Chapter 1

Introduction

The serial ATA (SATA) Suma 3016 RAID subsystem series described in this manual comes in three different models that provide users with flexible configuration options. The differences between the three models are described below.

1.1 Model Variations

Two single controller models and one redundant controller model make up the three available models in the Suma SATA RAID storage subsystem series.

The three models are shown in **Table 1- 1**.

Model Name	Host Channels	Controller Board
3016SA	2 x SCSI-160	IFT-7260S-16U3D (Single Controller)
3016FA	2 x 2Gbps FC	IFT-7260S-16F2D (Single Controller)
3016FA-R	4 x 2Gbps FC	IFT-7260R-16F2D (Dual Redundant Controllers)

Table 1- 1: Available Suma RAID Subsystem Models

NOTE:
Please check to see that you have the correct model. If you have a different model to the one you have ordered, please contact your subsystem vendor immediately.

1.1.1 Single-Controller Models

The single controller SUMA subsystems, the SUMA 3016SA and the SUMA 3016FA, combine either 2Gbps Fibre Channel (FC) or SCSI-160 host channels with 16 SATA drives in a single storage subsystem. These models are ideal for applications that require greater performance than data availability, and when full redundancy is not a critical requirement.

1.1.2 Dual Redundant Model

The dual redundant controller SUMA subsystem (SUMA 3016FA-R) combines two, dual redundant, 2Gbps FC controllers with 16 SATA drives in the SUMA subsystem. When equipped with dual-redundant controllers, the subsystem is capable of full redundancy and is able to sustain single failure of any of its active components. RAID controller failure is transparent to host computers and the failover process is automatically managed by firmware.

The redundant model operates in a Dual-Active RAID controller configuration. The two controllers work together to enhance the overall performance of the subsystem. Cache coherency is supported and the data cached in memory is protected by a battery module (BBU) that is able to sustain cache memory for up to 72 hours. An exact replica of the unfinished writes by hosts is constantly cached in both controllers. This ensures that there is no single point of failure when one controller fails. Users can freely associate logical arrays with multiple target IDs.

1.2 Enclosure Chassis

The Suma subsystem enclosure is divided into a front and rear section.

NOTE:
*Components accessed through the front panel are referred to as "**Front Panel Components**" and Components accessed through the rear panel are referred to as "**Rear Panel Components**."*

1.2.1 Front Section

The front section of the Suma subsystem features a 4 x 4 layout for sixteen 3.5" drives and houses a foldable LCD panel.

1.2.2 Rear Section

The rear section of the Suma subsystem is accessed through the rear panel and is reserved for the RAID controller module(s), power supply units (PSU), cooling fan modules and power switches.

1.2.3 Midplane and Driveplane Boards

Integrated driveplane and midplane boards separate the front and rear sections of the Suma subsystem. These PCB boards provide logic level signals and low voltage power paths. They contain no user-serviceable components.

1.3 Suma Subsystem Components

All the active components on the Suma subsystems can be accessed through either the front or rear panel. The modular design of the active components facilitates their easy installation and removal. Hot-swap mechanisms are incorporated to eliminate power surges and signal glitches that might happen while removing or installing these modules.

1.3.1 Front Panel Overview

The front panel of the Suma RAID subsystem described in this manual is shown in **Figure 1-** 1. A description of each front panel component is given below.

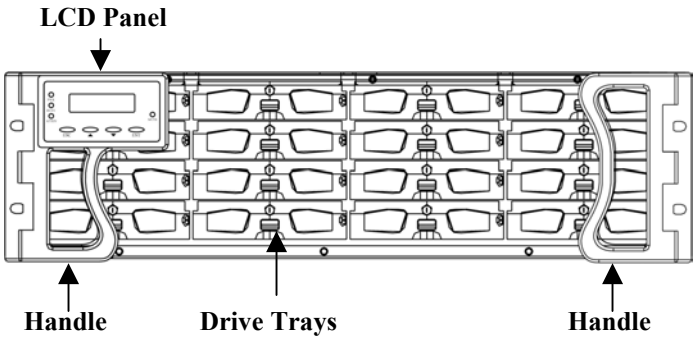

Figure 1- 1: Front View – RAID Appliance Models

The front panel shown in ***Figure 1- 1*** is designed to accommodate the following components:

- ***LCD Panel:-*** The LCD Panel shows system information and can be used to configure and monitor the Suma subsystem.

- ***Drive bays with drive tray canisters:-*** The drive bays are used to house the Suma subsystem hard drives.

1.3.2 Rear Panel Overview

The rear panel of the RAID subsystem described in this manual is shown in ***Figure 1- 2***. A description of each rear panel component is given below.

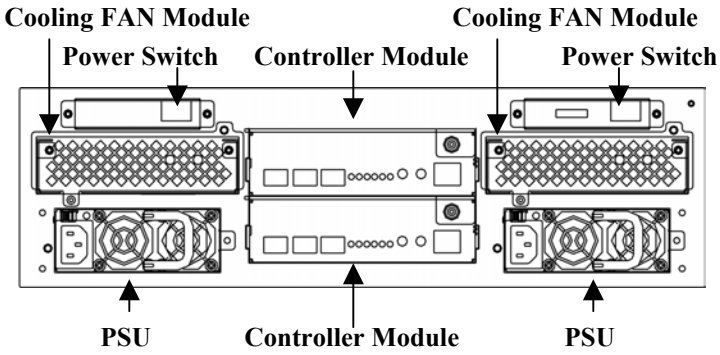

Figure 1- 2: Rear View – Redundant Controller FC Suma Subsystem

The rear panel shown in ***Figure 1- 2*** is designed to accommodate the following components:

- ***RAID controller module(s)*:-** The controller modules contain both the RAID controllers and the battery back up units (BBU), which are optional for the single controller models.

  NOTE:
  For the single RAID Controller model, a metal sheet will be placed over the lower controller bay at the rear of the subsystem. The single controller module that came with the subsystem must be installed in the upper controller bay.

- ***PSU:-*** The PSUs are used to provide power to the subsystem.

- ***Cooling fan modules:-*** The redundant cooling FAN modules are used to ventilate the subsystem and to reduce the temperature within the subsystem.

- ***Power Switches:-*** The power switches are used to turn the system on and off.

1.4 Front Panel Components

1.4.1 LCD Panel

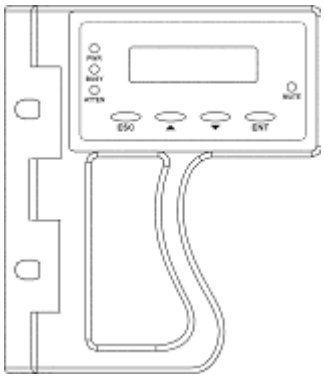

Figure 1- 3: LCD Panel

The LCD panel shown in ***Figure 1- 3*** consists of a 16x2 character LCD screen with push buttons and LED status indicators. The LCD front panel provides full access to all RAID configurations and monitoring. After powering up the subsystem, the initial screen will show the subsystem model name. A different name may be assigned for the system or different arrays. This will enable easier identification in a topology with numerous arrays.

In the redundant controller subsystem, two controller modules are present. After powering up the primary controller information will be shown. To view secondary controller information, press both the "Up" and "Down" arrow keys simultaneously. When both controllers are functioning properly, all the configuration changes can be made through the primary controller. If the primary controller malfunctions, system configuration changes must be made through the secondary controller.

1.4.2 Drive Trays and Enclosure Bay ID Allocation

16 Drive bays for the installation of standard 1" pitch, 3.5" disk drives. The drive bays are located on the front panel and are easily accessible to the end user.

As shown in ***Figure 1- 4*** below, the Suma subsystem is housed in an enclosure that is 4 bays wide by 4 bays high. Drive bays (slots) are, when viewed from the front, numbered 1 to 16 from left to right, then from top to bottom.

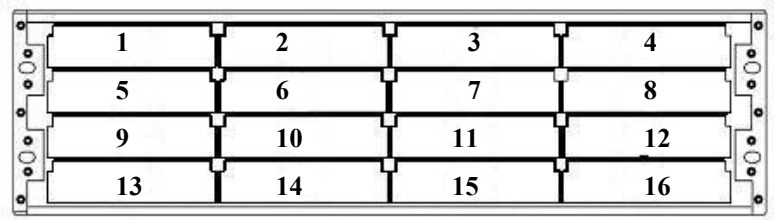

Figure 1- 4: Hard Drive IDs

The default ID for slot 0 is located at the top left hand corner and is set to "1." This setting should not cause any problems if the hard drives installed in this subsystem do not share the same loop with other devices. The last slot ID, located at the bottom right hand corner, will be "16".

NOTE:
Users cannot change the default ID settings for the drives. The ID settings for the drive are pre-assigned.

1.4.3 Dongle Kits

Single Controller Subsystems:- Both single controller Suma subsystems can accommodate SATA drives. If users wish to use parallel ATA (PATA) hard drives in their subsystem, then SATA-to-PATA dongle kits must be purchased separately and installed independently by the end user.

Redundant Controller Subsystems:- Prior to purchasing a redundant controller subsystem, the user must determine whether they would prefer to use SATA or PATA hard drives. If they wish to use SATA hard drives, the subsystem will be shipped with SATA-to-SATA MUX kits that must be installed by the end user. If a user wishes to use PATA hard drives, the subsystem will be shipped with 16 SATA-to-PATA MUX kits that must also be independently installed.

1.5 Rear Panel Components

1.5.1 RAID Controller Modules

The RAID controller module contains a main circuit board, a dedicated driveplane management interface, and a BBU that is optional for the single controller models but standard for the redundant controller models. The controller module contains no user-serviceable components. Except when replacing a faulty unit, installing a BBU, or installing/upgrading the cache memory inside, the controller module should never be removed or opened.

WARNING:
Although the RAID Controller can be removed, the only time a user should touch the controller itself is to install the memory modules or the BBU. Unnecessary tampering with the RAID controller can damage the controller and make the system unusable.

1.5.2 Controller Module Interfaces

The Suma subsystem controllers come with the following interfaces.

Host Interfaces

Subsystem Model	Host Channels
Suma 3016SA	2 x SCSI-160
Suma 3016FA	2 x 2 Gbps FC
Suma 3016FA-R	4 x 2 Gbps FC

Table 1- 2: System Host Channels

SCSI-160 Host Ports:- The SCSI host connects to the Suma subsystem through two mini-SCSI connectors, which are located at the back of the controller modules.

FC Host Ports:- The FC host connects to the Suma subsystem through two small form factor pluggable (SFP) connector, which are located at the back of the controller modules.

FC Speed Detection:- Speed auto-detection is specified by the FC standard. If a 1Gbps port is connected to a 2Gbps port, it will negotiate down and run at 1Gbps. If there are two 2Gbps ports on either end of the link, the link will be run at 2Gbps.

Drive Interfaces

All the models come with sixteen SATA drive channels that are connected to the back plane.

RCC Channels

The controllers in the redundant controller Suma subsystem, the Suma 3016FA-R, each come with a single dedicated onboard 2Gbps redundant cache coherence (RCC) channel that communicates between the two controllers.

Expansion Ports

Redundant controller subsystems come with two extra 2Gbps channels (one on each controller) that can be used for expansion. These ports can be used to connect to other JBODs, increasing the overall storage capacity of the SAN. (*Single controller models do not have the added expansion port.*)

NOTE:
Unlike other products, the channel modes cannot be changed.

Ethernet Ports

All the controller modules on the Suma subsystems come with a single RJ-45 Ethernet port. The Ethernet port is used for remote management through the network. When operated in the dual active mode, system configuration is handled through one of the controllers. In the event one controller fails, the Ethernet port on the other controller inherits the configured IP and continues the monitoring or configuration service.

RS-232C (Audio Jacks)

The controller modules all come with two RS-232C (Audio Jack) serial ports. One serial port is used for remote management and the other for UPS support.

1.5.3 Power Supply Units

Two 460W redundant hot swappable power supply units (PSUs) are located at the rear of the enclosure. If one PSU fails, the second PSU will be able to supply sufficient power for the system to keep running. The power switches for these PSUs are located at the top of the Rear Panel of the subsystem (see ***Figure 1- 2***).

The specifications for the PSUs are shown in ***Table 1- 3*** below.

Specification		
Nominal power	460 Watts with active PFC	
Input voltage	90 to 260VAC +-10%	
Input frequency	47 ~ 63 Hz	
Input current	8A @90VAC; 4A @230VAC	
Power factor correction	Yes	
Hold-up time	At least 16ms at 115/230VAC full load after a loss of AC input	
Over temperature protection	Lost cooling or excessive ambient temperature	
Size	265(D) x 107(W) x 42.2(H) mm.	
Cooling	11 CFM	
Acoustic noise	115V input, full load of +5V; 0.5A of +12V	50 dB max.

Table 1- 3: PSU Specifications

1.5.4 Cooling fan modules

Two pre-installed cooling fan modules (see ***Figure 1- 5***) come with the subsystem. Two 9.7cm blowers housed in each cooling module and can provide a total of 61 CFM of airflow running at the speed of 3600rpm.

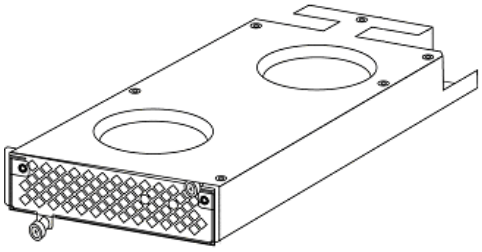

Figure 1- 5: Bottom view of a cooling fan module

1.6 Suma Subsystem Monitoring

The Suma RAID Subsystem comes with a number of different monitoring methods that enable users to constantly be updated on the status of the system and individual components. The following monitoring features are included in the subsystem.

1.6.1 I^2C bus

The following Suma subsystem elements are interfaced to the RAID controller over a non-user serviceable I^2C bus:

- PSU
- Cooling FAN Module

1.6.2 LED Indicators

The following active components all come with LEDs that indicate the status of the individual component.

- RAID Controller
- LCD Panel
- Cooling FAN Module

- PSU Module
- Drive Trays

1.6.3 Firmware (FW) and RAIDWatch GUI

Firmware:- The firmware is pre-installed software that is used to configure the subsystem. The FW can be accessed through either the front panel LCD module or a terminal emulation program that is installed on an external computer that is connected to the host.

RAIDWatch:- RAIDWatch is a premier web-based graphics user interface (GUI) that can be installed on a remote computer and accessed via the web.

1.6.4 Audible Alarms

The Suma subsystem comes with audible alarms that will be triggered when certain active components fail or when certain (controller or subsystem) thresholds are exceeded. If you hear an audible alarm being emitted from the Suma subsystem it is imperative that you determine and rectify the problem immediately.

WARNING:
Failing to respond when an audible alarm is heard can lead to permanent damage of the Suma subsystem. If an audible alarm is heard, rectify the problem as soon as possible.

This page is intentionally left blank

audible alarm, 1-13

BBU, 1-2, 1-5, 1-8

cache coherency, 1-2
controller module, 1-3, 1-8
cooling fan module, 1,-3, 1-5, 1-11

dongle kit, 1-7
drive bay, 1-4, 1-7
drive ID, 1-7
driveplane, 1-3, 1-8
dual active, 1,-2, 1-10
dual redundant, 1-2

ethernet port, 1-10
expansion port, 1-10

failover, 1-2
firmware, 1-13
front panel, 1-3, 1-4

GUI, 1-13

hot-swap mechanism, 1-3

I^2C bus, 1-12

LCD panel, 1-6
LCD Panel, 1-4
LED, 1-12

midplane, 1-3
mini-SCSI connector, 1-9
MUX kit, 1-8

PATA, 1-7
power switch, 1-3, 1-5, 1-10
primary controller, 1-6
PSU, 1-3, 1-5, 1-10

RAIDWatch, 1-13
RCC channel, 1-9
rear panel, 1-3, 1-4, 1-5, 1-10
redundant controller, 1-6
remote management, 1-10
RJ-45 port, 1-10
RS-232C (Audio Jack) serial port, 1-10

SATA, 1-7
SATA drive channel, 1-9
secondary controller, 1-6
SFP connector, 1-9
single controller, 1-2, 1-7
speed auto-detection, 1-9

terminal emulation program, 1-13

UPS, 1-10

CHAPTER 1: INTRODUCTION 1-1

1.1 MODEL VARIATIONS 1-1
1.1.1 Single-Controller Models 1-2
1.1.2 Dual Redundant Model 1-2
1.2 ENCLOSURE CHASSIS 1-3
1.2.1 Front Section 1-3
1.2.2 Rear Section 1-3
1.2.3 Midplane and Driveplane Boards 1-3
1.3 SUMA SUBSYSTEM COMPONENTS 1-3
1.3.1 Front Panel Overview 1-4
1.3.2 Rear Panel Overview 1-4
1.4 FRONT PANEL COMPONENTS 1-6
1.4.1 LCD Panel 1-6
1.4.2 Drive Trays and Enclosure Bay ID Allocation 1-7
1.4.3 Dongle Kits 1-7
1.5 REAR PANEL COMPONENTS 1-8
1.5.1 RAID Controller Modules 1-8
1.5.2 Controller Module Interfaces 1-8
1.5.3 Power Supplies Units 1-10
1.5.4 Cooling fan modules 1-11
1.6 SUMA SUBSYSTEM MONITORING 1-12
1.6.1 I^2C bus 1-12
1.6.2 LED Indicators 1-13
1.6.3 Firmware (FW) and RAIDWatch GUI 1-13
1.6.4 Audible Alarms 1-13

Figure 1- 1: Front View – RAID Appliance Models 4
Figure 1- 2: Rear View – Redundant Controller FC Suma Subsystem 5
Figure 1- 3: LCD Panel 6
Figure 1- 4: Hard Drive IDs 7
Figure 1- 5: Bottom view of the cooling fan module 12