	Disk inserted	JBOD <number> disk <slot> is inserted</slot></number>
		into system.
Warning	Disk removed	JBOD <number> disk <slot> is removed</slot></number>
		from system.
ERROR	HDD failure	JBOD <number> disk <slot> is disabled.</slot></number>
INFO	JBOD inserted	JBOD <number> is inserted into system</number>
WARNING	JBOD removed	JBOD <number> is removed from system</number>
WARNING	SMART T.E.C	JBOD <number> disk <slot>: S.M.A.R.T.</slot></number>
		Threshold Exceed Condition occurred for
		attribute %s
WARNING	SMART Failure	JBOD <number> disk <slot>: Failure to</slot></number>
		get S.M.A.R.T information
INFO	Dedicated	JBOD <number> PD <slot> has been</slot></number>
	spare	configured to RG <name> as a dedicated</name>
	configured	spare disk.
INFO	Global spare	JBOD <number> PD <slot>d has been</slot></number>
	configured	configured as a global spare disk.
WARNING	PD read error	Read error occurred at LBA
	occurred	<address>-<address> of JBOD</address></address>
		<number> PD <slot>.</slot></number>
WARNING	PD write error	Write error occurred at LBA
	occurred	<address>-<address> of JBOD</address></address>
		<number> PD <slot>.</slot></number>
INFO	PD freed	JBOD <number> PD <slot> has been</slot></number>
		removed from RG <name>.</name>

System maintenance events

Level	Туре	Description
INFO	System shutdown	System shutdown.
INFO	System reboot	System reboot.
INFO	FW upgrade start	Firmware upgrade start.
INFO	FW upgrade success	Firmware upgrade success.
WARNING	FW upgrade failure	Firmware upgrade failure.