Infortrend®

RAIDWatch®

Effortless RAID Management

Java-based GUI Manager for Infortrend Disk Array Subsystems

User's Manual

Software Revision: 2.2

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User's Manual Overview

Congratulations on your decision to use Infortrend's RAIDWatch management software program. This management program allows you to control and monitor disk array subsystems from a local host, a remote station connected through a local area network (LAN), or the Internet.

This manual discusses how to install and use RAIDWatch to manage disk array systems incorporating Infortrend's Fibre-to-Fibre, Fibre-to-SATA, SCSI-to-SATA, iSCSI-to-SATA, and SCSI-to-SCSI subsystems, or the EonRAID 2510FS series controllers. Please note that RAIDWatch does not support drive enclosure displays manufactured by other vendors.

In addition to RAIDWatch, you can also use the on-board COM port or LCD panel to manage the EonStor subsystems or systems that incorporate the EonRAID disk array controllers. For more information about these programs, see the documentation that came with your hardware.

User's Manual Structure and Chapter Overviews

The RAIDWatch User's Manual is divided into three (3) separate parts and Appendices.

Part 1: Getting Started With RAIDWatch

Chapter 1: Introduction

Provides information about RAIDWatch, including a product description, features summary and highlights. The basic concept of RAIDWatch is defined in an individual section.

Chapter 2: RAIDWatch Considerations

Provides some background information on RAID and defines some terms that will be used throughout the rest of the manual. Discusses the use of spares and how to replace a drive if no spares were available. Finally, provides a short discussion on RAIDWatch preliminaries.

Chapter 3: Installation

Discusses how to install RAIDWatch in your systems. Discussions include system requirements, setting up hardware, software installation, and how to update your software by downloading updates from Infortrend's FTP site.

Chapter 4: Configuration Client Options

Describes how to configure the RAIDWatch sub-module configuration client and event notification for faxes, e-mail, broadcast, and so on. Other functionalities of the utility are also described in full. Information about the supported notification levels are also provided to aid in explaining these functions.

Chapter 5: RAIDWatch Icons

Describes the icons used in RAIDWatch GUI.

Chapter 6: Basic Operations

Discusses basic operations at system startup. These include starting RAIDWatch, connecting and disconnecting from a disk array system, setting up system security, displaying controls, working with various disk array windows, and exiting the program.

Part 2: Using RAIDWatch for System Management

Chapter 7: Configuration Parameters

Discusses how to access the controller/subsystem configuration options and the different RAID configuration options that are available. A detailed description of how to set these options is given as well as brief explanations of the different parameters.

Chapter 8: Channel Configuration

Discusses how to access the channel configuration options and describes in detail the user-configurable channel options that can be set. Instructions on setting the configuration of a channel and how to configure host channel IDs are also discussed.

Chapter 9: Drive Management

This chapter describes the creation, expansion and deletion of both logical drives (LD) and logical volumes (LV). Different LD and LV options are explained and steps to setting the different options are described in detail. A discussion on partitioning LDs and LVs is also found in this chapter.

Chapter 10: LUN Mapping

Discusses how to map complete or separate partitions of LDs and LVs to different LUNs. Detailed description of the mapping procedure is given. A discussion on how to delete LUN mappings and a description of the LUN Mapping Table are provided. All the associated options are also described.

Part 3: System Monitoring

Chapter 11: System Monitoring & Management

Discusses how to obtain the current status of SAF-TE, I^2C, and S.E.S. monitoring devices and get updates on the status of storage system components. Descriptions on how to access these different monitoring devices are given and the type of information that is offered by these devices is shown.

Chapter 12: Enclosure Display

The Enclosure View customization is discussed fully in this chapter. Detailed instructions on how to access and use the Enclosure View are given. Examples of status messages are shown and explanations of the status messages are provided.

Chapter 13: NPC Utility

An independent NPC configuration utility is added for use with RAIDWatch installation without the Configuration Client functionality. Although not as

powerful as the Configuration Client, NPC provides basic event notifications over email, LAN broadcast, and SNMP traps.

Appendices

Appendix A: Command Summary

Summarizes the available commands and command buttons in RAIDWatch and the Configuration Client utility.

Appendix B: Glossary

Provides information on definitions of key technology terms used in this manual.

Appendix C: RAID Levels

Provides information about the various RAID levels.

Appendix D: Additional References

Provides information about Java Runtime environment, software download, and uninstallation.

Usage Conventions

Throughout this document, the following terminology usage rules apply:

- "Controller" always refers to Infotrend RAID array controllers.
- "Subsystem" refers to Infortrend EonStor 8-, 12-, or 16-bay RAID array subsystems.
- "RAIDWatch" refers to the entire program and all of its modules.
- "RAIDWatch Manager" refers only to the management interface, not to any other parts of the software.
- "Root Agent" is an independent agent of the software, which permits one management station to monitor and report the operating status of multiple RAID systems. The Root Agent gets information from and sends commands to one or multiple RAID arrays.
- "RAID Agent" is the part of the software, which allows the RAID controller/subsystem to talk to the RAIDWatch Manager or Root Agent. A RAID Agent communicates with the RAID array via SCSI bus, iSCSI or Fibre channels (using the In-band protocols), or via an Ethernet port. RAID Agents are the intermediaries between RAID systems and the RAIDWatch program.
- "Configuration Client" refers to the software utility that allows an administrator to be notified of system events at any of the RAID systems being managed. The Configuration Client also enables centralized management of multiple arrays using a single workstation.

Important information that users should be aware of is indicated with the following icons:

 **NOTE**:

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help you avoid making mistakes.

 **CAUTION!**

Cautionary messages should also be heeded to help you reduce the chance of losing data or damaging the system.

IMPORTANT!

The Important messages emphasis on using RAIDWatch management software.

WARNING!

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously.

Software and Firmware Updates

Please contact your system vendor or visit Infortrend's FTP site (ftp.infortrend.com.tw) for the latest software or firmware updates.

Problems that occur during the updating process may cause unrecoverable errors and system down time. Always consult technical personnel before proceeding with any firmware upgrade.

NOTE:

Firmware version installed on your system should provide the complete functionality listed in the specification sheet/user's manual. We provide special revisions for various application purposes. Therefore, DO NOT upgrade your firmware unless you fully understand what a firmware revision will do.

Revision History

May 18, 2005

This manual was revised for RAIDWatch revision 2.2. RAIDWatch is now a registered trademark of Infortrend Technology, Inc. ***Chapter 6*** was moved to ***Chapter 2*** to introduce RAID and RAIDWatch considerations to user before installation.

The program supports more operation environments that are listed in ***Chapter 1***. ***Chapter 1*** also describe the new features such as the multi-language support include English, Deutsch and Japanese for the software GUI and online help. The auto complete feature is added. This feature saves time when user is trying to connect a RAID system by typing in an IP address that was previously connected in the connection window.

The typical program installation opinion is newly provided while installing RAIDWatch. The option is fully described in ***Chapter 3***. RAIDWatch 2.2 comes with enhanced install shield program. The graphics used to explain the RAIDWatch installation are modified. The system requirements and platform requirements are also being updated in this chapter.

A Quick Installation icon under Configuration category is included in ***Chapter 5***.

The new ***Chapter 6*** (previously ***Chapter 5***) was rearranged to fit the current software version. The auto complete feature is included in the connection window. The new agent list window combined with auto discovery function is described in the chapter. A new function called Quick Installation is being added in the configuration category. The explanation of using Window commands is being added.

In C***hapter 11***, the event log list/configuration list functions are newly described. Users are able to use those functions to monitor and report the system status.

The content of ***Chapter 12*** is enhanced with more information.

December 20, 2004

Two new functions are being added. By using RAIDWatch revision 2.1.c, the configuration client supports the auto discovery of iSCSI models to auto detect the available agents. The new function is fully described in ***Section 3.5***. A restore factory defaults function is newly provided in the RAIDWatch main program. The function description can be found in ***Section 7.4***.

November 15, 2004

Revised for RAIDWatch revision 2.1.b. This is an initial RAIDWatch version to support iSCSI subsystems. The cover of the manual and the

header/footer through out the manual were modified to match the hardware manual. Graphics for note, caution, important, and warning messages were added. In ***Chapter 3***, some figures for notification settings were added to make the description more clear. The Generate Dummy Event function is added to the Configuration Client management utility. In the same chapter, GSM modem information for SMS message event notification function was also added. A new Task Schedule icon was added in ***Chapter 4***. In ***Chapter 5, Section 5.9*: Multi-array Management** was added. SCSI channel and compatible cables were explained clearer in ***Chapter 8***.

August 10, 2004

Revised for RAIDWatch revision 2.1. Added descriptions for new configuration options including the NPC utility for the Applet mode installation. Added ***Chapter 13: NPC Utility***.

April 20, 2004

Completely revised for RAIDWatch 2.0, but still kept the manual structure. Although software revision 2.0 has a brand new look and feel and a different configuration access, the available configuration options are basically the same. One chapter, Event Monitor, was removed because the functionality was combined with GUI screen interface. The chapter for NPC functionality was also removed because the event notifications were integrated with the Configuration Client utility.

October 15, 2003

Chapter 13 and ***Chapter 14*** were merged into a single chapter, ***Chapter 13: Panel View***. This chapter generally describes the panel view and removes the redundant descriptions that were previously in both ***Chapter 13*** and ***Chapter 14***. Part 4 of the previous edition was also removed and ***Chapter 13*** has been included in Part 3 of the Manual.

September 29, 2003

Figure 1-1 in ***Chapter 1*** was changed to show a rackmount enclosure. ***Section 3-1*** in ***Chapter 3*** was divided into two sections: "Using Windows – RAIDWatch Installed as In-Band" and "Using Web Browser – RAIDWatch Installed as Applet." ***Section 3.5***, "Rebooting the Controller," was also added. Modifications to ***Table 14-1*** were also made.

August 28, 2003

This manual was completely revised from previous editions. Previous editions came with six chapters and six appendices; the current revision has fourteen chapters divided into four parts and five appendices. The main changes to this edition are given below.

Chapter 1 remained largely unchanged with only minor editorial corrections that do not directly affect the content.

Chapter 2 was separated into two chapters. In the previous revision, ***Chapter 2***, Installation, described system and platform requirements, installation, and different configuration options. This chapter was separated into ***Chapter 2 Installation***, which describes the new RAIDWatch installer, and ***Chapter 3 Configuration Options*** in the new revision.

Chapter 3 in the old revision on Basic Operations became ***Chapter 4*** in the new revision. More detailed instructions on how to use RAIDWatch were added and new screen captures included.

Chapter 4 in the old revision on Array Management has been separated into six new chapters in the new revision. Five of the new chapters, ***Chapter 5*** – ***Chapter 9***, make up ***Part 2*** of this revision of the user's manual and the sections in ***Chapter 4*** of the previous edition on S.E.S. management and IIC, SAF-TE and Fault bus management were moved into ***Chapter 10*** of this revision. All these chapters have enhanced descriptions on how to manage an array, and a series of more indicative screen captures were added.

Chapter 5 Notification Processing Center and ***Chapter 6 Event Monitor*** in the older revisions of the user's manual became ***Chapter 11*** and ***Chapter 12,*** respectively, in the new revision. The content of these chapters remained largely unaltered with only a few minor editorial adjustments.

Appendix A in the previous revision was moved to ***Chapter 13*** in the current revision and is followed by a completely new chapter, ***Chapter 14*** on EonStor storage subsystem panel view customizations.

Extracting ***Appendix A*** from the appendices reduced the number of appendices from six to five and the names of each appendix changed to a higher letter, e.g., ***Appendix B*** in the last revision is now ***Appendix A, Appendix C*** is now ***Appendix B***, etc. The content of these appendices remained the same.

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Chapter 1

Introduction

This chapter provides information about the RAIDWatch management program. The following topics are discussed in this chapter:

1.1 RAIDWatch Overview

1.1.1 Product Description

Infortrend's innovated RAID manager, RAIDWatch, is a Java-based program specifically designed for use in managing Infortrend's RAID subsystems.

RAIDWatch provides a user-friendly interface that graphically represents disk array elements and simplifies the normally complicated process of array configuration. RAIDWatch also provides real-time reporting on the status of the entire array, thus making the task of monitoring disk arrays virtually effortless. The functionality provided in the Event Monitor sub-module in the previous RAIDWatch versions is now integrated into the main management screen and the Configuration Client.

RAIDWatch complements the on-board console interface found on Infortrend's RAID controllers and a line of host-based, text mode RAID Managers that provide the same functionality, but with greater ease of use. The following sections describe the outstanding features of RAIDWatch and introduce its conceptual framework.

1.1.2 Feature Summary

The list below summarizes RAIDWatch features:

- User-friendly graphical interface displays multiple information windows for simultaneously manage and monitor multiple RAID subsystems
- Direct representation of Enclosure View shows the component's and drive's location and status
- Standard TCP/IP connections to Internet agent for full-feature worldwide remote management over the network
- Communicates with the subsystems over a LAN (out-of-band) and the Internet, and over the SCSI bus, iSCSI or Fibre channels using in-band command protocols
- Graphical user interface and online help in multiple languages
- Auto discovery function searches available subsystems on the network for user-convenient RAID connections
- Severity levels and display sequence are configurable for event notification via Email, Fax, ICQ, MSN Messenger, SMS Short Message, LAN Broadcast, and SNMP Traps

- Provides password protection to guard against unauthorized modification of disk array configuration; passwords are set for Maintenance (user) and Configuration (administrator) login access.

- Compatible with most popular computer working environments: Windows, Linux, Solaris and Mac OS X operating systems compatible with the Java Run-time Environment

1.2 Featured Highlights

1.2.1 Graphical User Interface (GUI)

RAIDWatch manager is designed for ease-of-use. It uses symbolic icons to represent configuration levels, physical and logical drives, and logical volumes on the screen, and to identify the current configuration of a disk array system. Pull-down, right-click, and pop-up menus are used with all command options.

You need only point-and-click a mouse button to select an icon or command. The program also displays the current status of various disk drives or enclosure components by changing the color of their respective LED icons.

With an easy-to-use interface, complicated disk array operations such as logical drive and logical volume creation, drive partitioning, and drive partition mapping to host channels/LUNs can be completed with just a few mouse clicks.

1.2.2 Enclosure View

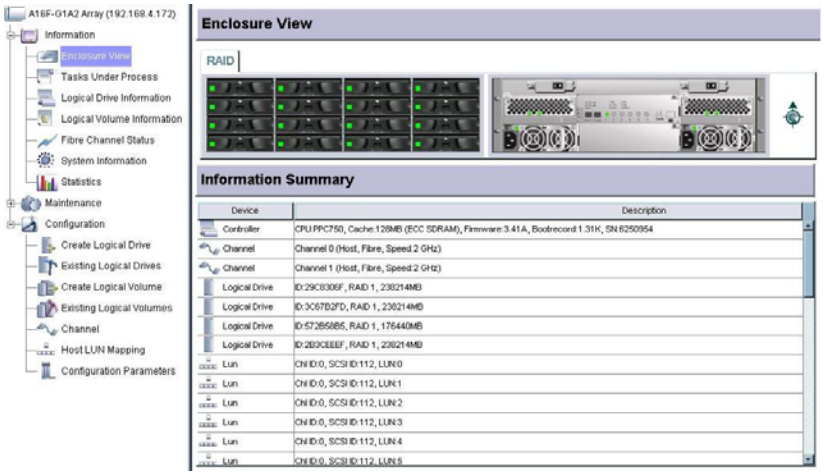

Figure 1-1: Enclosure View Window

The enclosure window shown in ***Figure 1-1*** provides real-time reporting of the status of enclosure components, including components that can be accessed through the front or the rear side of an enclosure. When a drive fails, the system highlights the corresponding LED icon of the failed drive

by changing its display color. When you remove a drive, its icon is removed from the enclosure window. This feature is particularly useful in cases when a drive fails, and you need to identify its exact location for subsequent replacement.

The enclosure window also appears in other configuration windows showing the logical relationship between the member drives of a logical configuration. Drives belonging to the same logical drive will be displayed in the same color. This allows you to easily identify members of different configurations. To see a cascaded enclosure, single click on the "JBOD" page on top of the enclosure graphic.

1.2.3 Powerful Event Notification Function

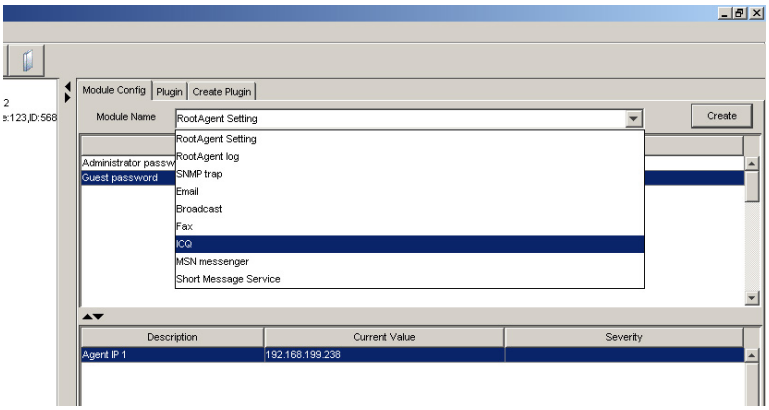

Figure 1-2: Event Notification Function

RAIDWatch can notify system administrators of event occurrences and status changes in the RAID system. Event Notification is managed by a RAIDWatch's sub-module, Configuration Client that is installed onto a management station and runs independently from the main manager program. Notifications can be sent via the Internet as email messages, via a local network as a broadcast message, SNMP traps, ICQ or MSN messenger, SMS short message, or via fax/modem as fax messages without location constrain. To setup the event notification options, please refer to ***Chapter 4*** in this manual.

1.2.4 Java-based Remote Management

RAIDWatch supports local or remote management of Infortrend EonStor subsystems over a LAN/WAN or the Internet using the TCP/IP protocol. RAIDWatch can be highly flexible to access to a RAID subsystem. When "Advanced" installation is chosen during the installation process, three (3) installation schemes are available for you to select using the install shield program. (See ***Figure 1-3***) Below sections are the explanations of the three options.

NOTE:

The default setting of RAIDWatch installation is using basic installation. Basic installation is the same as Mode 1, Centralized Management, in Advanced installation.

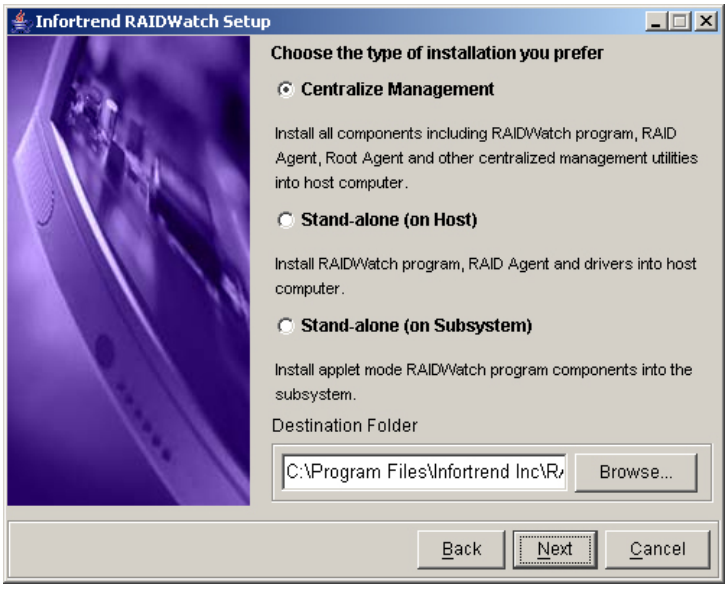

Figure 1-3: Installation Options

1.2.4.1 Mode One: Centralized Management

For centralized or one-to-many configurations using either the Ethernet or in-band host connection to RAID subsystems. The root agent and sub-modules, including the Configuration Client and RAIDWatch Gate, are included. Necessary RAID agents are installed onto the management computer.

1.2.4.2 Mode Two: Stand-alone (on Host)

For configurations depending on the existing SCSI, iSCSI, or Fibre host connection for RAIDWatch-to-RAID communications. Servers in DAS (Direct Attached Storage) environments, SCSI host models for example, require RAID agents for RAIDWatch commands to pass through and communicate with RAID arrays. RAID agents are installed onto the servers that are directly attached with a RAID subsystem.

1.2.4.3 Mode Three: Stand-alone (on Subsystems)

For remote and server-transparent management using an Ethernet connection to EonStor subsystems or EonRAID controllers. The manager program is installed on the RAID subsystem itself. The RAID subsystem then uses a segregated disk space, called the “reserved space,” to store the program files. The array is accessed by invoking a Java Applet on a web browser that runs anywhere in the network.

NOTE:

RAID agents are embedded in the RAID subsystem firmware. When subsystems are installed in Mode 2 or Mode 3, the management station running in Mode 1 can manage the RAIDWatch components. This way, multiple and/or distant arrays can be managed by a single management station.

1.2.4.4 Access Requirements

Three (3) installation schemes for different access requirements are discussed below.

NOTE:

The discussions below do not include all possibilities. RAIDWatch supports various configurations and the combinations of machines running components installed in any of the three different modes.

1. **A RAID Server Chosen as the Centralized Management Station**: Applied in heterogeneous environments where multiple arrays are serving different hosts/applications and scattered in distant locations. Access management over the network is achieved through data exchanges between a local or remote RAIDWatch Manager station (can be a RAID server or not) and RAID agents that are installed on the RAID servers or RAID subsystems themselves. The management center and the RAIDWatch station can be two different machines.

   A Root agent is installed on a computer chosen to be the management center. ***Figure 1-4*** shows a typical connection and ***Table 1-1*** shows the modules installed and the installation mode required:

Installation	Software Modules
Mode One	Management Center: Root Agent + Configuration Client utility
Mode Two	RAID Servers (servers A, B, and C) via in-band
Mode Three	Independent Array
Java Runtime	Management Station

Table 1-1: Software Modules: Heterogeneous RAIDWatch Connection

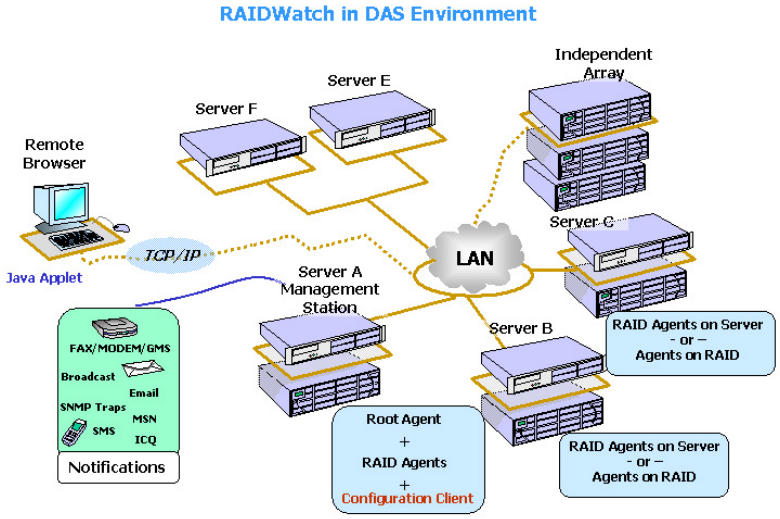

Figure 1-4: Typical RAIDWatch Connection – Heterogeneous

2. **Using a Workstation as the Management Center**: Applied in SAN (Storage Area Network) environments. Access management over the network is directed through exchanges between a remote manager station and RAIDWatch programs that exist on array hard drives.

   Installing the Configuration Client and Root Agent onto a management station enables Event Notification. Installing these modules onto two or more management computers also supports redundancy for agents (see ***Figure 1-5***.)

Installation	**Software Modules**
Mode One	Management Center: Root Agent + Configuration Client utility
Mode Three	RAID Arrays
Java Runtime	Management Station

Table 1-2: Software Modules: RAIDWatch Connection over Java Applet

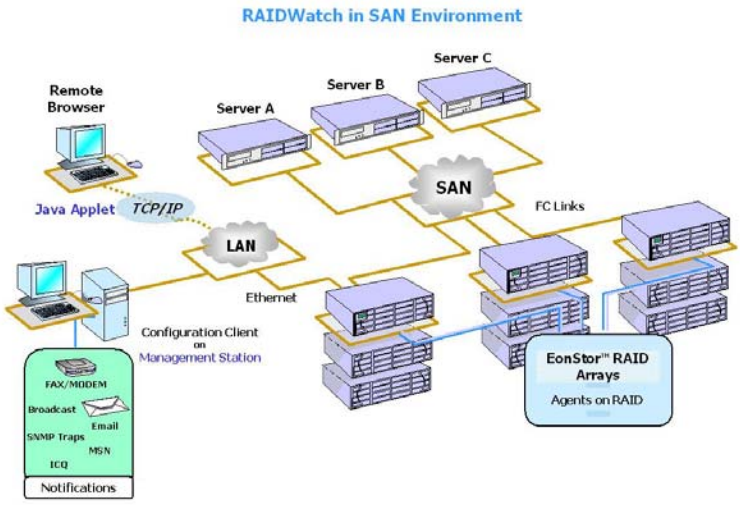

Figure 1-5: Typical RAIDWatch Connection – Applet Mode

3. **Stand-alone/Out-of-Band (on Host) Installation:** This installation provides management access with no centralized management utility. Event notification is provided through an independent NPC utility. RAIDWatch accesses RAID subsystems over the network through the command exchanges between a manager station and RAIDWatch programs that exist in array hard drives, (See ***Figure 1-6***.) The management session and the NPC configuration screen are invoked as a Java Applet.

Installation	Software Modules
Mode Three	RAID Arrays
Java Runtime	Management Station

Table 1-3: Software Modules: Management Only

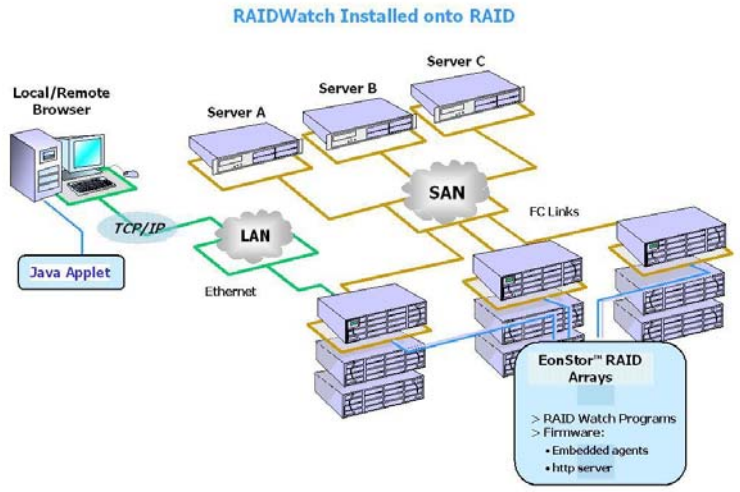

Figure 1-6: Typical RAIDWatch Connection – Applet Mode

1.2.5 Multi-Language Support

RAIDWatch is a useful RAID management tool that is being used worldwide. The software is currently available in three languages: English, Deutsch and Japanese. Support for other languages is under development. The language display is easily changed using the language selection on the program menu bar. As soon as a language is selected, the user interface, wizards, and online help display the chosen language.

1.2.6 Password Protection

RAIDWatch Manager comes with password protection to prevent unauthorized users from modifying the configuration of the RAID system. With the password security feature, you have control over array settings knowing that the currently managed disk array is safe from unauthorized modifications because the correct password must be entered for each access level.

The RAIDWatch management screen has a navigation tree panel that provides access to functional windows under three major categories:

- **Information:** An **Information** login can only access the first level, Information.
- **Maintenance:** A **Maintenance** (user) login can access the second level, the Maintenance tasks.
- **Configuration:** The **Configuration** (administrator) login has access rights to all three levels, Configuration, Maintenance, and Information.

NOTE:

The default password for Information categories is 1234.

Passwords for access levels can be set in the Configuration category under the "Configuration Parameters" "Password" settings. Please refer to ***Section 7.5****.*

1.3 Conceptual Foundation

In order for RAIDWatch to function properly, different software modules must be correctly installed on different servers and stations in a given LAN or WAN. If you follow the default installation during the installation process, RAIDWatch will be installed as a centralized management tool into your system.

1.3.1 Centralized Management (Agent-based) Installation

1. RAIDWatch communicates with a RAID subsystem either using the firmware-embedded RAID agents or agents manually installed onto a RAID-attached server. Assuming that a given network has multiple RAID systems, RAIDWatch can communicate with RAID arrays through the RAID agents installed on the servers or on the RAID subsystems.

2. A server is chosen as the main management server. When RAIDWatch is installed onto this server using the first installation scheme, two important modules are included, **Configuration Client** and **Root Agent**. The Configuration Client enables automatic notifications of system events, and the Root Agent communicates with multiple RAID subsystems that are not directly attached to this server.

3. The main management server will also need Java Run-time Environment (JRE) installed if a system administrator needs to configure the arrays from it.

4. ***Table 1-4*** on ***page 1-11*** provides a guide to what modules need to be installed on which servers.

NOTE:

*The items in the lower section of **Table 1-4**, JRE, web browser and/or web server are not included with RAIDWatch management program; therefore, they must be installed or modified by system users.*

5. For more information about specific platform requirements, see ***Section 3.3 Platform Requirements***.

	Mode 1 Centralized Management	All Modes	Mode 2 Stand-alone on Host	Mode 3 Stand-alone on Subsystem
Installed Elements	Centralized Management Server	Remote Browser Station	Server w/ RAID Directly Attached (in-band)	RAID Subsystem (Applet Mode)
Root Agent	Yes	-	-	-
RAID Agents	Yes	-	Yes	-
RAIDWatch Manager	Yes	-	Yes, if it is used to run RAIDWatch	Yes
Configuration Client	Yes	-	-	-
JRE	Yes, if it is used to run RAIDWatch	Yes	Yes	-
Web Browser	Yes	Yes	Yes	-
Web Server	Yes	-	-	Embedded

Table 1-4: RAIDWatch Module Requirements

1.3.2 Stand-alone (on Host) Installation

Main features of the RAID-based installation method are listed below:

- RAIDWatch main programs and the RAID agents used to communicate with a RAID subsystem over in-band connection are installed.
- RAIDWatch runs on the RAID-attached server as a Java program.

1.3.3 Stand-alone (on Subsystem) Installation

Main features of the RAID-based installation method are listed below:

- RAIDWatch revisions 2.0 and above support installation to array hard drives. A portion of the drive capacity (256MB of disk space) is segregated and formatted on each hard drive. This segregated portion is called a “reserved space.” Once installation begins, RAIDWatch’s main programs are automatically distributed to the reserved space.

NOTE:

The RAIDWatch 2.0 or above installation only executed when hard drive is formatted or at least one logical drive exists. Use LCD panel or RS-232 terminal program to create a logical drive when you are using new hard drive before installing RAIDWatch 2.0 or above version.

- There is no need to install the RAIDWatch program to your management computer.
- If the arrays are managed by dual-redundant controllers, in the event of single controller failure, the manager interface can "failover" to a counterpart controller. Operators' access to the system will not be interrupted.
- The RAID subsystem can be accessed from a remote station running a web browser. RAIDWatch now runs in Java Applet mode. Applet is executed when the connection is established between a remote browser and the RAID subsystem. Web browsers, which are often equipped with Java virtual machines, can interpret applets from web servers.
- The controller firmware has an embedded HTTP server. Once properly configured, the controller/subsystem's Ethernet port behaves like an HTTP server.

Chapter 2
RAIDWatch Considerations

Before you begin installing RAIDWatch, the following items should be considered:

2.1 Background Information

Redundant Arrays of Independent Disks (RAID) is a storage technology used to improve the processing capability of storage systems. This technology is designed to provide reliability (i.e., "fault tolerance") in disk array systems and to take advantage of the performance gains multiple disks can offer.

RAID comes with a redundancy feature that ensures fault-tolerant, uninterrupted disk storage operations. In the event of a disk failure, disk access will still continue normally with the failure transparent to the host system.

RAID has several levels and multi-level configurations including RAID 10, 30, and 50. RAID levels 1, 3 and 5 are the most commonly used levels, while RAID levels 2 and 4 are less popular. ***Appendix C***, ***RAID Levels***, gives information about these levels and the benefits of each.

Infortrend disk array controllers support hot-swapping so that a failed drive can be replaced while the disk array system continues to function. Spares can also be assigned so that, as soon as a drive fails, the spare is automatically configured into the array and reconstruction will commence.

2.2 Definition of Terms

This section describes some of the disk array terms used in this documentation.

- **Physical drives.** These are the actual drives installed into the enclosure drive slots. These drives are displayed in Enclosure View and the Front View of different configuration windows.

- **Spare drives.** These are physical drives that serve as backups. When a drive fails, the spare automatically joins the array and data reconstruction commences immediately. Dedicated and Global Spares are shown in different colors. A Dedicated Spare appears in the same color as other members of the logical drive it belongs to. A Global Spare uses the default color (black). Both Dedicated and Global Spares have an orange cross superimposed on them.

- **Replacement drives.** These are physical drives that are manually configured into the array to replace failed drives. In the absence of spare drives, you will need to use replacement drives to replace defective drives before rebuilding. If a spare drive has been used to

rebuild the array, you will also need to replace the failed drive manually to create another spare in case another drive fails.

- **Failed drives.** These are physical drives that fail due to some type of error. Failed drives appear with red LED marks on their respective icons.

- **Logical drives.** Logical drives are the combinations of multiple physical drives. Combining physical drives into logical drives gives you a disk array with a certain RAID level. To view logical drives, select "Existing Logical Drives" under the navigation menu tree.

- **Logical volumes.** Volumes are the combinations of several logical drives. Combining logical drives into logical volumes gives you a single logical unit with even larger capacity. Logical volumes or their partitions are mapped to various host LUNs. To view logical volumes, select "Existing Logical Volumes" under the navigation menu tree.

2.3 Operating with Spare Drives

You can assign spare drives to a particular logical drive to serve as backup drives. When a drive fails within the logical drive, one of the spares will be automatically configured into the logical drive, and data reconstruction onto it will immediately commence.

The following are guidelines for disk failure recovery when a spare drive is available:

- If a spare drive exists in the same logical drive, the controller will automatically mount the spare drive and start rebuilding data in the background.

- Depending on system design, it may be possible to remove a defective drive and replace it with a new drive without shutting down the system (hot-swapping). All EonStor subsystems support drive hot-swapping.

- The replacement drive must then be assigned as a new spare drive.

2.4 Operating without Spare Drives

The following are guidelines for disk failure recovery when a spare drive is not available:

- Depending on the design of the system, it may be possible to remove a defective drive and replace it with a new drive without shutting down the system (hot-swapping). All EonStor subsystems support drive hot-swapping.

- If the replacement drive is installed on the same channel and ID (the original drive slot where the faulty drive was), you can then proceed with data rebuilding.

- If the replacement drive is installed on a different channel or ID (different drive slot) or the periodic drive scan function has been disabled, you need to scan in the new drive first, and then assign it as a spare drive of the logical drive which had a drive failure. Data rebuilding will have to be manually initiated.

IMPORTANT!

Although the RAID system provides uninterrupted disk access even after a disk failure, do not leave a failed drive unattended. Without replacement, the system will not survive a second physical drive failure on the same logical drive. A defective drive must be promptly replaced and data rebuilt.

CAUTION!

When performing hot-swapping, be sure to remove only the defective drive. Removing the wrong drive will result in complete, unrecoverable data loss. Use the Enclosure View window or Logical Drive Information window to locate exactly which physical drive has failed.

2.5 Before You Start

RAIDWatch Manager comes with password protection that prevents unauthorized modification of the disk array configuration. During each attempt at modifying the system configuration, the configuration will require the correct password before proceeding.

By default, the RAIDWatch Manager station comes with a password for login as an Information viewer. For information on how to set a password and other security features, see the ***Password*** section of ***Chapter 7***, ***Configuration Parameters***.

Chapter 3
Installation

This chapter describes RAIDWatch requirements and the installation procedure. The following sections are covered in this chapter:

3.1 System Requirements

The minimum hardware and software requirements for RAIDWatch are listed below.

3.1.1 Server Running RAIDWatch

A server can be chosen as the centralized management center, which uses the Configuration Client utility and can be installed with the RAIDWatch manager program using the first installation scheme (Centralized Management)

- Computer must be Pentium or above PC-compatible running Windows 2000, 2003, Linux RedHat 8/9, Linux RedHat Enterprise Linux 3.0, LinuxSuse8.1/9.1, Solaris 8/9, or Mac OS X that supports Java Runtime 1.4.2 or higher.
- 256-color or higher mode management station monitor.
- At least one available RS-232C port is required (if connection to the controller is through the RS-232C).

3.1.2 Local Client Running RAIDWatch Manager

- Computer must be Pentium or above PC-compatible running Windows 2000, 2003, Linux RedHat 8/9, Linux RedHat Enterprise Linux 3.0, LinuxSuse8.1/9.1, Solaris 8/9, or Mac OS X that supports Java Runtime 1.4.2 or higher.
- Remote station must be running Netscape 4.7X, IE6.0 or Mozilla 5.0, Java Runtime 1.4.2 (for a particular platform).
- 256-color or higher mode management station monitor.
- At least one available RS-232C port is required (if connection to the controller is through the RS-232C).
- Windows Messaging (MAPI) for Windows 2000/2003 if fax notification support is needed.
- Windows NetBEUI support for Windows 2000/ 2003 must be enabled if network broadcast support notification is needed. Please refer to your Windows documentation for more information.
- SNMP traps service for Windows NT if SNMP traps notification is desired.
- TCP/IP with a valid IP assigned to each controller/subsystem.

- A fax modem that supports Hayes AT command protocol is required (if using the fax event notification function.) (Fax command class 2.0 and above.)

- A GSM modem is required (if using the SMS short message event notification function). RAIDWatch currently supports two GSM modem models:

  - Siemens TC35

  - WAVECOM Fast Rack M1206

NOTE:

Please contact Infortrend for the complete list of compatible GSM modems.

3.2 RAID Chart

Before installing RAIDWatch and its various agents and modules, it is helpful to chart your RAID systems. If you operate a single RAID from a local or remote workstation, you may skip this section. If you have multiple RAID systems, the information shown in ***Table 3-1*** provides guidelines for charting existing RAID systems. Each field is explained follows the table.

RAID System	RAID System 1	RAID System 2	RAID System 3
ID/Name	Example	Example	….
Location	HQ	Storage	….
OS	Windows 2000	N/A	….
IP Address	205.163.164.111	xxx.xxx.xxx.xxx	….
Role	Centralized Management Center	Storage pool	….
Internet Capable	Yes	N/A	….

Table 3-1: RAID Charting Table

- **ID/Name** – User designated; an ID or name should be a unique identifying label.

- **Location** – A specific geographic reference (e.g., headquarters, Building 3, Equipment Room 100.)

- **OS** – The operating system running on the particular system.
- **IP Address** – If available.
- **Role** – The purpose fulfilled by the particular system, relative to RAID operations.
- **Internet Capable** – If a server is an Internet server, the answer to this is "***Yes***." If a workstation will manage RAID systems through a browser, note the particular browser software, its version number, and its support for Java.

3.3 Platform Requirements

RAIDWatch supports Windows 2000/2003 operating systems both for servers (RAID management hosts or web servers) and for client management stations (RAIDWatch Manager workstations). Support for Java, however, depends on the Java Runtime installed on each OS. Below is the platform requirements using windows OSes.

1. Under Windows 2000/2003, the Java installation program, installshield.jar, ONLY supports:
   - Netscape 4.5 (or above)
   - Microsoft Internet Explorer 4.0 (or above)
2. Windows Messaging (MAPI) for Windows must be enabled if support for fax or email notification under NT is needed. Refer to your Windows documentation for more information.
3. Windows NetBEUI support for Windows must be enabled if network broadcast support notification is needed. Refer to your Windows documentation for more information.

3.4 Software Setup

This section discusses how to install RAIDWatch in your system. Before proceeding with the setup procedure, read through the ***Before You Start*** section below.

3.4.1 Before You Start

Before starting the installation, read through the notes listed below:

- TCP/IP must be installed and running with a valid IP address assigned to a server. The server can either be used as a centralized management station, a remote client using a browser to access the array, or directly attached with a RAID system using the in-band protocols.
- Your system display must be running in 256 colors or higher mode otherwise some configuration items may not be visible.
- Be certain that your system meets the minimum hardware and software requirements listed in ***Section 3.1 System Requirements***.
- Check to confirm that the RAID disk arrays and controllers are installed properly. For the installation procedure, see the documentation that came with the controller/subsystems.
- Follow the directions provided in the ***Section 3.3 Platform Requirements,*** and prepare for installation and operation under different OS environments.

3.4.2 Installing RAIDWatch

Follow these steps to install RAIDWatch on your server(s) and RAID subsystems:

Step 1. Insert the Infortrend product CD or RAIDWatch installation CD into your CD-ROM drive.

Step 2. If you are currently running other applications, close them before proceeding with the setup process. This will minimize the possibility of encountering system errors during setup.

Step 3. The RAIDWatch installer program is included in a CD-ROM that came with your RAID controller or subsystem. An auto-run screen provides a hot link to the installer program. (See ***Figure 3-1***) Click "***Install RAIDWatch***."

Figure 3-1: Product Utility CD Initial Screen

Step 4. Click the supported platform on the right-hand side to start the installation process. The current availability is "***Windows 2000 and above***." (See ***Figure 3-2***)

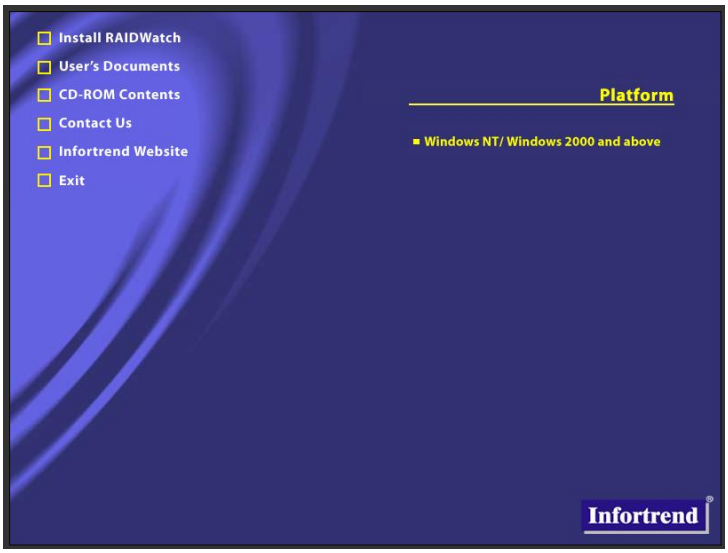

Figure 3-2: The Platform Window

Step 5. After opening the install shield, the welcome screen shown in ***Figure 3-3*** will appear. If your server or workstation is not ready with Java Runtime (at least version 1.4.2), the install shield will automatically install Java Runtime onto your machine. Please follow the on-screen instructions to proceed.

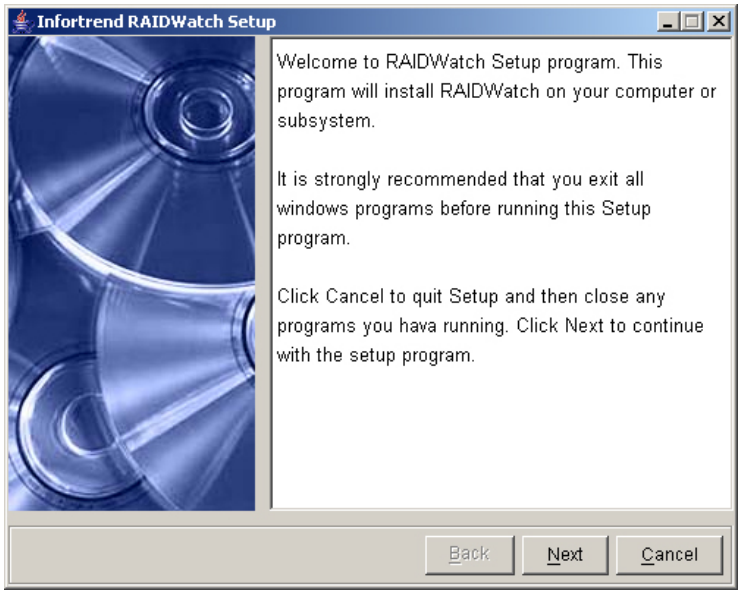

Figure 3-3: Welcome to the Install Shield Window

Step 6. To continue installing RAIDWatch, click the ***Next*** button at the bottom of the window. If you do not wish to continue with the installation process, select the ***Cancel*** button.

Step 7. If you selected the ***Next*** button on ***Figure 3-3***, the License Agreement window seen in ***Figure 3-4*** will appear. First read through the License Agreement. If you are in agreement with the specified terms and wish to continue installing the RAIDWatch program, select ***Accept***. If you do not wish to continue with the installation process then select the ***Decline*** button.

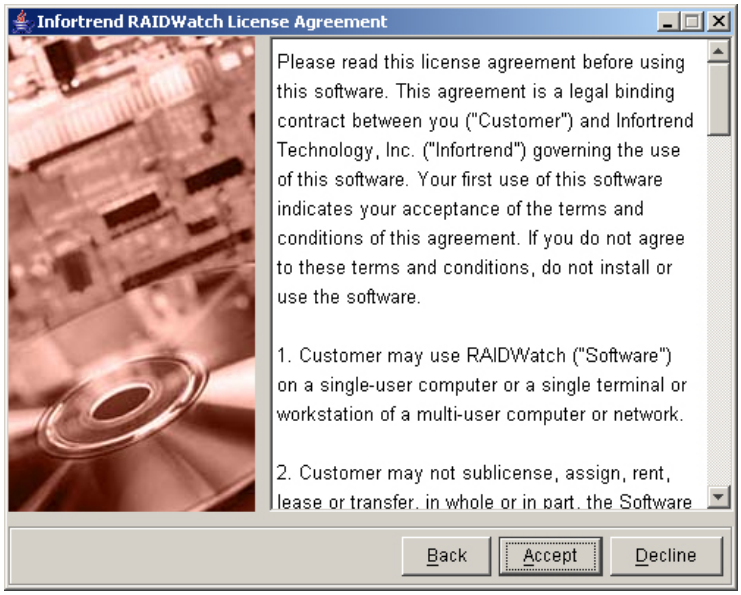

Figure 3-4: License Agreement

Step 8. If you accepted the License Agreement in ***Figure 3-4***, a new window with two installation options will appear. These options, shown in ***Figure 3-5***, are ***Typical Install*** and ***Custom Install***. The default is set to ***Basic Install***. All users are recommended to install RAIDWatch

program by default setting. This will create a new "Infortrend Inc" folder in the computer chosen as a management center. If you like to install RAIDWatch in a different folder, type in a new location or click the ***Browse*** button to select a destination folder. If you follow the default selection and click ***Next*** button, the install shield will start install the RAIDWatch software, RAID Agents, and necessary drivers on the computer.

If you like to install the management utility redundantly onto two different servers, select ***Advanced Install***, and click the ***Next*** button to choose a desired installation mode in the next screens.

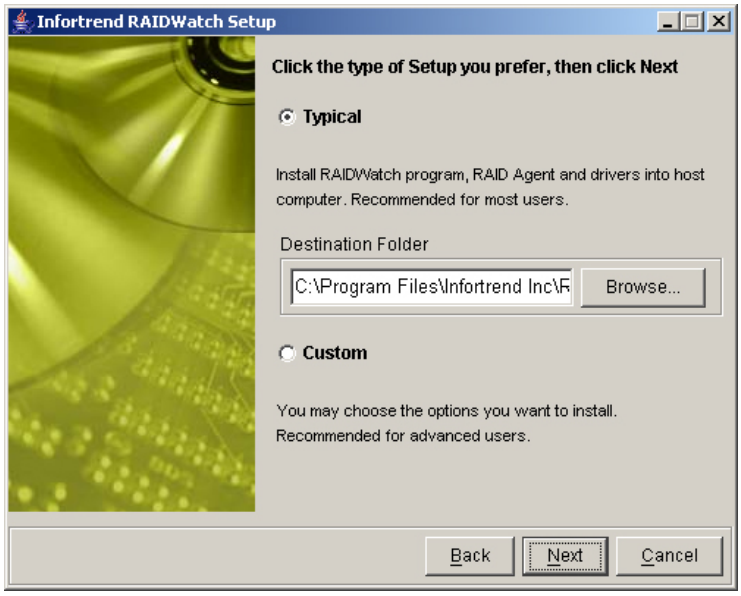

Figure 3-5: Choose an Installation Mode

Step 9. If you choose the ***Advanced Install*** in the previous screen, three (3) installation modes will appear. These modes, shown in ***Figure 3-6***, are ***Centralized Management***, ***Stand-alone (on Host)***, and ***Stand-alone (on Subsystem)***.

- ***Centralized Management*** – Selecting this option allows you to install the RAIDWatch software, a Root Agent, RAID Agents, Configuration Client utility, and necessary drivers on the computer chosen as a management center.

- ***Stand-alone (on Host)*** – Selecting this option will install the In-band driver (RAID agents) for servers that are directly attached to a RAID subsystem, and the RAIDWatch software on the local computer.

- ***Stand-alone (on Subsystem)*** – This will install the software onto the controller/subsystem itself. The EonStor subsystems come with necessary RAID agents embedded in the firmware. A RAID subsystem will use a small section of formatted disk space (called the reserved space) to store software related

files. Installed in this mode, RAIDWatch can be started by a remote browser accessing the IP address assigned to the subsystem's Ethernet port.

If the ***Stand-alone (on Subsystem)*** installation was selected, you will have to use a web browser to connect to the RAIDWatch program. To do this, open a web browser and enter the controller/subsystem IP address. The RAIDWatch program can then be accessed and used to manage the storage array.

IMPORTANT!

There is no need to configure the Peripheral Device setting if you are trying to manage a RAID subsystem from a RAIDWatch station through an Ethernet connection (to the EonStor subsystem's Ethernet port). An Ethernet connection to RAID uses TCP/IP as the communication protocol.

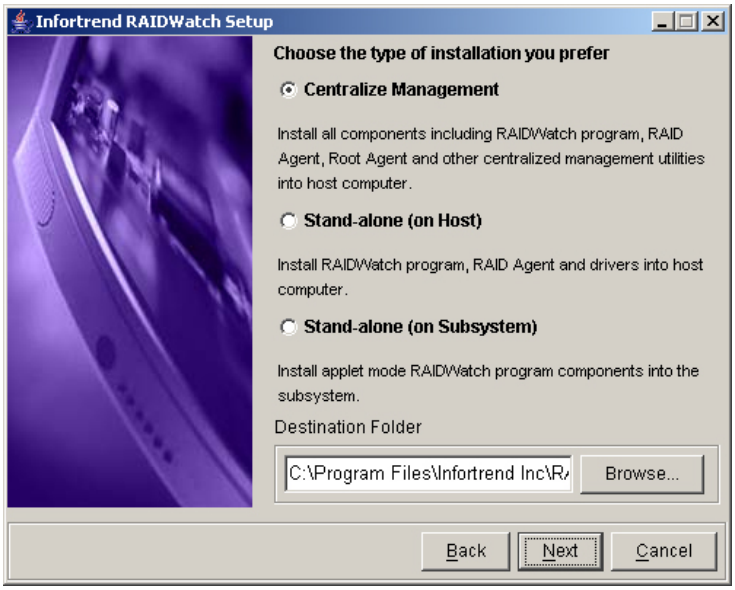

Figure 3-6: Advanced Installation Options

3.4.3 Installing Software Components

RAIDWatch allows you to install its management utility redundantly onto two different servers. This prevents blind time if one server fails or is powered down for any expected reasons. Note that if a server is chosen as either the Master or Slave host, RAIDWatch must be manually installed on it.

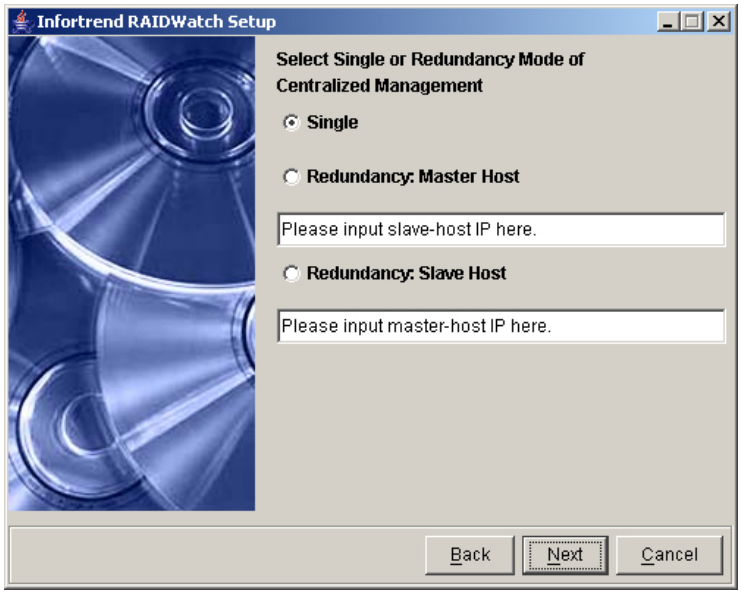

Figure 3-7: Choice of Software Module Redundancy

RAIDWatch allows you to choose components during the ***Advanced*** installation process. However, it is recommended to keep all the default combinations.

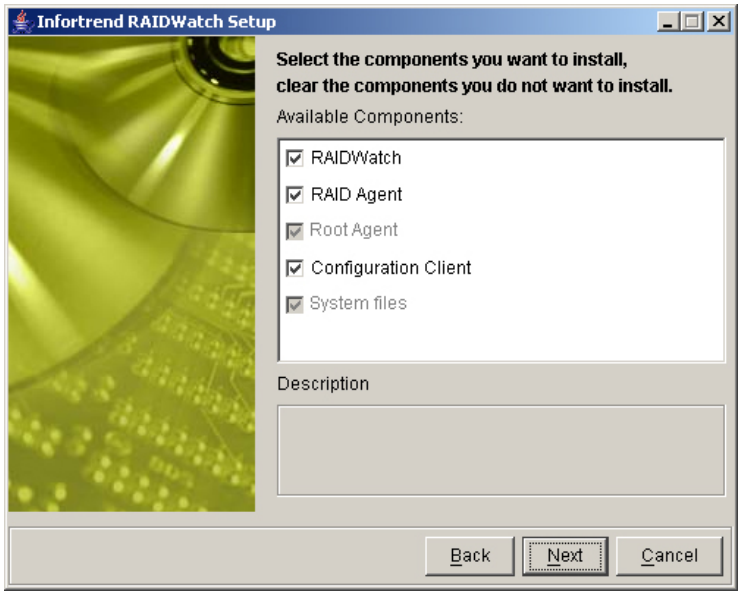

Figure 3-8: Optional Components

Once the additional components have been selected, and if you wish to proceed with the installation process, select the ***Next*** button. If you do not wish to proceed with the installation process, select the ***Cancel*** button. If you wish to re-select the installation options, select the ***Back*** button.

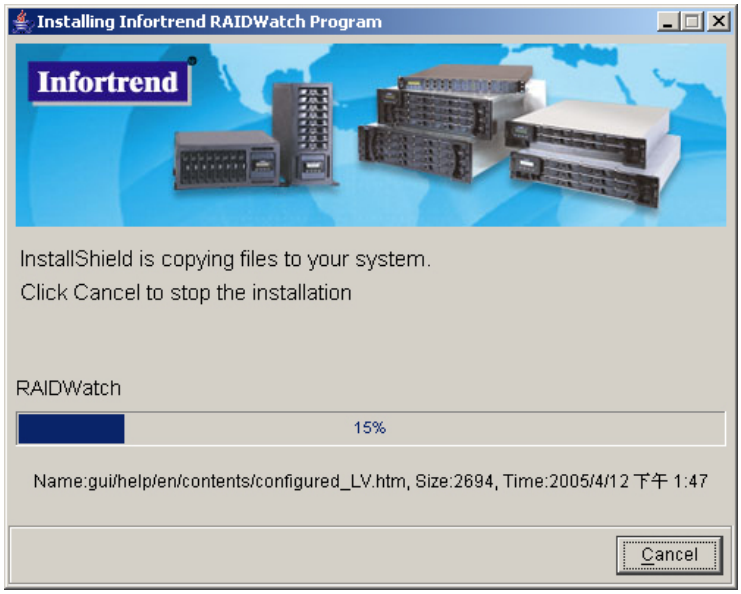

Figure 3-9: Installing Active

Step 1. If the ***Next*** button from ***Figure 3-8*** was selected, the Install Active window shown in ***Figure 3-9*** will appear. If you wish to stop the installation procedure, then click the ***Cancel*** button.

Step 2. Once the software has been successfully installed, a window indicating the successful installation (see ***Figure 3-10***) will appear. To complete the process and exit the window, click ***Finish.***

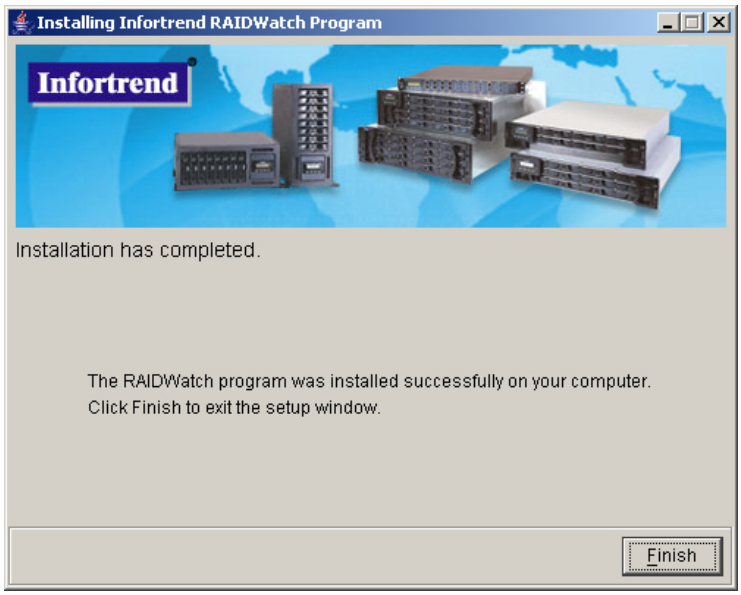

Figure 3-10: Successful Installation

3.4.4 Stand-alone (on Host or Subsystem) Installation

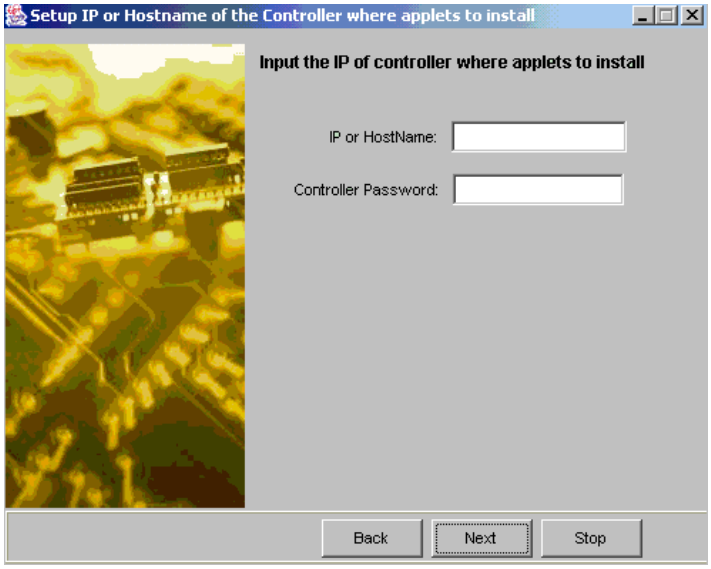

Figure 3-11: Input IP and Controller Password

Step 1. As shown in ***Figure 3-11*** above, enter the IP address or the host name of the controller/subsystem and the controller password in their respective fields. The default for the controller/subsystem IP or password is blank. The preset IP and password should have been configured along with other configuration utilities before proceeding with RAIDWatch installation.

Once the IP (or host name) and the controller password have been entered, select the ***Next*** button if you wish to proceed with the installation process. If you do not wish to proceed with the installation process, select the ***Stop*** button. If you wish to re-select the installation options, then select the ***Back*** button.

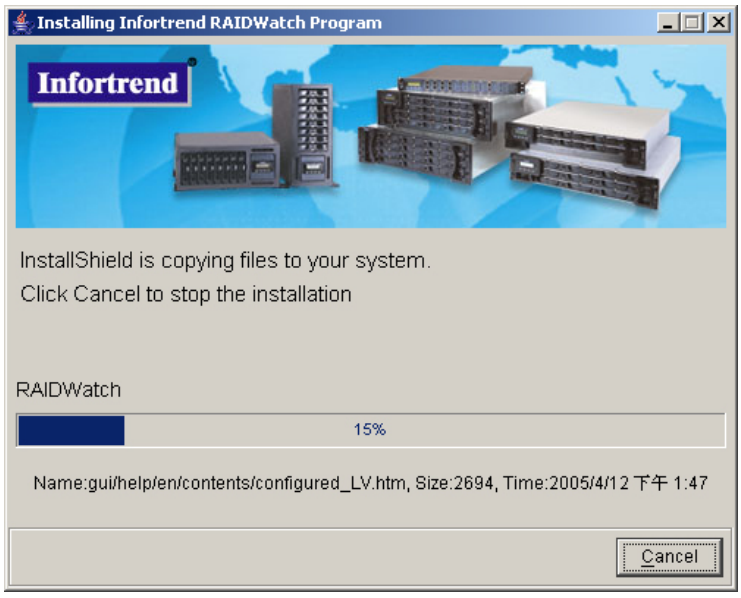

Figure 3-12: Installing Active

Step 2. If the ***Next*** button from ***Figure 3-12*** was selected, the Install Active window shown in ***Figure 3-13*** will appear. If you wish to stop the installation procedure, then click the ***Cancel*** button. If you wish to continue installing the Applet components, allow the installation shield to continue through the rest of the procedure.

Step 3. Once the software has been successfully installed, a window indicating the successful installation (see ***Figure 3-13***) will appear. To complete the process and exit the window, click the ***Finish*** button.

Figure 3-13: Successful Installation

Step 4. If you wish to immediately access the RAIDWatch manager, open a web browser and type in the IP address that you used in ***Figure 3-11***.

To run the **RAIDWatch Manager** from the controller, enter the following into the address bar of the web browser:

http://www.xxx.yyy.zzz

where **www.xxx.yyy.zzz** is the IP address entered in ***Figure 3-11***.

3.5 Program Updates

As Infortrend's valued customer, you are entitled to free program updates. You can download the latest version of RAIDWatch from Infortrend's FTP sites at *ftp.infortrend.com.tw*. For customers granted special access, the update files can also be found in the VIP section of Infortrend's website. For more information about this service, contact Infortrend support or an Infortrend distributor in your area.

3.6 In-band SCSI

3.6.1 Overview

To meet the needs of device monitoring and administration, more and more external devices require communication with the host computers. Out-of-band connections such as RS-232C ports or an Ethernet port can be used to achieve this goal.

An alternative way of communication is in-band SCSI, which transfers configuration commands into supported SCSI commands and uses them to communicate with RAID arrays over the existing SCSI or Fibre host connections. The traditional way for controllers to communicate with the host computer has been via software (such as RAIDWatch) using an Ethernet connection. With in-band, integrators have more flexibility and may use the existing host connection instead.

There are limitations on the use of in-band protocols however. In order for a host to "see" the RAID controller/subsystem, at least one (1) logical drive must exist and be mapped to a host ID/LUN. Otherwise, the RAID controller/subsystem itself must be configured to appear as a peripheral device to the host computers.

See the examples below for the procedures on configuring RAID controller/subsystems into a peripheral device.

3.6.2 Related Configuration on Controller/Subsystem

The RAID controller or subsystem must make some adjustments as well as the host computer's SNMP settings before the two can communicate using SCSI commands. You can use the RS-232 terminal to change the RAID controller settings.

Step 1. From the **Main** Menu, press the ***Up*** or D***own*** buttons to select "**View and Edit Configuration Parameters**."

Step 2. Press ***Enter***; and then use the ***Up*** or ***Down*** keys to select "**Host-side SCSI Parameters**." Then press ***Enter***.

The **Peripheral Device Type Parameters** submenu is also need to be adjusted. Refer to the instructions below to set the proper settings for the in-band protocol to work.

Step 1. First select the "**Peripheral Device Type**" submenu and then select "**Enclosure Services Devices <Type=0xd>**."

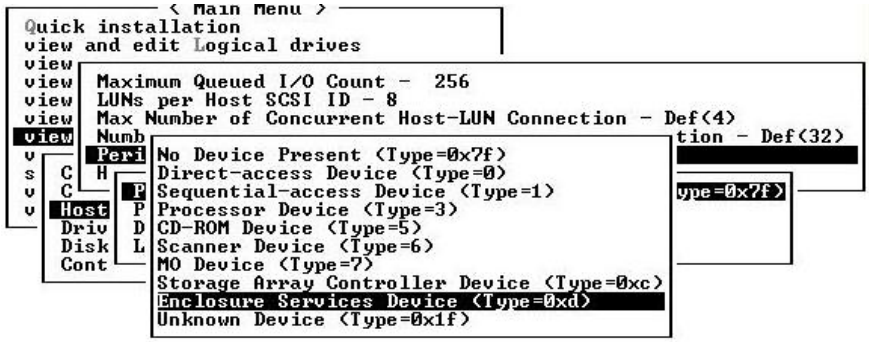

Figure 3-14: RS-232 Terminal Screen (I)

Step 2. Select "**LUN Applicability - Undefined LUN-0's Only**" option.

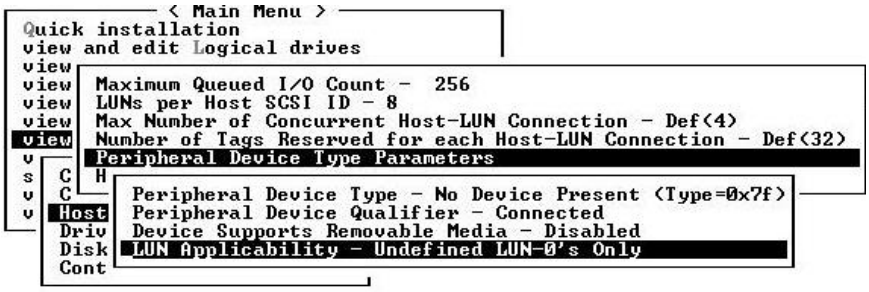

Figure 3-15: RS-232 Terminal Screen (II)

Step 3. Leave other options as defaulted. In-band should work fine by setting these two options. The adjustments necessary to use in-band protocols have been completed.

NOTE:

Be sure to change the Peripheral Device Type to your preference after in-band SCSI connection has been setup.

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Chapter 4
Configuration Client Options

This chapter describes the Configuration Client options. There are a number of different items that users can configure. These include the Root Agent and RAID Agents relationship and the configuration options concerning event notification. The following sections are covered in this chapter:

4.1 The Configuration Client Utility

4.1.1 Start the Configuration Client Program

If the Centralized Management option was selected during the installation process outlined in ***Chapter 2***, the Root Agent driver, associated agents, and Configuration Client utilities will be installed onto your computer. Centralized management in a multi-RAID environment is achieved through the Configuration Client utility.

To access the Configuration Client interface, please do the following:

Step 1. Open the directory in which the RAIDWatch management software was installed. The directory was selected during the installation process and the default access route was named "***Infortrend Inc***."

Step 2. If you are using a Windows operating environment, you may start the Configuration Client by double-clicking on the ***Configuration Client*** shortcut on your Windows Desktop. (See ***Figure 4-1***) Otherwise, select ***Start*** on the bottom left of your screen, select the ***Programs*** menu, and then select ***Infortrend Inc.*** Under the ***Infortrend Inc*** directory, select the ***Configuration Client*** option shown in ***Figure 4-2***.

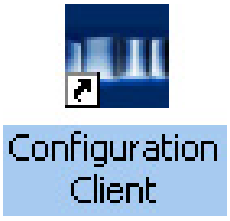


Figure 4-1: Configuration Client Shortcut on Windows Desktop

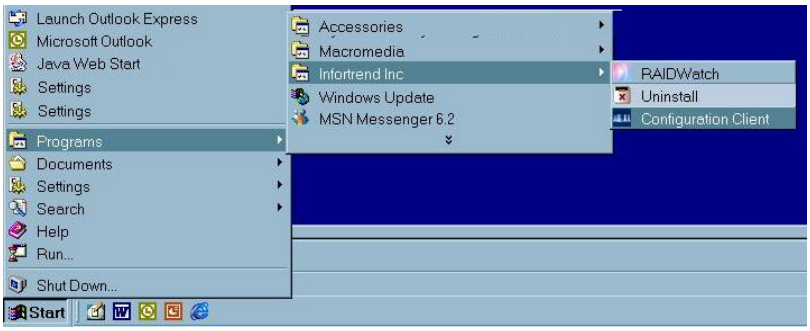


Figure 4-2: Configuration Client Shortcut on Windows Startup Menu

Step 3. Click on ***Configuration Client*** to activate the Configuration Client window as shown in ***Figure 4-3.*** The Configuration Client program allows you to configure the following items:

- Root Agent (administrative settings)
- Auto Discovery
- Notification configuration options

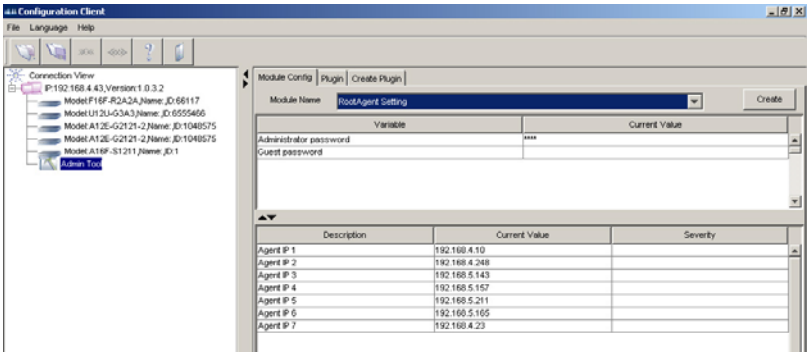


Figure 4-3: Configuration Client Window

4.1.2 Setting Up a Root Agent

Step 1. Launch the Configuration Client program. See ***Section 4.1.1***.

Step 2. From the Command menu, select **File->Add Host** (see ***Figure 4-4***), or right-click on ***Connection View*** to bring up the **Input Root Agent** Dialog Box, and enter a **Root Agent IP** here. (See ***Figure 4-5***)

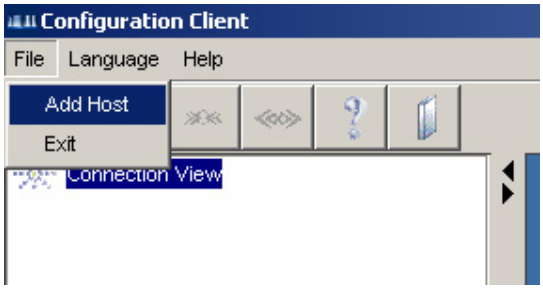


Figure 4-4: Add Host Command

Figure 4-5: Input Root Agent Dialog Box

NOTE:

The Root Agent IP is usually the computer IP where the Configuration Client is installed.

Step 3. The connected IP displays on the left of the **Connection View** window. Select the IP and click the ***Connect Root Agent Server*** icon (see ***Figure 4-6***) or right-click on the displayed IP to display the ***Connect*** commands. (See ***Figure 4-7***)

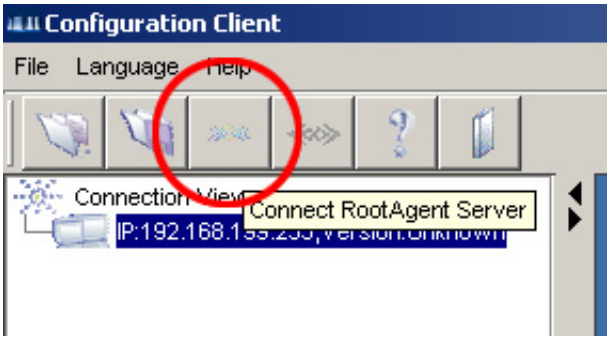


Figure 4-6: Connect Commands

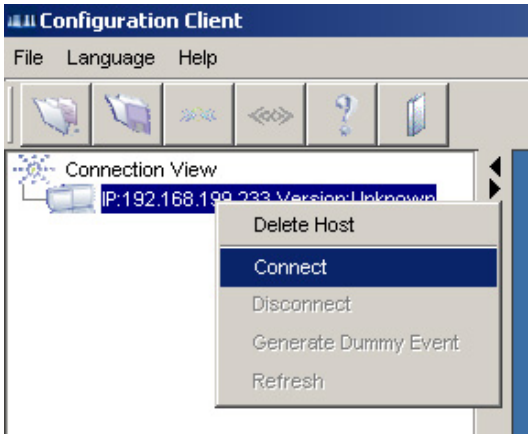


Figure 4-7: Connect Commands

Step 4. The **Confige user** dialog box appears. Select to log in either as an Administrator or Guest. An administrator has the authority to change any configuration client settings, unlike a guest is allowed to view the settings only. (See ***Figure 4-8***)

Figure 4-8: Access Rights Selection Box

Step 5. When login as an administrator, enter "***root***" as the authentication code in the **Password** dialog box at the first time login, and then click ***OK***. (See ***Figure 4-9***) The authentication code can be changed later in the utility. Only an administrator who has the password can access the notification settings.

Step 6. Password is not required when login as a guest. Click ***OK*** to login without entering any password.

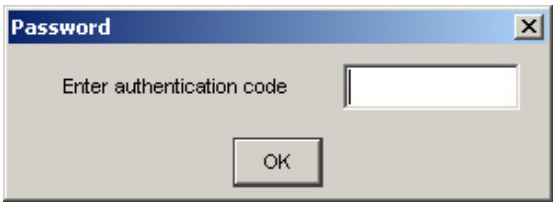


Figure 4-9: Password Dialog Box

Step 7. Double-click the **Admin Tool** item on the **Connection View** window in the **Configuration Client** User Interface. (See ***Figure 4-10***)

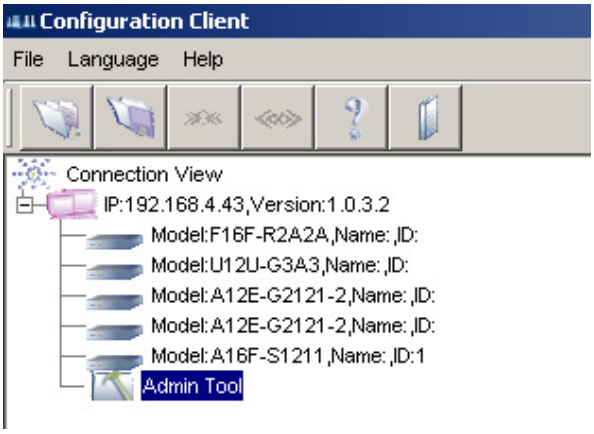


Figure 4-10: Left Column of Configuration Client User Interface

Step 8. The **Module Configuration** window will display on the right of the **Configuration Client** User Interface. You may now start configuring event receivers under each notification method window. Click on the **Module Name** pull-down list to display all the configuration options. (See ***Figure 4-11***)

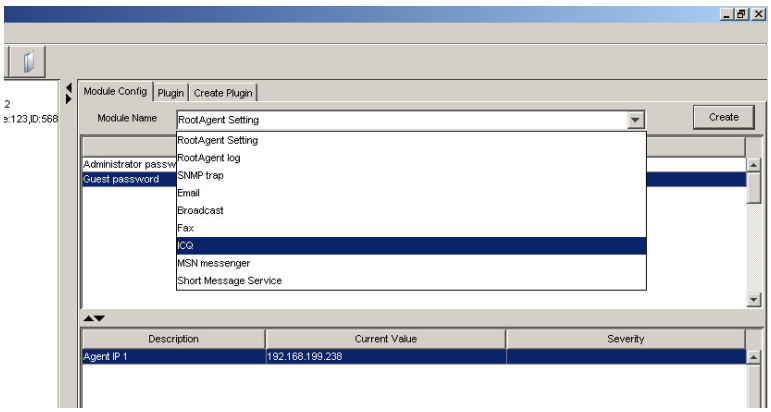


Figure 4-11: Module Name Pull-down List

4.2 Configuration Client User Interface

The Configuration Client user interface contains four (4) major elements: Tool Bar Buttons, Connection View Window, and Module Configuration Window. They are shown in ***Figure 4-12***.

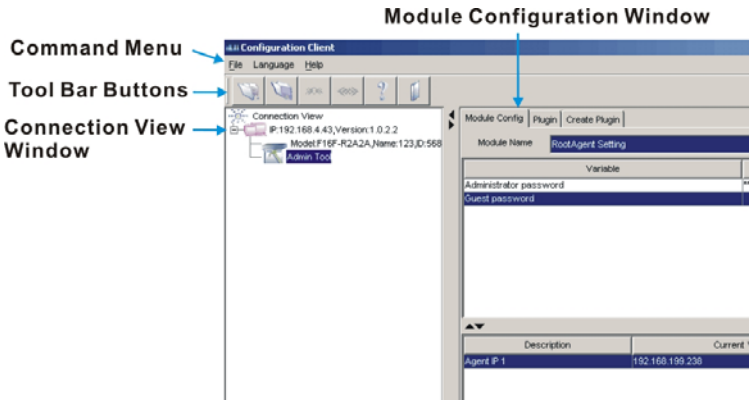


Figure 4-12: Major Elements in Configuration Client User Interface

4.2.1 Command Menu

- **File** commands include **Add Host** and **Exit**. The **Add Host command** connects you to a Root Agent host. A Root Agent host is one that is chosen as a management center to manage multiple RAID agents, which are, in turn, used to access different arrays. By connecting to a Root Agent IP, all its subsidiary RAIDs are then managed by the management center. The **Exit** command will let you exit the **Configuration Client User Interface** and close the program.

- The **Language** command allows you to select the language display on the **Configuration Client User Interface**. The current selections include English, Deutsch and Japanese.

- The **Help** command provides information about the current software version. The **Help** explains how to use the Configuration Client and can be accessed in RAIDWatch's main Help program.

4.2.2 Tool Bar Buttons

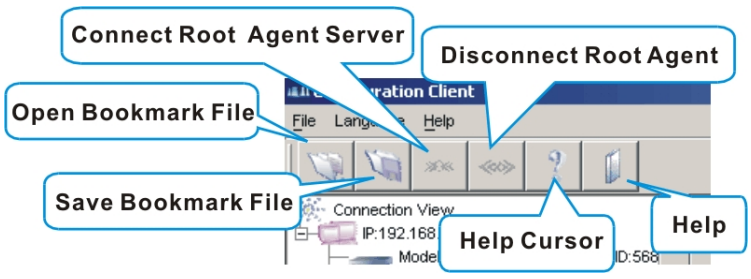


Figure 4-13: Tool Bar Buttons

The tool bar has six (6) buttons, described from left to right as follows:

- ***Open Bookmark File***: In the environment where multiple arrays need to be monitored at the same time, this button brings out the previously saved profile of the access to multiple arrays (via Root Agent and RAID Agent IPs).

- ***Save Bookmark File***: This button allows you to save the current connection profile (as shown in the Navigation panel) as a file to your system drive. A file path dialog box displays when selected.

- ***Connect Root Agent Server***: This button allows you to connect to a Root Agent server to begin monitoring, for example, in situations when it has been manually disconnected.

NOTE:

The Root Agent IP is the IP of the computer where you installed your Configuration Client utility.

- ***Disconnect Root Agent***: This button allows you to disconnect from a Root Agent server.

- ***Help Cursor***: Click the ***Help Cursor*** button and then click on the area where you have question. A **Help** window will appear to explain the functionality.

- ***Help***: Click on the ***Help*** button to browse the Online Help in RAIDWatch management software's main Help program.

4.2.3 Connection View Window

The **Connection View** window displays the current connections with different RAID Agent servers. Each Root Agent server IP has an Administration Tool. This window has a command menu that can be triggered by ***right-clicking*** a Root Agent icon. Right-click on the Root Agent server to show a selection menu. (See ***Figure 4-14***)

These commands on the selection menu allow you to remove a Root Agent entry, to connect, disconnect, or refresh the current connectivity status. The **Connection View window** automatically updates when an array is turned on or off, and automatically prompts you for a status change, e.g., a managed array once disconnected is now connected.

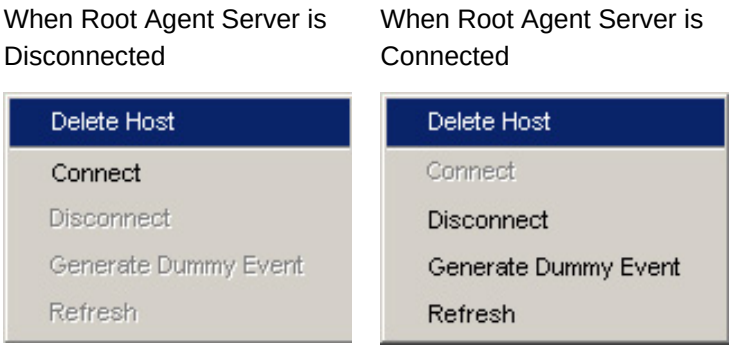


Figure 4-14: Connection: The Right-click Menus

***Delete Host*:** Delete the Root Agent Server by selecting this command.

Connect: Select this command to connect your computer to the Root Agent Server.

Disconnect: To disconnect the Root Agent Server from your computer, select this command.

***Generate Dummy Event*:** You can also generate simulated events to test the notification functions once you have configured any or all of the notification methods.

Refresh: Refresh the connection between your computer and the Root Agent Server.

4.2.4 Module Configuration Window

The ***Module Config*** panel contains pull-down menus that allow access to create or modify various notification methods. The panel also allows you to setup an administrator's identity and lets an administrator be constantly aware of all arrays' status through notification emails.

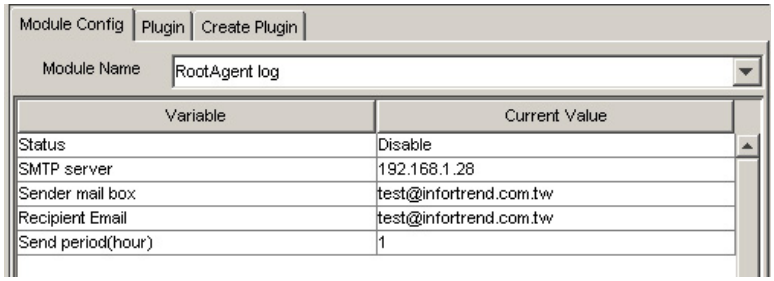


Figure 4-15: Enable an Administrator's Options

The Module Config panel provides access to ten (10) configurable items, and each item contains two or more setup options. Seven (7) of them belong to the notification methods (ways you configure to notify a user if event faults occur) settings.

Double-clicking the Current Value field can modify all configuration options.

4.3 Root Agent Configuration

To configure the Root agent settings, select the ***Module Config*** menu on the right of the Configuration Client User Interface as shown in ***Figure 4-16***. Select the pull-down menu named ***Root Agent Settings*** from the ***Module Name*** section.

4.3.1 Root Agent Settings

The ***Root Agent Settings*** option is shown in ***Figure 4-16***.

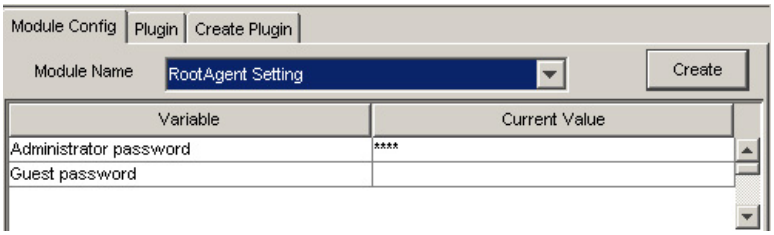


Figure 4-16: Root Agent Setting

- ***Administrator Password***: This allows you to set an administrator's password. This is the port number the RAIDWatch centralized manager station will use to communicate with the Root Agent. The default for Administrator is "**root**." There is no default password for login as Guest.

NOTE:

This password is independent from the password set for the "Configuration" login to start the RAIDWatch management program.

- ***Guest Password:*** This is selected to enable a user logging in as "Guest" to view the status of RAID arrays currently being managed by the Configuration Client utility.

4.3.2 Adding RAID Agents IPs (Associating Root Agent with Multiple RAID Arrays)

RAID Agents are the sub-modules of RAIDWatch or the Configuration Client utility used to communicate with a RAID subsystem. Multiple RAID Agents can be associated with a Root Agent. A Root Agent then summarizes and presents these RAID Agents to the Configuration Client so that system administrators can be notified of system alerts if any faulty conditions are detected within these RAID arrays.

Step 1. RAID Agents currently being managed by a Root Agent are listed in the lower right corner of the RAIDWatch screen.

Step 2. To add or delete RAID Agents, click the ***Create*** button next to the **Root Agent** pull-down list to open an ***Add Monitor Controller*** window. (See ***Figure 4-17***) The same command can also be activated by right-clicking on the agent list under ***Current Value*** section. (See ***Figure 4-18***)

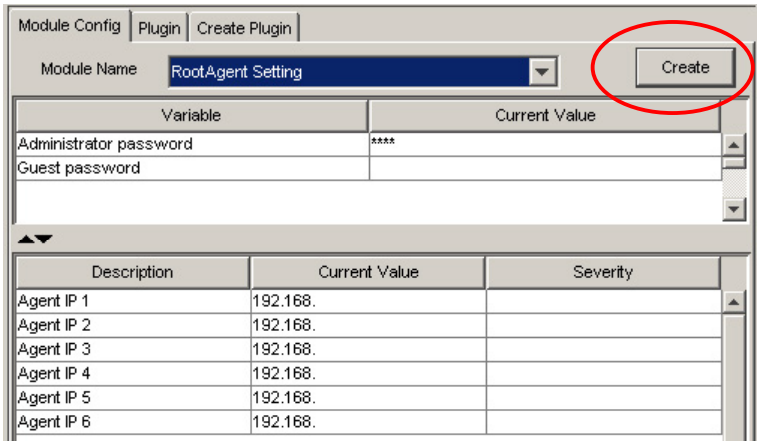


Figure 4-17: Agent List under Root Agent Setting

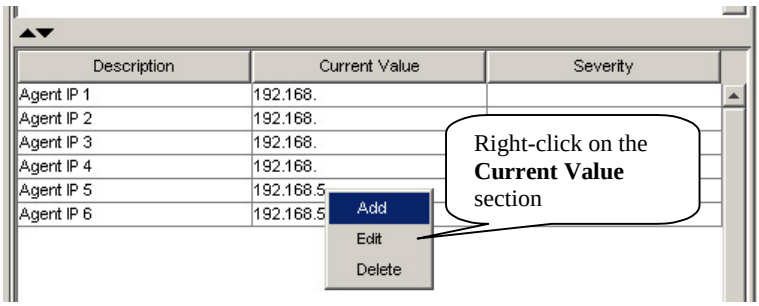


Figure 4-18: Agent List Right-click Menu

Step 3. Enter the IP address of the array you wish the Root Agent to manage. Click ***OK*** to complete the process. An example is shown in ***Figure 4-19***.

Figure 4-19: Adding RAID Agent IP

4.3.3 Root Agent Log Settings

Following are the methods used to keep an administrator constantly notified of the status of managed arrays. As shown in ***Figure 4-20,*** when properly configured, the Root Agent Log allows an administrator to receive event logs for all managed arrays for every preset time period.

To configure the ***Root Agent Log*** settings:

Step 1. Enable the function by double-clicking the Current Value field in the Status field.

Step 2. Set an SMTP server address in the **SMTP server** field so that event log emails can be sent to the administrator.

Step 3. Set a valid mail address in the **Sender mailbox** field and an administrator's email address in the **Recipient Email** field.

Step 4. The **Send period (hour)** determines how often an administrator receives event log notifications.

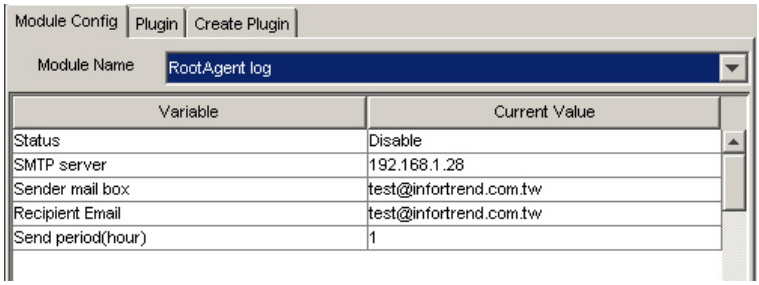


Figure 4-20: Root Agent Log Settings

4.3.4 Create Plug-ins with Event Notification

4.3.4.1 Before you begin

- The **Plug-in** sub-function allows you to add a specific feature or service to RAIDWatch's notification methods.

- The add-ins can be used to process the events received from Configuration Client utility and extend its functionality.

  Prepare your execution file, and place it under the **plug-in** sub-folder under the directory where you installed the RAIDWatch program. If the default installation path has not been altered, the plug-in folder should be similar to the following:

  Program Files -> Infortrend Inc -> RAID GUI Tools -> bin -> plug-in.

  Place the execution file that will be implemented as a plug-in in this folder.

The plug-in capability provides advanced users the flexibility to customize and present the event messages received from the Configuration Client utility.

4.3.4.2 The Configuration Process

Step 1. Click the Create **Plug-in** tab.

Step 2. Make sure you have placed the execution file in the **plug-in** folder as described earlier.

Step 3. Enter the appropriate data in the Plug-in Description and Plug-in Label fields, and then select an execution file from the ***Application Program*** field (if there is more than one).

Step 4. Click ***Create*** to complete the process. (See ***Figure 4-21***)

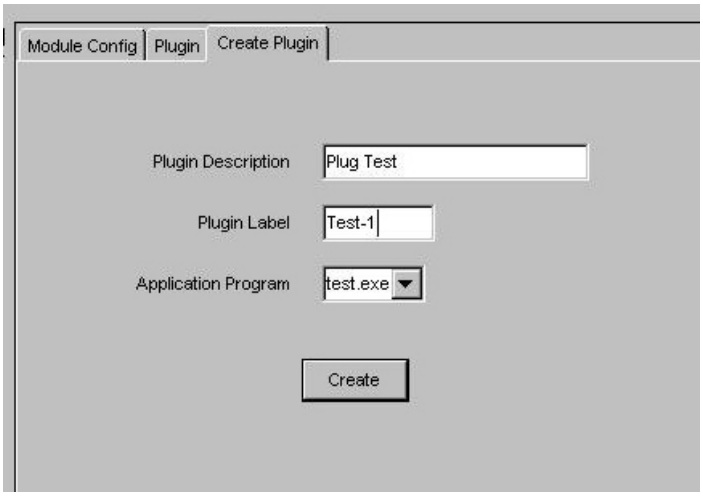


Figure 4-21: Naming and Associating a Plug-in file

Step 5. Select the ***Plug-in*** tab from the panel. Click ***Create Receiver*** to display an input field dialog box.

Step 6. Enter the configuration string to be read when the application program starts. (See ***Figure 4-22***) A configuration argument may look like this:

"\plugin\userprogram.exe uid=xx model=xxx-xxx ip=xxx.xxx.xxx.xxx ctrlrName=N/A severity=1 evtStr="Evt String" recv="customized string"

An added profile is listed in the **Receiver Data** field.

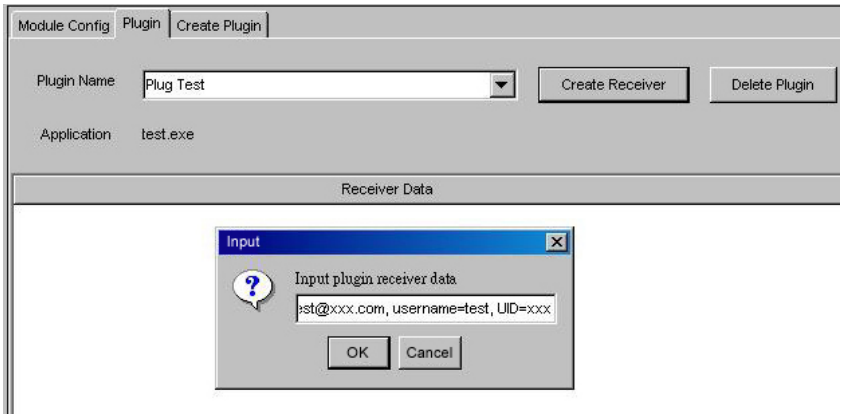


Figure 4-22: Create Plug-in Receiver Profile

4.4 Event Notification Settings

4.4.1 Configuration Client Notification Methods

Configuration Client provides the following methods for sending notifications: SNMP traps, email, LAN broadcast, fax, ICQ, SMS, and MSN Messenger. Some notification methods, such as the connection to a fax machine, require Windows MAPI support on the servers used as the Configuration Client platform.

To configure the Event Notification (previous *NPC*) settings, select ***Module Config*** from the right-hand side of GUI screen. Scroll down the pull-down menus to create or modify various notification methods.

There are seven notification methods listed in the pull-down menus. Along with seven different means of informing RAID managers that an event has occurred (fax, broadcast, email, SNMP traps, ICQ, SMS, and MSN messenger), the severity level of events to be sent via these notification methods can also be configured.

4.4.2 Event Severity Levels

You may select a severity level for every notification method using the Event Severity Level setting. Each level determines events of what severity level(s) are to be sent to a receiver. See ***Table 4-1*** for severity level descriptions.

Level	Description
1	All severity levels
2	Two levels: Warning and Alert
3	Only the most serious events: Alert messages

Table 4-1: Levels of Notification Severity

The event security level can be set during notification function setting. If you wish to modify the security levels for any notification setting, right-click on the ***Severity*** section in the lower level of **Configuration** screen. Select **Edit** common to view the **Edit** dialog box. (See ***Figure 4-23***) Select the desired severity level in the **Severity** pull-down menu. (See ***Figure 4-28***) Once the severity level is selected, click ***OK*** to exit the dialog box.

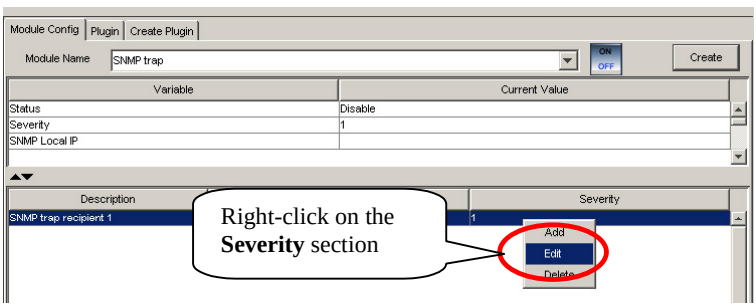


Figure 4-23: Editing the Severity Level

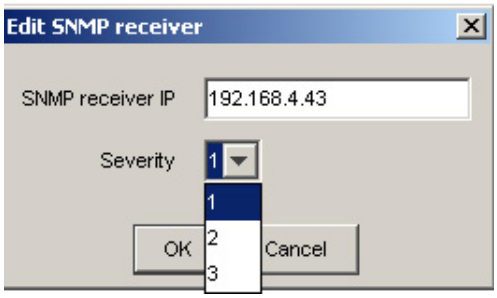


Figure 4-24: Selecting the Severity Level

4.4.3 Enabling Notification Functions

When all notification settings have been properly configured, remember to enable each notification method by double-clicking the ***Current Value*** field in **Status** row. Set **Status** to ***Enable*** if you want the module to be activated every time the Root Agent is loaded. Please see an example shown in ***Figure 4-25***.

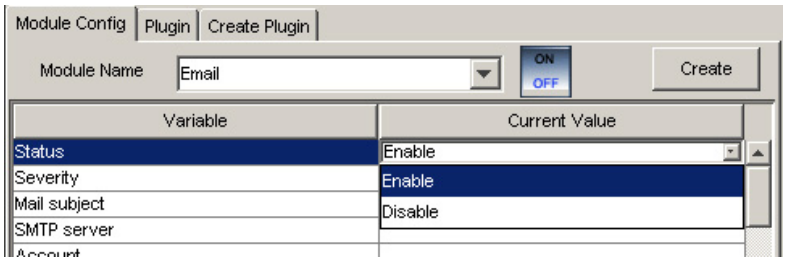


Figure 4-25: Enabling a Notification Method under Status Row

You can also turn on and off each notification method by double-clicking on the switch button located on the upper left of the user interface. (See ***Figure 4-26***)

The Root Agent runs as an application and is automatically loaded when the server is powered on. Restart the Configuration Client for the changes to take effect.

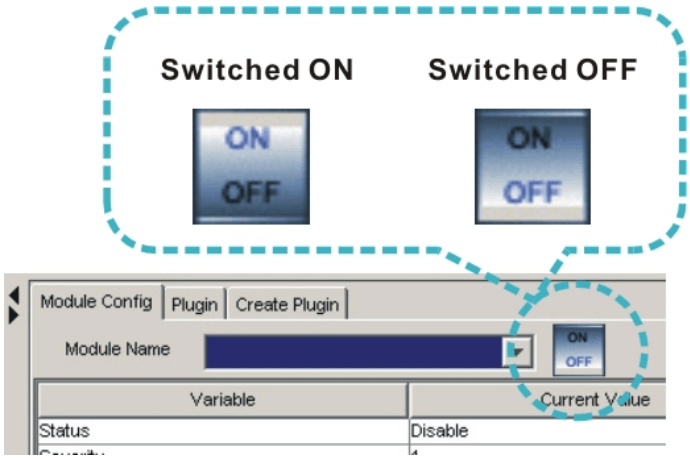


Figure 4-26: Enabling a Notification Method by the Switch Button

4.4.4 SNMP Traps Settings

Receiver Side

To set a client listening to SNMP traps:

Step 1. Open the ***Module Config*** page. Use the ***Module Name*** pull-down menu to select ***SNMP trap***.

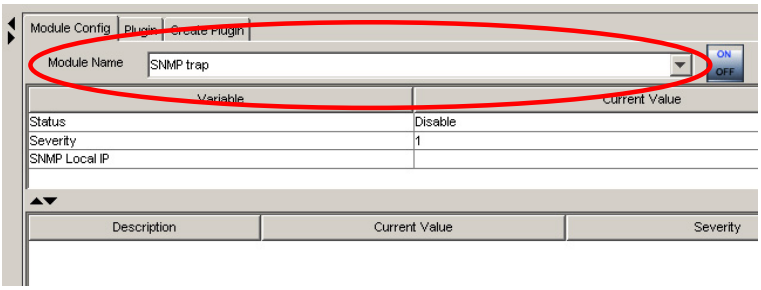


Figure 4-27: Selecting SNMP Trap Notification

Step 2. To create a new SNMP trap, click the ***Create*** button on the top right screen or right-click on the lower half of the configuration screen; the **Add SNMP Receiver** dialog box will appear.

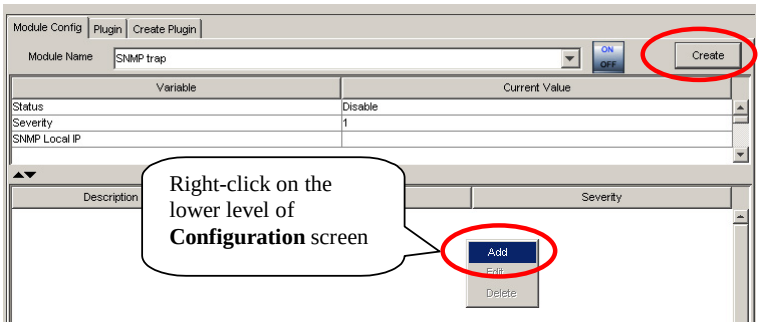


Figure 4-28: Adding SNMP trap

Step 3. Enter the IP addresses of the SNMP agents that will be listening for trap notification in the **Add SNMP Receiver** dialog box

Figure 4-29: Add SNMP Receiver Dialog Box

Step 4. Select the severity level of events that will be sent to the SNMP agent. Refer to ***Section 4.4.2.***

Step 5. Repeat this process to add more SNMP agents.

Sender Side

From the Module Config window:

Step 1. Find the SNMP settings from the pull-down list.

Step 2. Click on the ***On/Off*** switch beside the pull-down button to enable SNMP traps notification.

Switched ON Switched OFF

Step 3. Double-click on the Current Value field of the Status row to enable SNMP traps notification.

Step 4. Select the severity level of events to be sent to the receiver station.

Step 5. Provide a valid out port IP that will be used for delivering SNMP traps. Usually the default IP detected by the Root Agent will be sufficient. If you have more than one Ethernet port, double-click to configure it.

4.4.5 Email Settings

Receiver Side

NOTE:

SASL authentication is supported with this revision.

To set an email address to receive notification emails:

Step 1. Open the **Module Configuration** page. Use the **Module Name** pull-down menu to select **Email**.

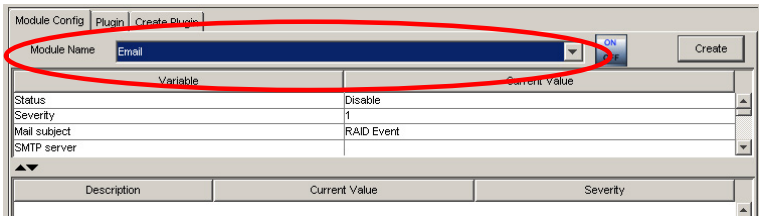


Figure 4-30: Selecting Email Notification

Step 2. To create a new email notification, click ***Create*** on the top right of the screen or right-click on the lower half of the configuration screen to display the **Add Email Recipient** dialog box.

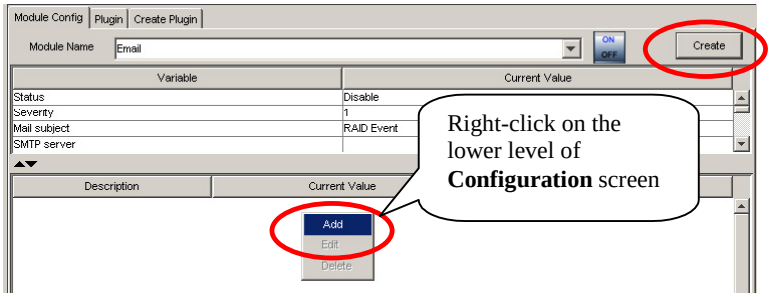


Figure 4-31: Adding Email Notification

Step 3. An **Add Email Recipient** dialog box appears. Enter an email address that is able to receive email notification.

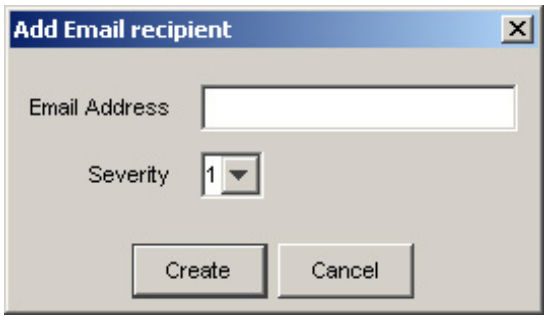


Figure 4-32: Add Email Recipient Dialog Box

Step 4. Select the severity level of events to be sent to the receiver's email.

Step 5. Repeat this process to add more email addresses.

Sender Side

From the Module Config window:

Step 1. Find the email settings from the ***Module Name*** pull-down list.

Step 2. Click the On/Off switch beside the pull-down list button to enable Email notification.

Switched ON Switched OFF

Step 3. Double-click on the **Current Value** field of the Status row to enable email notification.

Step 4. Select the severity level of events to be sent to the receiver station.

Step 5. Enter the mail subject by double-clicking the **Current Value** field.

Step 6. Set your SMTP mail server through which emails will be sent.

Step 7. Enter the Account name and Password if your mail server requires these values. SASL is the currently supported mechanism.

Step 8. Provide a valid email address as your sender's address.

4.4.6 LAN Broadcast Settings

Receiver Side

To set a computer to receive broadcast messages:

Step 1. Open the **Module Configuration** page. Use the **Module Name** pull-down menu to select **Broadcast**.

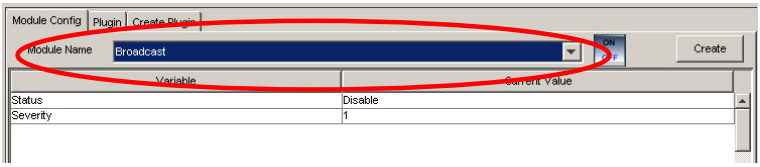


Figure 4-33: Selecting LAN Broadcast Notification

Step 2. To create a new LAN broadcast notification, click the ***Create*** button on the top right of the screen or right-click on the lower half of the configuration screen to display the **Add Broadcast Recipient** dialog box.

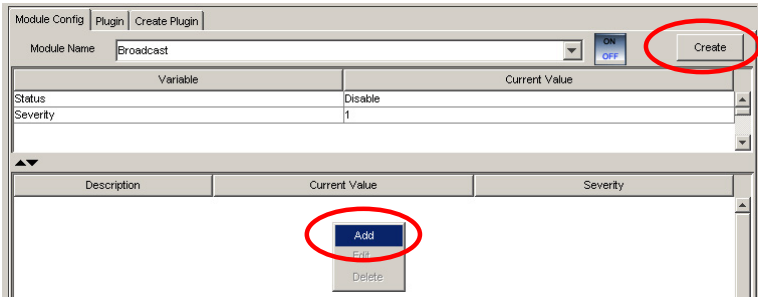


Figure 4-34: Adding LAN Broadcast Notification

Step 3. An **Add Broadcast Receiver** dialog box appears. Simply enter the IP addresses of a station configured on a network.

Figure 4-35: Add Broadcast Receiver Dialog Box

Step 4. Select the severity level of events to be sent to the receiver station.

Step 5. Repeat this process to add more receivers.

NOTE:

NETBUES and TCP/IP should be active services on your Centralized Management station for message broadcasting.

Sender Side

From the Module Config window:

Step 1. Find the Broadcast settings from the pull-down list.

Step 2. Click on the On/Off switch beside the pull-down button to enable LAN broadcast notification.

Switched ON Switched OFF

Step 3. Double-click on the Current Value field of the Status row to enable LAN broadcast. Set Status to Enable if you want the module to be activated every time the Root Agent is started. Note that the On/Off switch should also be in the On position before you turn off the server or close the utility. Otherwise, you will have to manually enable the function whenever you reboot the server.

Step 4. Select the severity level of events to be sent to the receiver station.

4.4.7 Fax Settings

In order to use fax notification, a fax modem is required and its parameters must be properly set on the main management station. For NT servers, Widows MAPI services, modem, and fax must be ready and running for the notification methods to work.

Receiver Side

To set a fax machine to receive event messages:

Step 1. Open the **Module Configuration** page. Use the **Module Name** pull-down menu to select **Fax**.

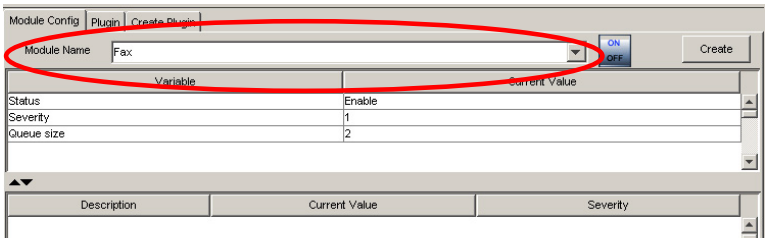


Figure 4-36: Selecting Fax Notification

Step 2. To create a new Fax notification, click ***Create*** on the top right of the screen or right-click on the lower half of the configuration screen to display the **Add Fax Recipient** dialog box.

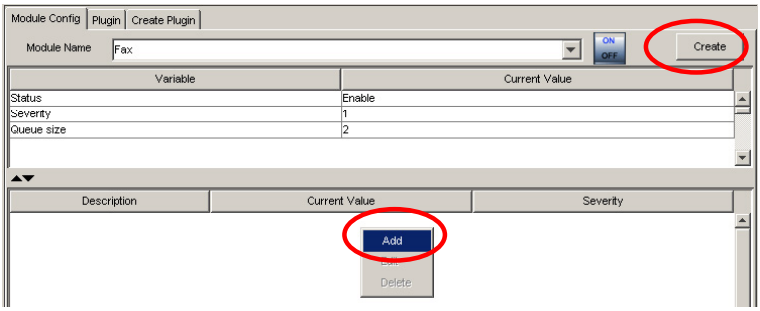


Figure 4-37: Adding Fax Notification

Step 3. An **Add Fax Receiver** dialog box prompts. Enter the phone number of the fax machine that will receive event notifications.

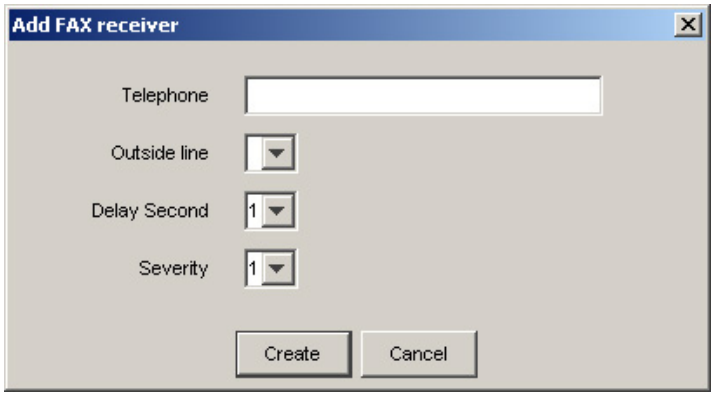


Figure 4-38: Add FAX Receiver Dialog Box

Step 4. Enter the Outside line dial-out number if there is any.

Step 5. Enter the Delay Second number.

Step 6. Enter the level of **Severity** of events to be sent via fax.

Step 7. Repeat this process to add more receivers.

NOTE:

The physical connection and fax service with Windows MAPI should be ready before configuring this function.

Sender Side

From the Module Config window:

Step 1. Find the Fax settings from the pull-down list

Step 2. Click on the On/Off switch beside the pull-down button to enable Fax notification.

Switched ON Switched OFF

Step 3. Double-click on the Current Value field of the Status row to enable fax notification. Set Status to Enable if you want the module to be activated every time the Root Agent is started. Note that the On/Off switch should also be in the On position before you turn off the server or close the utility. Otherwise, you will have to manually enable the function whenever you reboot the server.

Step 4. Select the severity level of events to be sent to the receiver station.

Step 5. The Fax device row shows the fax machine(s) currently available. Check for appropriate setup in the Windows control panel.

Step 6. Queue size determines how many events will be accumulated and then sent via a single fax transmission.

4.4.8 ICQ Settings

Receiver Side

To set an ICQ contact to receive notification messages:

Step 1. Open the **Module Configuration** page. Use the **Module Name** pull-down menu to select **ICQ**.

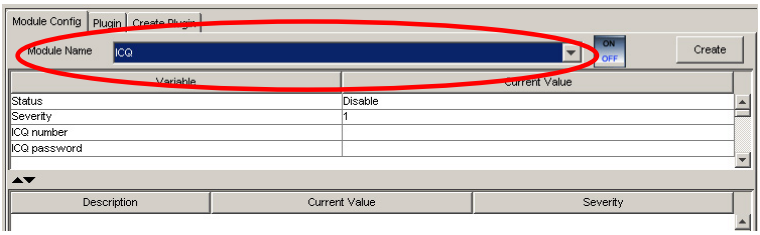


Figure 4-39: Selecting ICQ Notification

Step 2. To create an ICQ notification, click ***Create*** on the top right of the screen or right-click on the lower half of the configuration screen to display the **Add ICQ Recipient** dialog box.

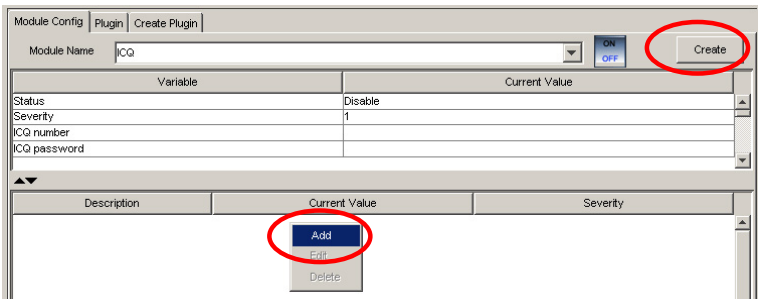


Figure 4-40: Adding ICQ Notification

Step 3. Enter the ICQ User Name of the contact receiving event messages.

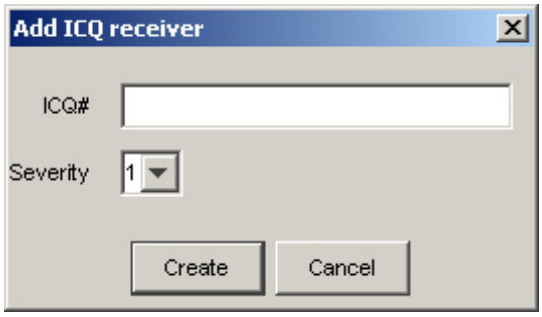


Figure 4-41: Add ICQ Receiver Dialog Box

Step 4. Select the severity level of events to be sent to the receiver.

Step 5. Repeat this process to add more receivers.

Sender Side

From the Module Config window:

Step 1. Find the ICQ settings from the pull-down list.

Step 2. Click on the On/Off switch beside the pull-down button to enable ICQ notification.

Switched ON Switched OFF

Step 3. Double-click on the Current Value field of the Status row to enable ICQ notification. Set Status to Enable if you want the module to be activated every time the Root Agent is started. Note that the On/Off switch should also be in the On position before you turn off the server or close the utility. Otherwise, you will have to manually enable the function whenever you reboot the server.

Step 4. Select the severity level of events to be sent to the receiver station.

Step 5. Enter an ICQ login ID.

Step 6. Enter a password for ICQ login.

4.4.9 MSN Settings

Receiver Side

To set an MSN messenger address to receive notification messages:

Step 1. Open the **Module Configuration** page. Use the **Module Name** pull-down menu to select MSN.

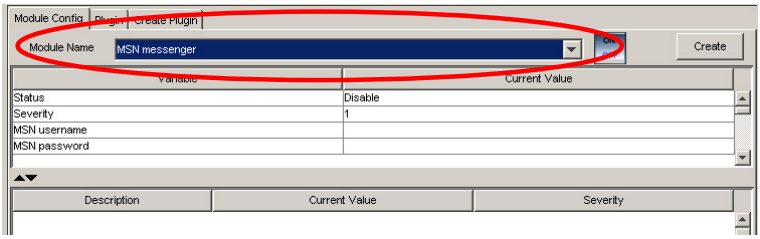


Figure 4-42: Selecting MSN Notification

Step 2. To create an MSN notification, click ***Create*** on the top right of the screen or right-click on the lower half of the configuration screen to display the **Add MSN Recipient** dialog box.

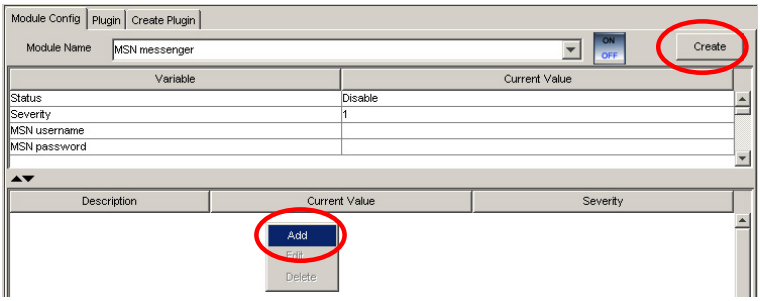


Figure 4-43: Adding MSN Notification

Step 3. Enter the MSN account of the contact receiving event messages.

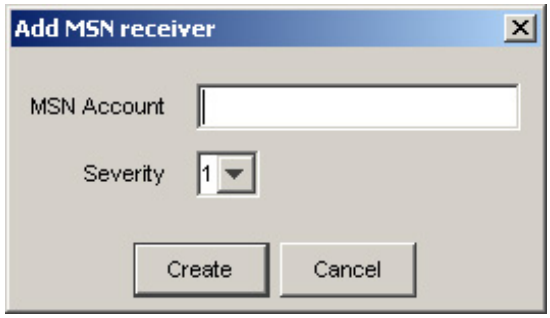


Figure 4-44: Add MSN Receive Dialog Box

Step 4. Select the severity level of events to be sent to the receiver.

Step 5. Repeat this process to add more receivers.

Sender Side

From the **Module Config** window:

Step 1. Find the MSN settings from the pull-down list.

Step 2. Click on the On/Off switch beside the pull-down button to enable MSN notification.

Switched ON Switched OFF

Step 3. Double-click on the Current Value field of the Status row to enable MSN notification. Set Status to Enable if you want the module to be activated every time the Root Agent is started. Note that the On/Off switch should also be in the On position before you turn off the server or close the utility. Otherwise, you will have to manually enable the function whenever you reboot your server.

Step 4. Select the severity level of events to be sent to the receiver station.

Step 5. Provide a valid MSN contact by entering the user name.

Step 6. Provide the associated password.

4.4.10 SMS Settings

SMS is a short for "Short Message Service." Using this notification method requires a GSM modem. RAIDWatch currently supports two GSM modem models:

- Siemens TC35
- WAVECOM Fast Rack M1206

Please contact Infortrend for the complete list of compatible GSM modems.

Receiver Side

To set a cell phone to receive notification messages:

Step 1. Open the **Module Configuration** page. Use the **Module Name** pull-down menu to select SMS Message Service.

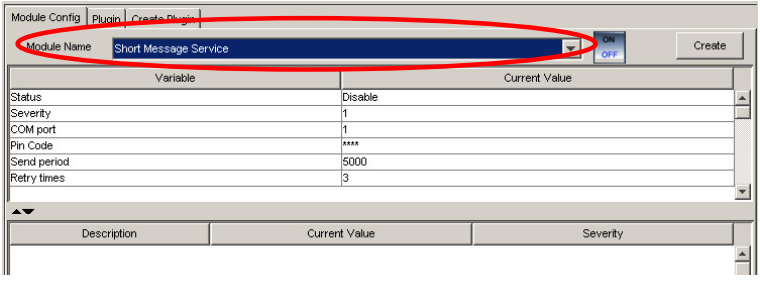


Figure 4-45: Selecting SMS Notification

Step 2. To create a new SMS notification, click the ***Create*** button on the top right of the screen or right-click on the lower half of the configuration screen to display the **Add SMS Recipient** dialog box.

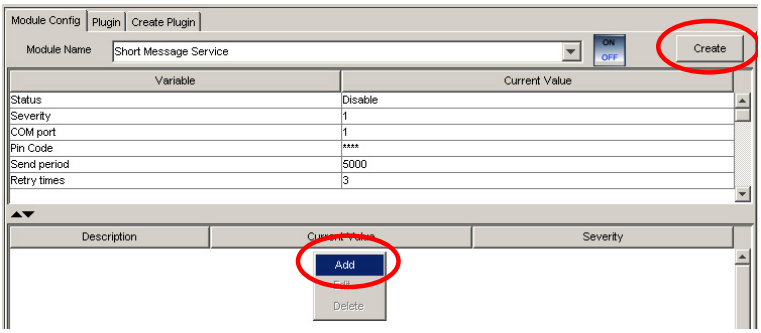


Figure 4-46: Adding SMS Notification

Step 3. Enter the **Cell Phone Number** of the contact who will receive event messages.

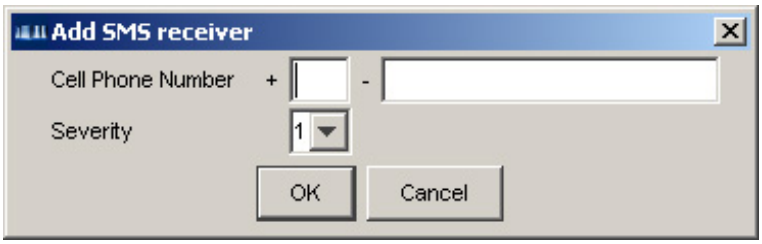


Figure 4-47: Add SMS Receiver Dialog Box

Step 4. Select the severity level of events to be sent to the receiver.

Step 5. Repeat this process to add more receivers.

Sender Side

From the Module Config window:

Step 1. Find the SMS settings from the pull-down list.

Step 2. Click on the On/Off switch beside the pull-down button to enable SMS notification.

Switched ON Switched OFF

Step 3. Set Status to Enable if you want the module to be activated every time the Configuration Client is started. Note that the On/Off switch should also be in the On position before you turn off the server or close the utility. Otherwise, you will have to manually enable the function whenever you reboot the server.

Step 4. Select the severity level of events to be sent to the receiver station.

Step 5. Select the COM port where you connect your GSM modem.

Step 6. Enter the four-digit identification Pin Code required by the modem.

Step 7. Provide a Send Period in milliseconds for time intervals between messages sent.

Step 8. Provide a retry time value.

4.5 Auto Discovery

The innovative Auto Discovery feature provides quick, instant agent search function. If this option is enabled, the system will automatically search for the available agents and add it into agent list without manually key-in each agent IP address.

To setup the Auto Discovery option, please follow the steps below:

Step 1. Open the **Module Configuration** page. Use the **Module Name** pull-down menu to select Auto Discovery option. (See ***Figure 4-48***)

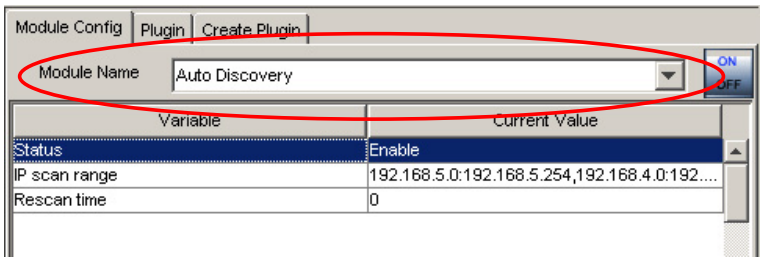


Figure 4-48: Auto Discovery Option

Step 2. Double-click on the current value under **IP scan range** row to open the Auto Discovery dialog box. (See ***Figure 4-49***)

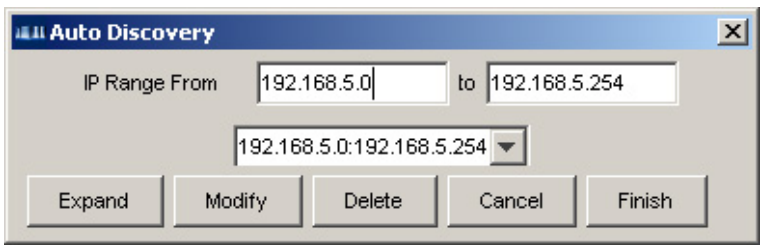


Figure 4-49: Auto Discovery Dialog Box

Step 3. Enter a set of IP range that you want the system to detect in the IP range dialog box.

NOTE:

You may modify an existing IP range by clicking the Modify button or delete an existing IP range by clicking the Delete button. Click on the Cancel button to cancel any action you made in the Auto Discovery dialog box and return to the Auto Discovery main screen.

Step 4. Click the Expand button to add the new IP range into a preset list.

Step 5. Click Finish button to close this dialog box and return to the Auto Discovery option main screen.

Step 6. Double-click on the current value under **Rescan time** row to modify a time frame in minute that you like the system to scan the network.

NOTE:

*The default rescan time is set to **0** minute that indicates the system will scan the network only when Configuration Client is starting up. The Auto Discovery option will be turned off after the first scan.*

Step 7. You may turn on and off this option by double click on current value under **Status** row (see ***Figure 4-50***) or click on the On/Off switch beside the pull-down button to enable the option.

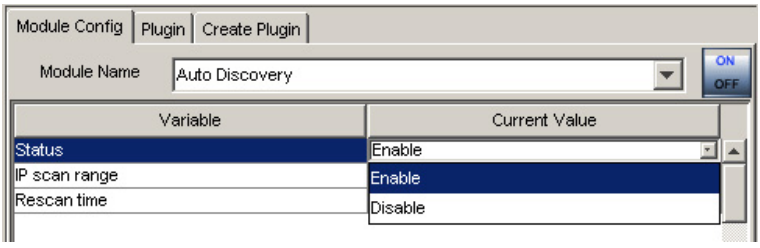


Figure 4-50: Enable/Disable the Auto Discovery

NOTE:

If you already have the Auto Discovery option turned on, be sure to turn off and then turn on the option for any adjustments that you newly made to take effect.

Once the Auto Discovery option is successfully configured, the system will detect the IP range that you designated, and automatically add the search results into the agent list. An Auto Discovery Notice window will prompt, you may click *OK* button to close the window and start using Configuration Client and RAIDWatch Manager.

Figure 4-51: Auto Discovery Notice

If you open the Root Agent setting option under module configuration window, an available agent list will be shown in the lower section of the Configuration Client user interface. (See ***Figure 4-52***)

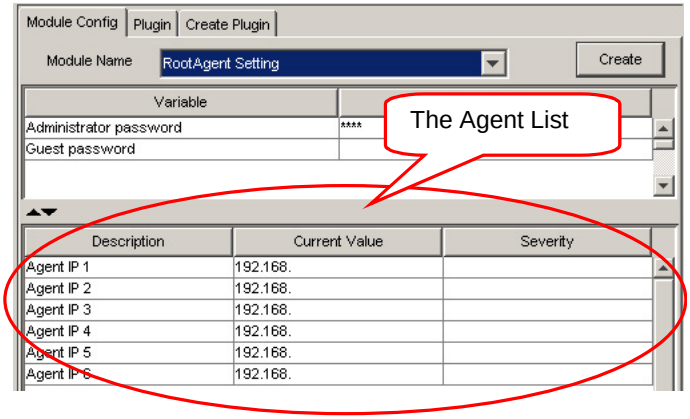


Figure 4-52: The Root Agent List

If you like to start using the RAIDWatch manager, please refer to ***Section 5.2***. A *Agent List window* will automatically show the controllers that were detected by the Auto Discovery option.

4.6 Event Severity Levels

RAIDWatch classifies disk array events into three severity levels. Level 1 includes non-critical information events such as initialization of the controller and initiation of the rebuilding process. Level 2 severity includes events which require the issuance of a warning message. Level 3 severity is the most serious level, and includes events that need immediate attention. The following provides example events for each level:

NOTE:

The severity levels here are different from the levels used for configuring the notification methods

4.6.1 Level 1 Severity Events (Examples)

- Controller Initialization Complete
- Rebuild Initiated
- Rebuild Complete
- Rebuild Failed
- Logical Drive Initialization Started
- Logical Drive Initialization Complete
- Logical Drive Initialization Failed

4.6.2 Level 2 Severity Events (Examples)

- SCSI Target Select Timeout
- SCSI Target Phase/Signal Error
- SCSI Target Unexpected Disconnect
- SCSI Target Negotiation Error
- SCSI Target Timed Out
- SCSI Target Parity Error
- SCSI Bus Reset Issued
- SCSI Target Not Ready Error
- SCSI Target Media Error
- SCSI Target Hardware Error
- SCSI Target Unit Attention
- SCSI Target Unexpected Sense Date
- SCSI Target Block Reassignment Failure
- SCSI Target Unexpected Data Over/Underrun
- Drive SCSI Unrecognized Event

4.6.3 Level 3 Severity Events (example)

- Drive Failure
- Enclosure Power Supply Failure
- Cooling Fan Module Failure
- RAID Controller Unit Failure

4.7 Event Log Display

Once RAID Agent IPs are associated with a Root Agent, their icons and names display on the Connection View panel.

To check the events that have happened since the Configuration Client started, single-click on a connected RAID.

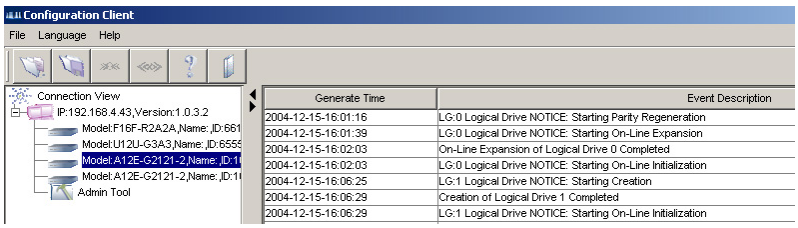


Figure 4-53: Event Log Display Window

The event log window displays on the right-hand side of the RAIDWatch screen.

NOTE:

The utility does not display events that happened before the utility started.

Chapter 5

RAIDWatch Icons

This chapter introduces icons used in the main configuration access categories:

- ***Navigation Tree Icons – Section 5.1***
- ***Information Icons – Section 5.2***
- ***Maintenance Icons – Section 5.3***
- ***Configuration Icons – Section 5.4***
- ***Event Log Icons – Section 5.5***

5.1 Navigation Tree Icons

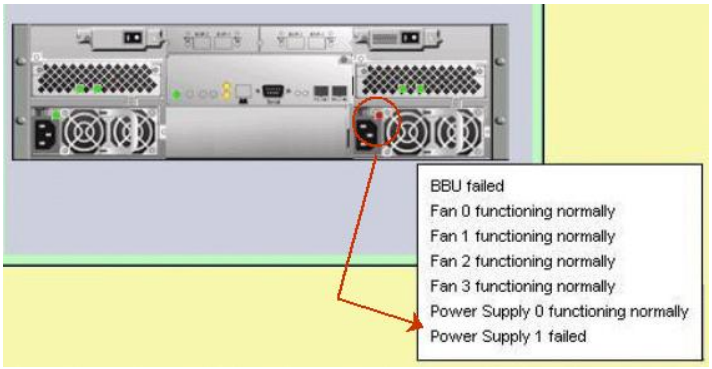
	**Connected RAID Array**

	**Information**	
		Enclosure View
		Tasks Under Process
		Logical Drive Information
		Logical Volume Information
		Fibre Channel Status
		System Information
		Statistics

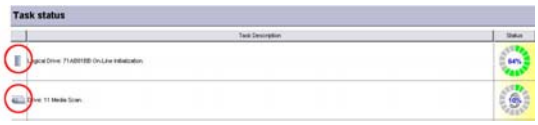
	**Maintenance**	
		Logical Drive
		Physical Drive
		Task Scheduler

	**Configuration**	
		Quick Installation
		Create Logical Drive
		Existing Logical Drives
		Create Logical Volume
		Existing Logical Volumes
		Host Channel
		Host LUN Mapping
		Configuration Parameters

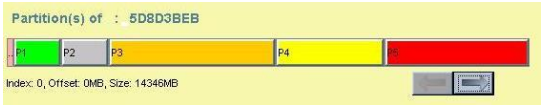
5.2 Array Information Icons

Enclosure View	
	Drive in good condition
	Drive missing or bad
	Global Spare
	Any drive icon showing a color other than black represents a member of a logical drive or a dedicated spare. Black is the default color of a new or used drive. A used drive is a drive that had been used as a member of a logical drive.
	An empty tray; disk drive not installed
	This graphic represents a rotation button. Each mouse-click on it turns the enclosure graphic 90 degrees clockwise.
	
RAIDWatch recognizes each subsystem by its board serial number, and displays an exact replica of it in the panel view. LEDs shown on the enclosure view correspond to the real LEDs on the subsystem's rear panel If an LED corresponding to a failed component is lit red as shown in the diagram, move your mouse cursor to point to the red LED on the enclosure panel. Hold the cursor on the LED for a few seconds and an enclosure status summary will be displayed.	

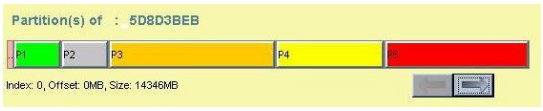
Tasks Under Process

	Type of tasks being processed by the subsystem. The Task status window displays icons representing specific configurations.
	Progress indicator

Logical Drive Information

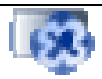
	A logical drive
	A partitioned logical drive volume is represented as a color bar that can be split into many segments. Each color segment indicates a partition of a configured array.

Logical Volume Information

	A logical volume
	A partitioned logical volume is represented as a color bar that can be split into many segments. Each color segment indicates a partition of a configured volume.

	A member of a logical volume, representing a logical drive. Different logical drives are presented using icons of different colors.

Fibre Channel Status	
	A Fibre host channel

System Information	
	A battery module
	A RAID controller unit
	A current sensor
	A cooling module
	An enclosure device connected through an I^2C bus
	A power supply
	An enclosure device connected through SAF-TE (SCSI bus)
	An enclosure device connected through SES (Fibre link)
	A drive tray slot
	A temperature sensor
	An UPS device
	A voltage sensor

5.3 Maintenance Icons

Maintenance
This category uses the same icons as in the Logical Drive Information window. See ***Logical Drive Information*** section.

5.4 Configuration Icons

Create Logical Drives

This window uses the same icons as in the Logical Drive Information window. See ***Logical Drive Information*** section.

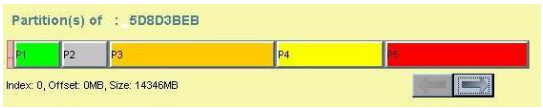
Existing Logical Drives

	A configured array (logical drive)

Create Logical Volume

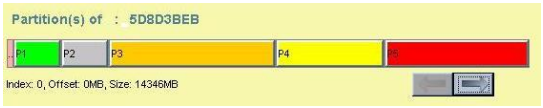
	A member of a logical volume, representing a logical drive. Different logical drives are presented using icons of different colors.

Existing Logical Volumes

	A logical volume
	A partitioned logical volume is represented as a color bar that can be split into many segments. Each color segment indicates a partition of a configured array.
	A member of a logical volume, representing a logical drive. Different logical drives are presented using icons of different colors.
	A logical volume

Host Channel

	A host channel

Host LUN Mapping	
	A logical drive. Different logical drives are presented using icons of different colors.
	A logical volume
	A partitioned array volume is represented as a color bar that can be split into many segments. Each color segment indicates a partition of a configured array.

Configuration Parameters
No icons are used in the window.

5.5 Event Log Icons

Event Messages	
Severity Levels	
	An informational message: Command-processed message sent from the firmware
	A warning message: System faults
	An alert message: Errors that need immediate attention
Event Type	
Type of messages detected by the subsystem. The event view panel displays icons representing specific categories using the same icons as those used in the System Information window.	

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Chapter 6
Basic Operations

This chapter describes the RAIDWatch screen elements and basic operations.

6.1 Starting RAIDWatch Agents

6.1.1 Under Windows 2000/2003 OSes

Once the RAIDWatch software is properly installed, the necessary software agents start automatically under Windows operation environment each time the host computer is started or reset, e.g., RAID Agents and Root Agents. However, the GUI part of RAIDWatch and the Configuration Client utility need to be manually started.

Since the majority of RAID storage applications require non-stop operation, the Configuration Client utility, which is used to monitor and report array conditions, should be installed on a management server that runs 24-7 operation. For a higher level of fault tolerance in case of server failure, the Configuration Client can be installed onto more than one server. As shown below, when installing RAIDWatch using the Advance/Centralized Management scheme, a pair of redundant servers can be specified in the installation wizard prompt. The configuration is done by specifying IP addresses for a Master Host and a Slave Host.

IMPORTANT!

RAIDWatch must be manually installed (Advanced Installation, and then choose Mode 1 installation: Centralized Management) onto both the Master and Slave hosts. The Configuration Client functionality on the Slave host becomes active only when the Master host fails.

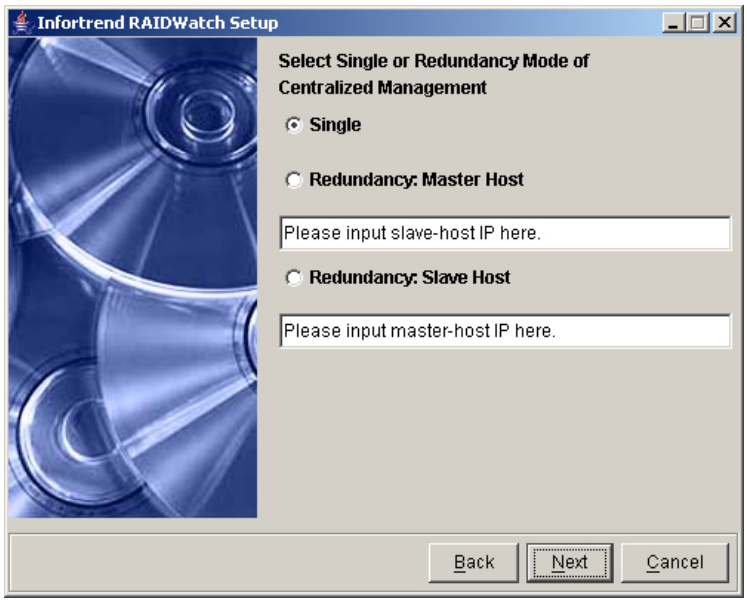

Figure 6-1: Installation Wizard Prompt: Redundancy Server

Before management can be performed on a particular disk array system, you need to first establish a connection from your array to the network or a connection between your array and the directly attached server. Once a connection is established successfully, management can be started.

The following discusses how to connect to a disk array. Information on disconnection is provided at the end of this section.

6.2 Starting RAIDWatch Manager

The management software interface, RAIDWatch Manager, needs to be started by a network or RAID systems manager regardless of which OS is being used.

Depending on your setup, you can start RAIDWatch Manager in various ways.

For both local and remote management, and under various OSes, starting the program is fairly simple. Please refer to the appropriate sub-sections below for information.

6.2.1 Locally or via LAN under Windows 2000/ 2003 Environments

NOTE:

If you are using an EonStor subsystem, after connecting to the subsystem, the Enclosure View showing images of both the front and rear views will appear.

Step 1. From the Startup menu, select Programs → Infortrend Inc. → RAIDWatch Manager. (See ***Figure 6-2.***) Double-click the RAIDWatch Manager icon.

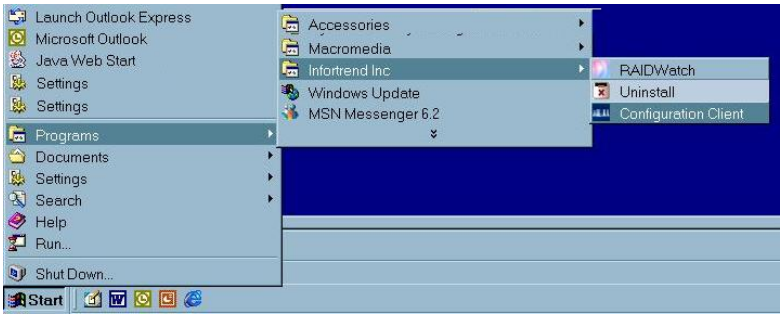

Figure 6-2: Configuration Client Shortcut on Windows Startup Menu

- OR -

Double-click the RAIDWatch Manager icon from the desktop (see ***Figure 6-3***) if a shortcut was added during the installation process.

Figure 6-3: RAIDWatch Shortcut on Windows Desktop

Step 2. The RAIDWatch Manager should be launched. The RAIDWatch Connection window should prompt and appear on the screen. (See ***Figure 6-4***)

Figure 6-4: RAIDWatch Connection Window

On the computer screen, if you don't see the RAIDWatch Connection window, it can be opened from the RAIDWatch program menu. Click on the System and then select **Open Device** command, and the RAIDWatch Connection window will prompt up. (See ***Figure 6-5***)

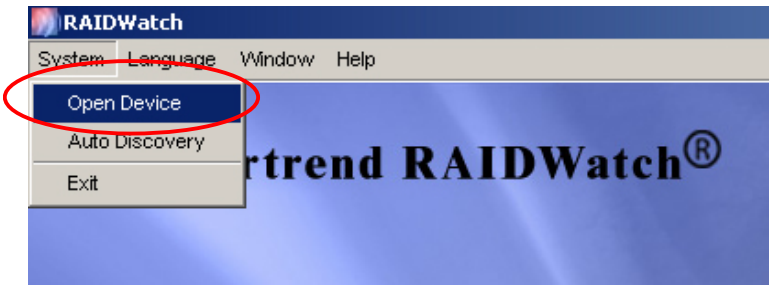

Figure 6-5: Opening the RAIDWatch Connection Window

Step 3. If you have a specific RAID array's IP address in mind and wish only to manage one array, simply enter the IP address to proceed.

As soon as you input the first number of an IP address, the screen will show the previous entries that start with the same number by auto complete feature. You are able to choose one you are looking for from the list or type in a new IP address.

NOTE:

If you are not certain of a RAID array's IP address, you may rely on the Auto Discovery option in the Configuration Client to automatically detect the available RAID arrays that are controlled by root agents. If the Auto Discovery option is enabled, the available RAID array will be shown automatically in the Agent List window that is described in later this section. To use the Auto Discovery option, please refer to ***Section 4.5: Auto Discovery****.*

Step 4. You may select to enable the Secure Sockets Layer (SSL) security option by a single mouse-click on its check box. SSL works by using a private key to encrypt data when transmitting private documents and obtain confidential information. SSL creates a secure connection between a client and a server, over which any amount of data can be sent securely.

Step 5. Enter a user name by selecting from the pull-down menu. Each user name represents an authorized access level. Enter a password to proceed. Leave it blank if there is no preset password. Click ***OK*** button to start the management session.

NOTE:

Refer to ***Section 6.3*** *for the details of the three authorized access levels.*

Agent List Window

Step 1. If you would like to see the available RAID systems that are connected to the network or a specific root agent, you may click the ***Show Root Agent List*** button on the bottom of the RAIDWatch Connection window. The window displays the tree tables of the available RAID systems that are detected by Auto Discovery function. An example of an Agent List window is shown in ***Figure 6-6***.

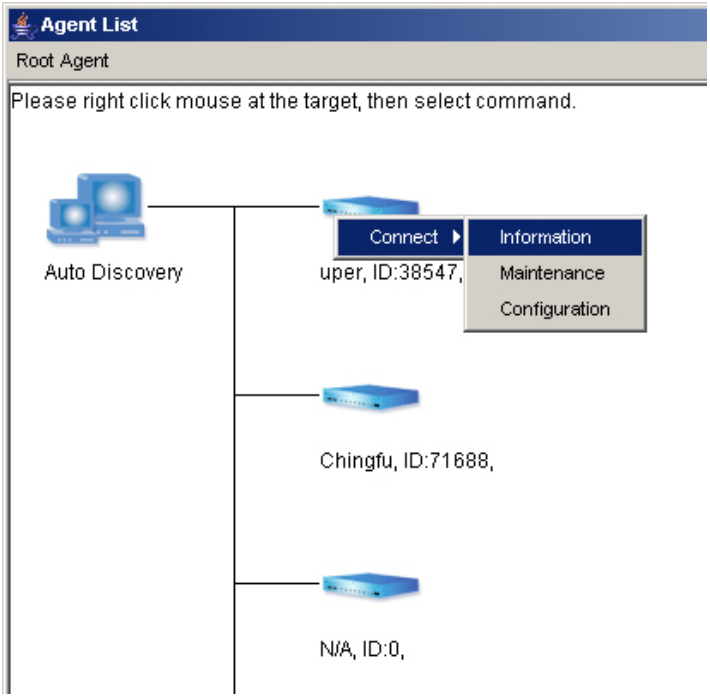

Figure 6-6: Retrieve IP List: IPs Managed by Root Agents

Step 2. If you like to add a new root agent, pull-down the Root Agent command menu in the Agent List window and select **Add Root Agent**. Enter a root agent IP address in the prompt up window. Any RAID systems that are connected to the root agent will be shown in a tree table in the Agent List window.

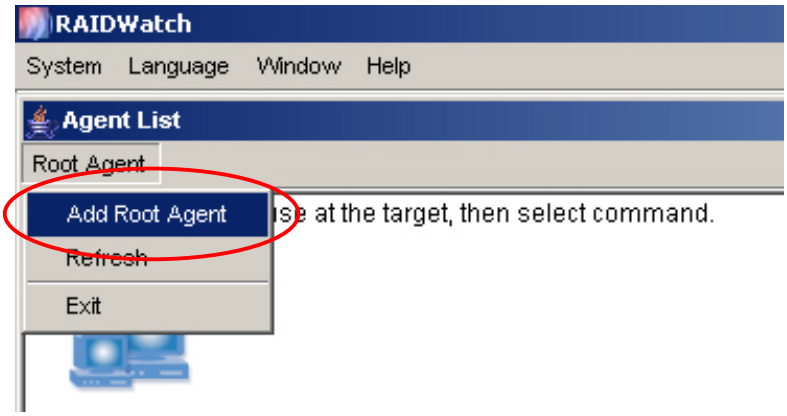

Figure 6-7: Add an Root Agent

Step 3. You may refresh the Agent List window by select **Refresh** under Root Agent command menu.

Step 4. Click on the controller that you want to manage and select an authorized access level. Enter any necessary password and the program will lead you to its management session.

Step 5. If you like the system to search the available RAID systems again, pull down the **System** command menu and select **Auto Discovery**. (See ***Figure 6-8***) The new search result will be showing in the Agent List Window.

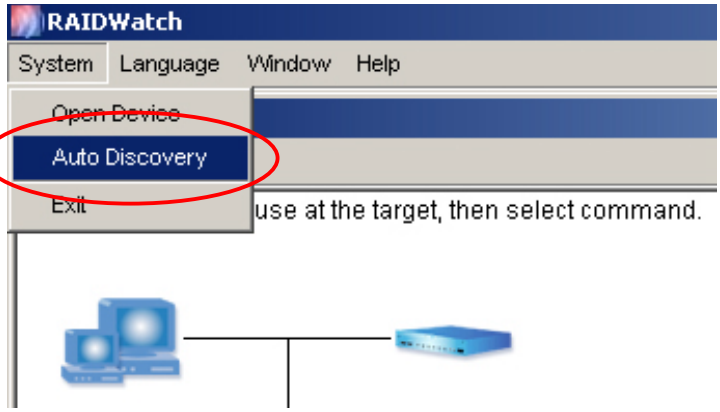

Figure 6-8: Start Auto Discovery Function

When the system is executing auto discovery function, the Auto Discovery option in the System pull-down menu will be temporarily disabled. (See ***Figure 6-9***)

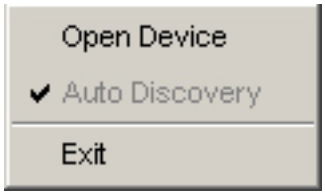

Figure 6-9: The system is processing Auto Discovery Function

NOTE:

The procedures of setting up Auto Discovery option are showing in ***Section 4.5: Auto Discovery****.*

6.2.2 For Remote Management via Web Browser (Any Supported OSes)

Step 1. Start your web browser and enter the IP address assigned to the RAID subsystem Ethernet port or that of a RAID-attached server as your URL (e.g., 210.212.121.123). The IP of a RAID-attached server is used when the server uses in-band protocols to communicate with the attached RAID array. After a brief delay while the Java Applet starts, the RAIDWatch Manager main connection wizard appears on the screen.

Step 2. The RAIDWatch management window should start after a brief moment.

NOTE:

In Applet mode, connecting to the second array requires opening another browser window and entering its IP.

6.2.3 Disconnecting and Refreshing a Connection

From the **System** menu, select **Logout**.

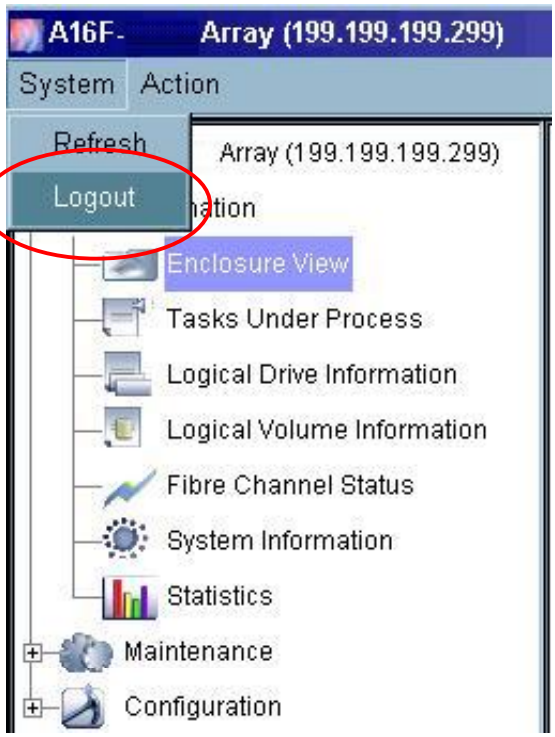

Figure 6-10: Disconnect from a Connected Array

Select **Logout** will close the current management session and return to the **Outer Shell** window. If you wish to connect to another RAID array, enter its IP address and then click ***OK*** to proceed. Click ***Cancel*** to close the connection prompt and return to the **Outer Shell** window.

Selecting the **Refresh** button allows you to re-connect with an array if a RAID system has been temporarily disconnected; e.g., the RAID system is being reset or the host links were disconnected for maintenance reasons.

6.3 Security: Authorized Access Levels

Password protection is implemented with the Connection wizard to prevent unauthorized access to configured arrays. This protection, which is implemented along with the security access levels, prompts a user for the station password the first time he or she attempts to connect to a RAID system.

By default, no password is required to access a RAID system using the first two protection levels, "**Configuration**" (Administrator) and "**Maintenance**" (User). A default password is required for the **Information** login.

Default Passwords	
Configuration	Password previously set for the controller/ subsystem; press **Enter** for none. The password can be changed in "Configuration Parameters" window in RAIDWatch's main program.
Maintenance	You can set a password for this level login in "Configuration Parameters" window in RAIDWatch's main program.
Information	Default password is "1234."

It is recommended to configure passwords for the first two access levels at the first time you successfully connect to an array. **Information** users can monitor array status and see event messages. A user logging for **Maintenance** access can perform maintenance jobs onto configured arrays, and a user logging in using the **Configuration** login has full access to create, modify, or delete all related array configurations.

Note that some RAID subsystem/controllers may have been configured with a password using terminal or LCD keypad utilities. This preset password can be used for a "Configuration" login. However, the password can be changed using "Configuration Parameters" window in RAIDWatch's main program. See ***Chapter 7*** for the description of password setup.

6.4 Look and Feel

6.4.1 Look and Feel Overview

Because RAIDWatch Manager is a Java-based GUI program, it accommodates the "look-and-feel" standards of various OSes. At present, Windows interface appearance is supported.

RAIDWatch Manager will auto-detect and configure to match the OS where it is currently running.

In the event of a compatibility problem or under an unknown OS or OS versions, the program will default to the Java look and feel.

Just like other GUI-based applications, RAIDWatch Manager works entirely with windows, buttons, and menus to facilitate various disk array operations. These windows follow the standard Windows look-and-feel specifications, so that manipulating elements and windows within any RAIDWatch Manager window generally conforms to standard procedures.

The management sessions are best displayed with 1024x768 screen resolution.

NOTE:

Screen captures throughout this document show the Windows look and feel.

6.4.2 Screen Elements

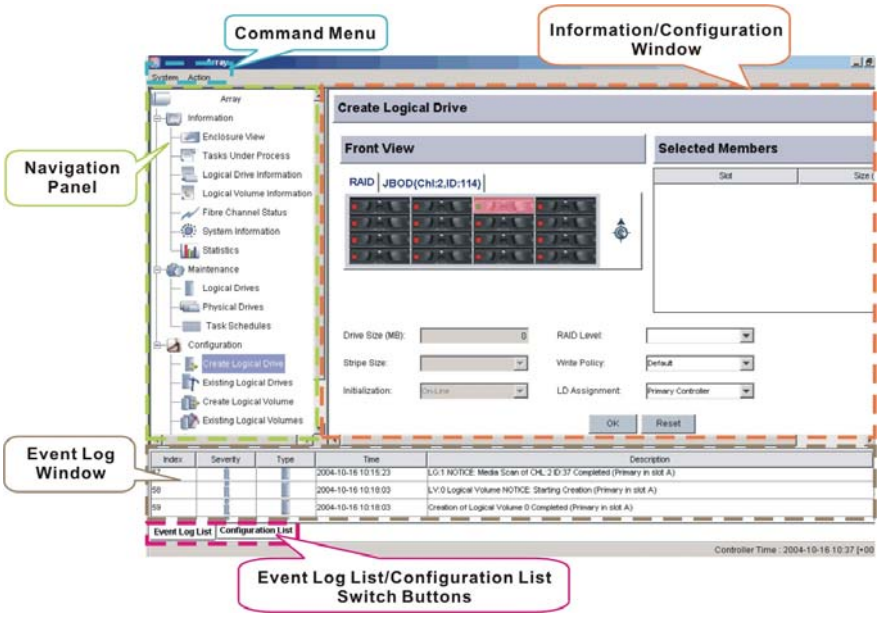

Figure 6-11: GUI Screen Elements

The GUI screen can be divided mainly into three (3) separate windows: a tree-structure **Navigation Panel**, the **Information/Configuration** window, and the **Event Log/Configuration View** window at the bottom.

Each informational or configuration window can also be accessed through the command menus on the upper left corner of the management interface. At the bottom of the Event Log window, tab buttons allow you to switch the view to the Configuration View display.

6.4.3 Command Menus

The menu bar shown in ***Figure 6-12*** displays the available menus on the Outer Shell window. The Outer Shell window contains multiple management windows each providing access to a connected array.

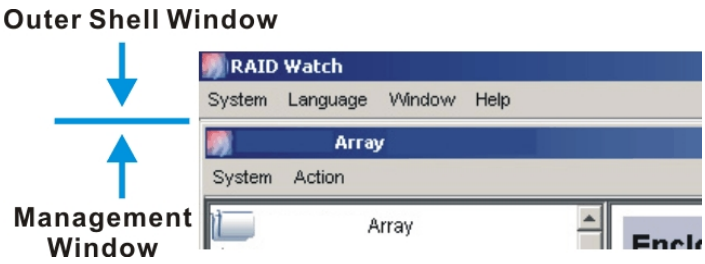

Figure 6-12: Command Menu Bar

All menus provide a list of commands (shown in ***Figure 6-13***) for invoking various disk array and display-related operations.

For a summary of commands, see ***Appendix A,*** *Command Summary*.

NOTE:

Multiple simultaneous RAIDWatch Managers can connect to one RAID system.

6.4.4 Outer Shell Commands

The following commands are described in ***Section 6.4.2*** and shown in ***Figure 6-13***.

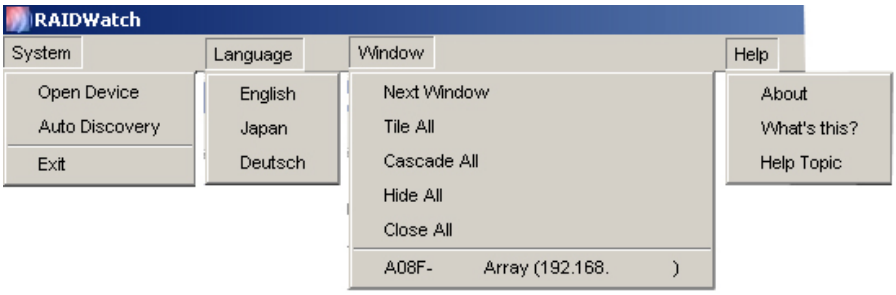

Figure 6-13: Outer Shell Commands

- Under **System** menu, the **Open Device** command lets you connect to a RAID array. This command triggers the connection prompt. Multiple arrays can be managed each in a separate management window.

  Click the **Auto Discovery** command will start a new search of any available RAID systems in the specific IP ranges on the network. The function can be setup using Configuration Client utility.

  The **Exit** command under the **System** menu is always available and is used to end all RAIDWatch Manager sessions at once.

- The **Language** items allow you to display on-screen GUI, instructions, commands, messages, and explanatory legends in a different

languages. The current supporting languages are **English**, **Deutsch** and **Japanese**.

- The **Window** command allows you to enlarge, shrink or rearrange the system view window(s). Please refer to ***6.8 Arranging Windows*** for details on the use of the Window commands.

- Under the **Help** menu, the **About** command brings up a window that provides RAIDWatch version and copyright information.

  The **Help Topic** commands bring up the online help contents, which are implemented in Java Help format.

  You may click the **What's this?** command, move it across the screen, and display related information by a second mouse-click on the screen element you are interested in.

6.4.5 Management Window Commands

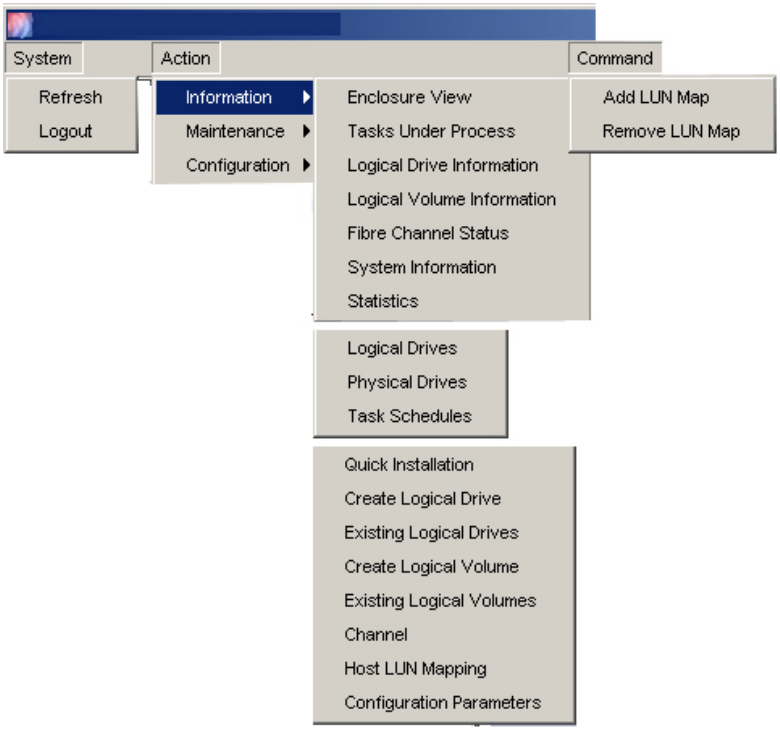

Figure 6-14: Management Window Commands

- The **Refresh** command sends instructions to GUI asking to review the connection status. The **Logout** command under the **System** menu allows you to disconnect from a controller/subsystem and to end the software session. This command is only available when RAIDWatch Manager is currently connected to a RAID array.

- The **Action** menu brings up sub-menus that allow you to access various options under the three (3) configuration categories:

Information, **Maintenance** and **Configuration**. Each of these options will be discussed in later this chapter.

- The **Command** menu provides different configuration options only when specific configuration items are selected in a functional display window. On the other hand, when a configurable item is selected, the corresponding command menu and the related commands automatically appear on the menu bar.

6.5 The Information Category

The **Information** category allows you to access to information about every aspect of system operation.

To access the information category, either select the icon from the navigation tree or go to the **Action** Command menus and then select **Information** on the top of the screen. (See ***Figure 6-15***)

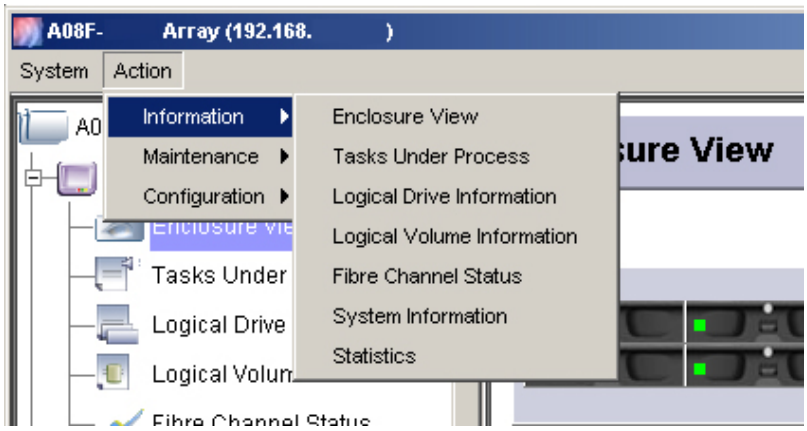

Figure 6-15: Accessing Information Commands

6.5.1 Enclosure View Window

The **Enclosure View** window displays the physical view of all major components, including drive slots and enclosure components. When the Enclosure View window is opened, the screen shown in ***Figure 6-16*** should appear. Use the Enclosure View window to monitor multiple enclosures from the computer screen. For detail of using the Enclosure View window, please refer to ***Chapter 12***.

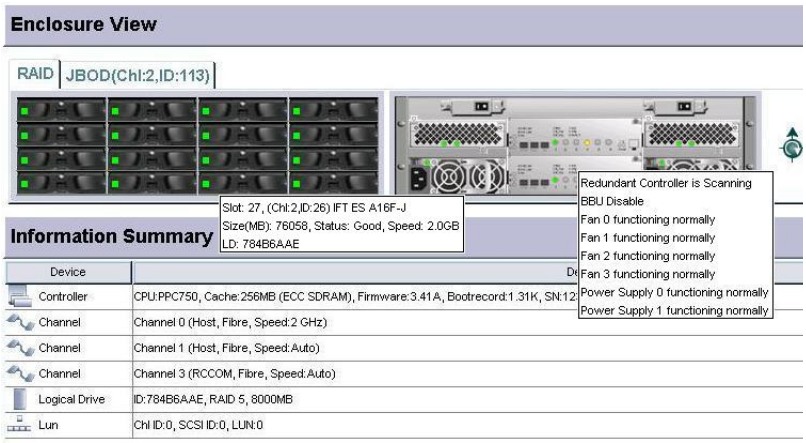

Figure 6-16: Enclosure View Window

6.5.2 Tasks Under Process Window

The **Tasks Under Process** window shown in ***Figure 6-17*** reminds you of unfinished tasks being processed by a subsystem. The start time and percentage of progress are also displayed on screen.

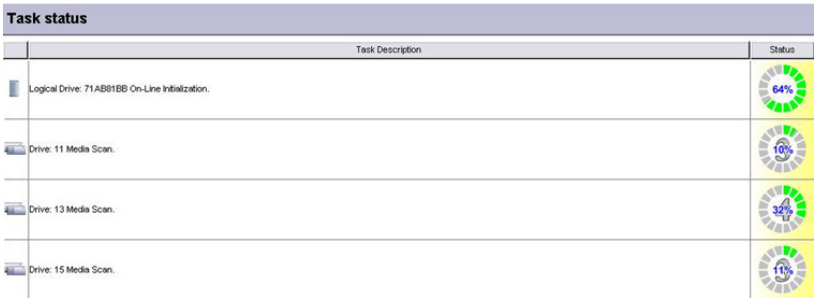

Figure 6-17: Task Status Window

6.5.3 Logical Drive Information Window

The **Logical Drive Information** window shown in ***Figure 6-18*** provides the configuration, management, and monitoring functions available in RAIDWatch. The Logical Drive View window includes three (3) sub-windows: Logical Drive Status, Front View, and Logical Drive Message.

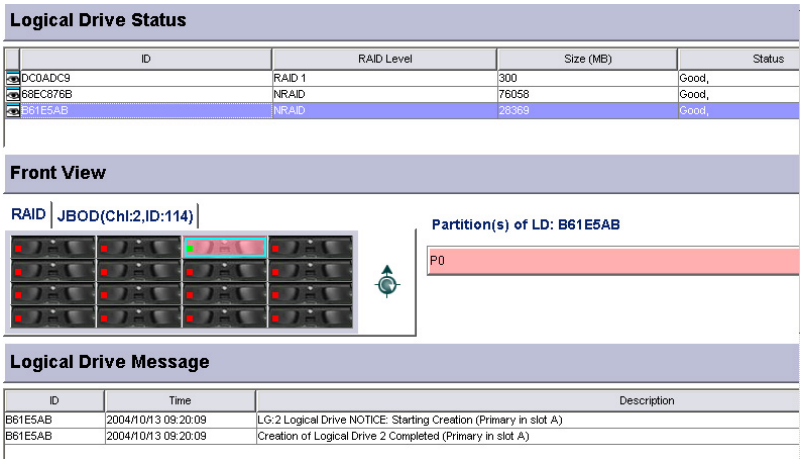

Figure 6-18: Logical Drive information

Logical Drive Status: This sub-window displays information on configured arrays (logical drives) showing a unique array ID, RAID level, capacity, array status and a name that can be manually assigned.

Front View: This sub-window helps you to quickly identify configured arrays by the physical locations of their members. Different arrays are distinguished by different colors. When any member drive is selected by a mouse click, the rest of the array's members will be highlighted by bright blue lines, indicating they are members of the selected array.

Formation of logical partitions is displayed next to the Front View window.

Logical Drive Message: Messages related to a selected array are automatically listed at the bottom of the screen.

6.5.4 Logical Volume Information Window

The **Logical Volume Information** window shown in ***Figure 6-19*** provides the configuration of a configured volume. The Logical Volume Information window includes three sub-windows: Logical Volume Status, Member Logical Drive(s), and Related Information.

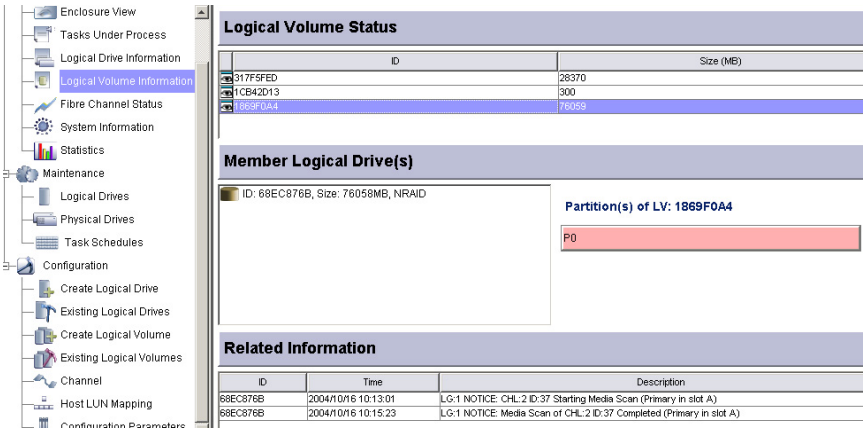

Figure 6-19: Logical Volume Information

6.5.5 Fibre Channel Status Window

The **Fibre Channel Status** window shown in ***Figure 6-20*** displays information on the Fibre host channel ID, connection speed, host-side connection protocols (topology), link status, WWPN port name and WWNN node name, loop IDs, and Fibre Channel address. The corresponding icon turns gray and is disabled if RAIDWatch operates with a SCSI or iSCSI host subsystem. This information is useful when configuring a subsystem for a heterogeneous environment such as a storage network operating with multiple hosts and applications.

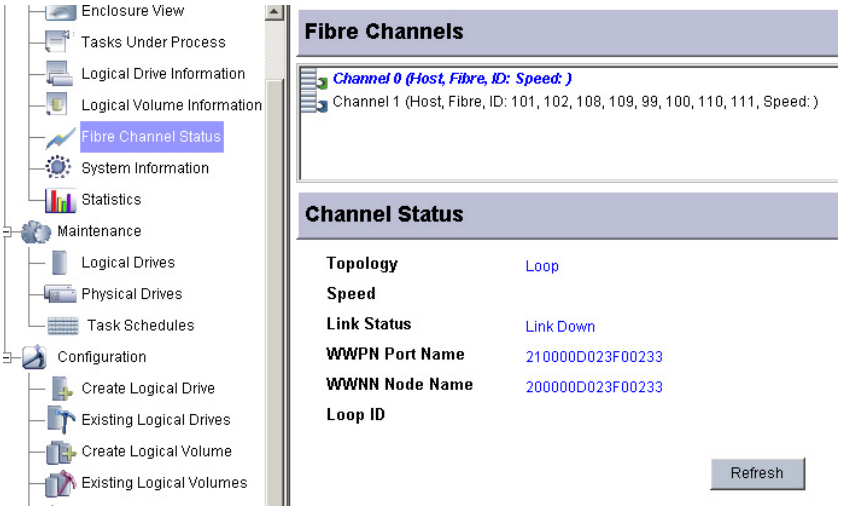

Figure 6-20: Fibre Channel Status Window

6.5.6 System Information Window

The **System Information** window shown in ***Figure 6-21*** provides key information about the RAID subsystem and the RAID controller unit that powers the subsystem. Enclosure information includes the operating status of power supply, temperature sensors, and cooling fan units. Controller information includes CPU, firmware/boot record version, serial number, CPU and board temperature, voltage, and status of the battery. This window has no configuration options.

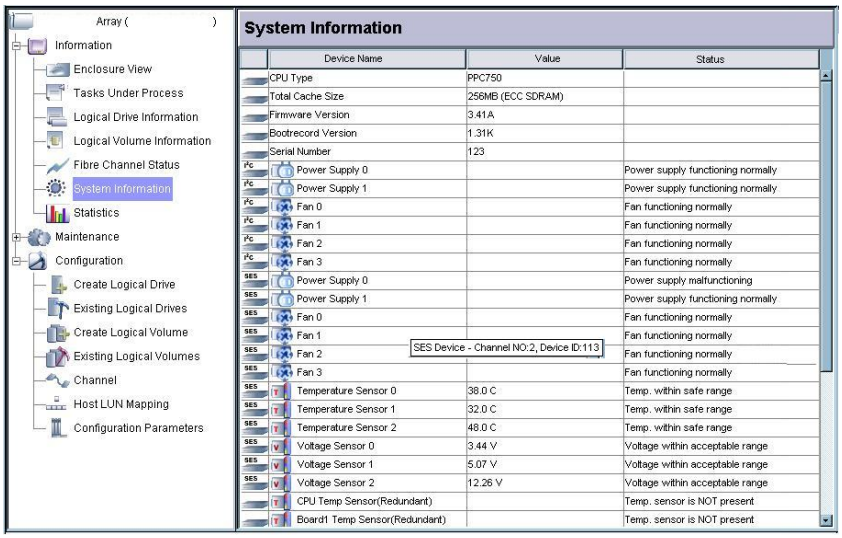

Figure 6-21: System Information Window

6.5.7 Statistics Window

Select the **Statistics** window in the configuration tree, and start calculating "Cache Dirty" rate or "Disk Read/Write Performance" by clicking either or both of the check boxes.

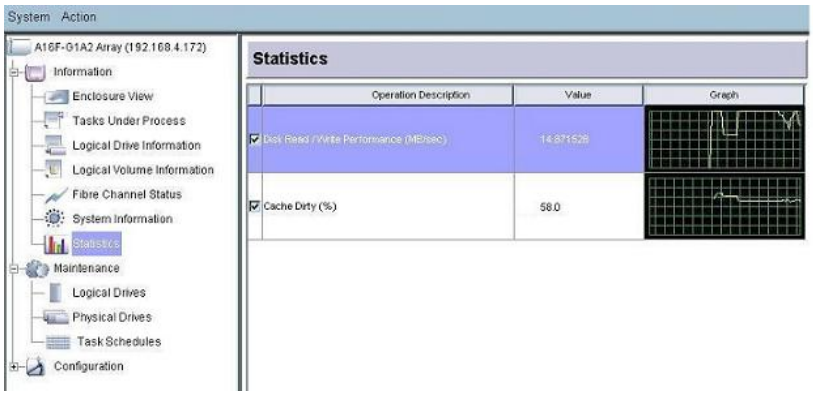

Figure 6-22: Performance Statistics Window

Cache Dirty (%)

If you select Cache Dirty (%), a window similar to the one shown in ***Figure 6-22*** will appear. The percentage of the cache block in use is displayed in numbers and the cache hits average is displayed as a graph. The Cache Dirty rate provides cached writes data over the last few minutes and indicates data caching consistency and frequency.

Disk Read/Write Performance (MB/s)

If you select Disk R/W, a window similar to the one shown in ***Figure 6-22*** will appear showing the read/write performance. A real-time view of current activity is provided as a graph and the performance data is constantly updated and displayed as MB/s.

6.6 The Maintenance Category

The **Maintenance** category provides access to logical and physical drives and performs maintenance functions that help ensure the integrity of the configured arrays. The operation of the Maintenance window also includes access through the Navigation Panel and a functional window.

To access the maintenance category, either select the icon from the navigation tree or go to the Action Command menus and then select Maintenance on the top of the screen. (See ***Figure 6-23***)

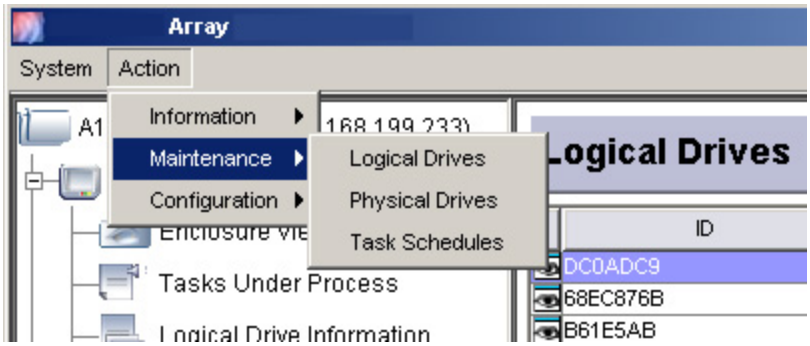

Figure 6-23: Accessing Maintenance Commands

6.6.1 Logical Drives Maintenance Window

When the **Logical Drives** maintenance window is opened, the screen shown in ***Figure 6-24*** should appear.

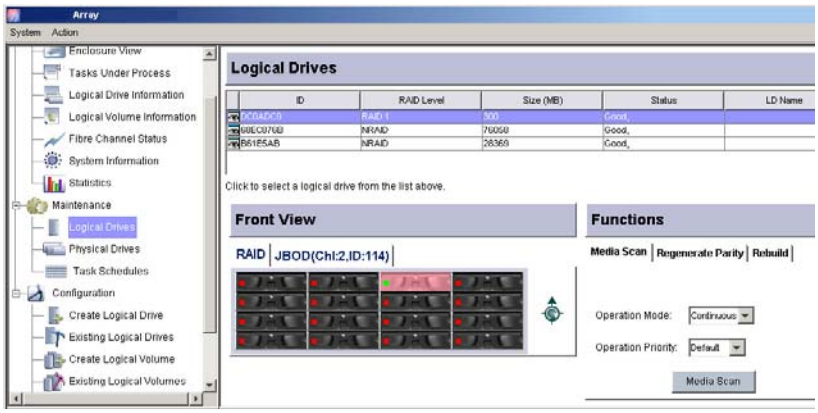

Figure 6-24: Maintenance - Logical Drives

There are three (3) sub-windows in the Logical Drives maintenance mode window:

- The **Logical Drives** window provides a list of all configured arrays. Use a single mouse-click to select the logical drive you wish to perform maintenance tasks on.

- The **Front View** window allows you to see the locations of logical drives. Note that a logical drive is selected by a single mouse-click from the list of configured arrays on the upper screen.

- The **Functions** window provides configuration options for maintenance tasks and the buttons, which start a maintenance task.

6.6.2 Physical Drives Maintenance Window

When the **Physical Drives** maintenance window is opened, the screen shown in ***Figure 6-25*** should appear.

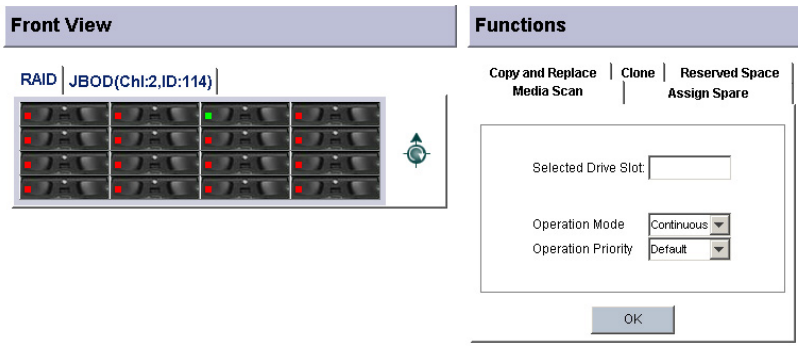

Figure 6-25: Maintenance - Physical Drives

There are two (2) sub-windows in the Physical Drives maintenance mode window:

- The **Front View** window allows you to select a hard drive to perform maintenance tasks on. A selected drive is highlighted by bright blue lines, and its slot number is shown in the Functions window in the Selected Drive Slot field.

- The **Functions** window provides configuration options with maintenance tasks and an ***OK*** button to apply the configuration.

6.6.3 Task Schedules Maintenance Window

When the **Physical Drives** maintenance window is opened, the screen shown in ***Figure 6-26*** should appear.

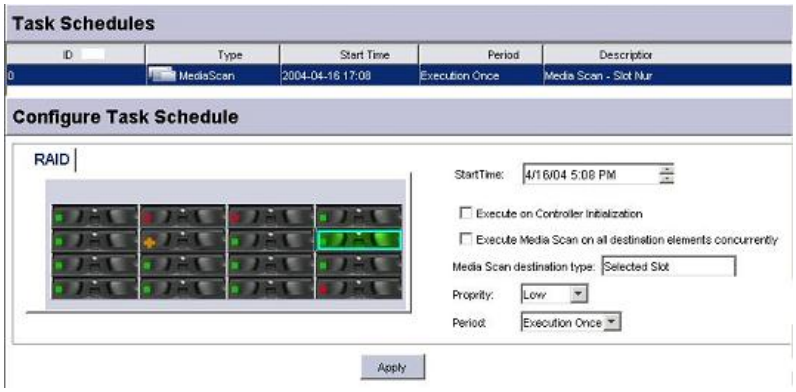

Figure 6-26: Task Schedules Window

To begin using the Task Schedule functionality, right-click to display the **Add New Schedule Task** command.

There are two (2) sub-windows in the Task Schedules maintenance mode window:

- The **Task Schedules** window displays previously configured schedules that are now being held in NVRAM.
- The **Configure Task Schedule** window allows you to select a hard drive or logical drive to perform a scheduled task on. A selected drive or logical drive is highlighted by bright blue lines, and its related configuration options are displayed on the selection boxes on the right of the screen.
- The **Apply** button allows you to complete the process and add the schedule.

6.7 The Configuration Category

The **Configuration** category contains functional windows that allow you to create logical configurations and set appropriate configuration settings for system operations. This category is available only when logging in using the Configuration access with the correct password.

To access the Configuration category, either select the icon from the navigation tree or go to the Action Command menus and then select Configuration on the top of the screen. (See ***Figure 6-23***)

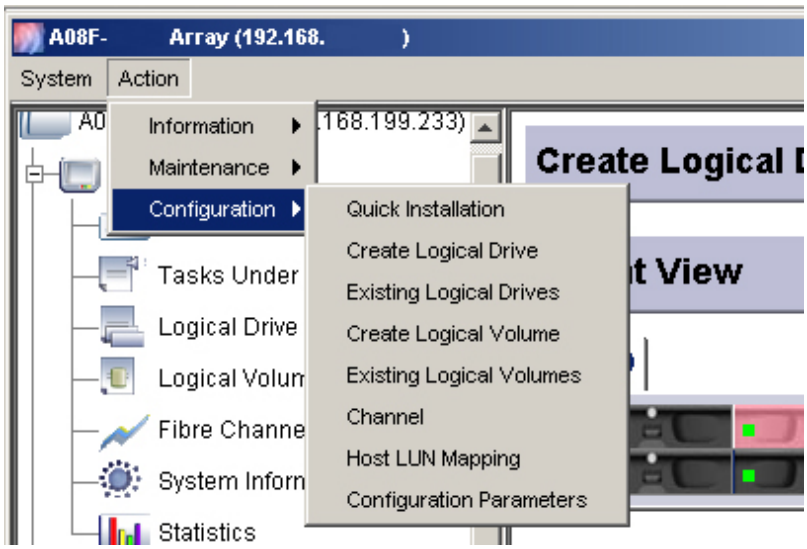

Figure 6-27: Accessing Configuration Commands

6.7.1 Quick Installation

This is a new function in RAIDWatch 2.2 or above version. When you first connect RAIDWatch to a new RAID system without any previous configurations, select **Quick Installation** and let RAIDWatch guide you

thought a simple logical drive creation process. Later, the RAIDWatch program will lead you to a LUN mapping process.

If you already have at least one logical drive existed in the RAID system, this function will be disabled. You will be prompt a message window that indicates logical drive already exists.

6.7.2 Create Logical Drive Window

When the **Create Logical Drive** window is opened, the screen shown in ***Figure 6-28*** should appear.

The basic rules for using the functional elements in the Create Logical Drive window are:

- This window uses a parallel display principle. To create a logical drive, select its members from the Front View window each by a single mouse-click. The Selected Members window then displays the disk drives' slot IDs and sizes.

- The Configuration view also employs an up-then-down pattern with the configuration process. Important logical drive characteristics are set using the pull-down menus at the lower part of the Configuration screen. The creation procedure is completed by clicking the ***OK*** button at the bottom of the screen.

- A selected physical drive is highlighted by bright blue lines; a second mouse-click on it deselects the drive.

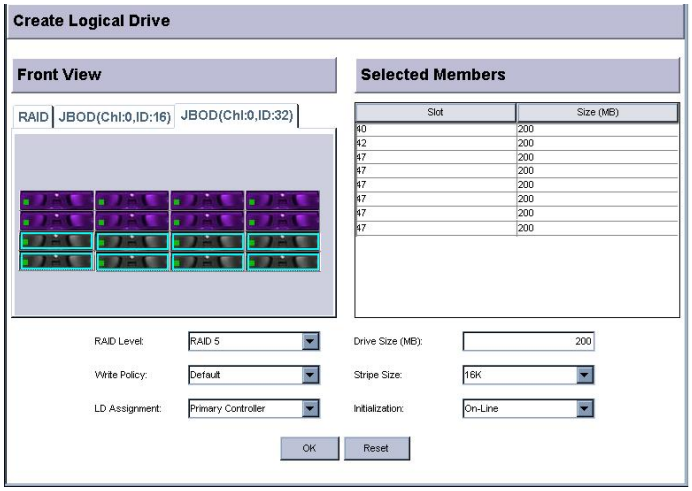

Figure 6-28: Selecting Members for a New Logical Drive

For detail of creating a logical drive, please refer to Chapter 9 of this document.

6.7.3 Existing Logical Drives Window

When the **Existing Logical Drives** window is opened, the screen shown in ***Figure 6-29*** should appear.

The basic rules for using the functional elements in the Existing Logical Drives window are:

- This window also uses a parallel display and the up-then-down principle. To start configuring an existing array, select a configured array from the LD list above. Locations of its members are automatically displayed, and then the available functions are displayed in the Functions window.

- This window contains three edit commands that can be triggered by right-clicking your mouse button.

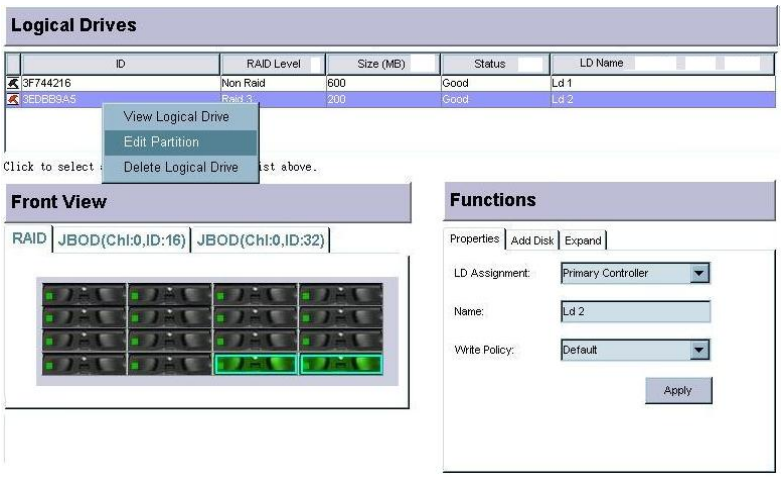

Figure 6-29: Existing Logical Drives Window

6.7.4 Create Logical Volume Window

This window uses the same operation flow as that applied in the Create Logical Drive window.

6.7.5 Existing Logical Volumes Window

This window uses the same operation flow as that applied in the Existing Logical Volumes window.

NOTE:

This window also contains Edit mode commands that are only accessible by a mouse right-click.

6.7.6 Channel Window

The **Channel** window allows you to change host or drive port data rate**,** channel mode (EonRAID 2510FS only), and to add or remove channel IDs.

When the **Channel** window is opened, the screen shown in ***Figure 6-30*** should appear.

Two pages, **Parameters** and **ID**, display on the right of the **Channel** screen.

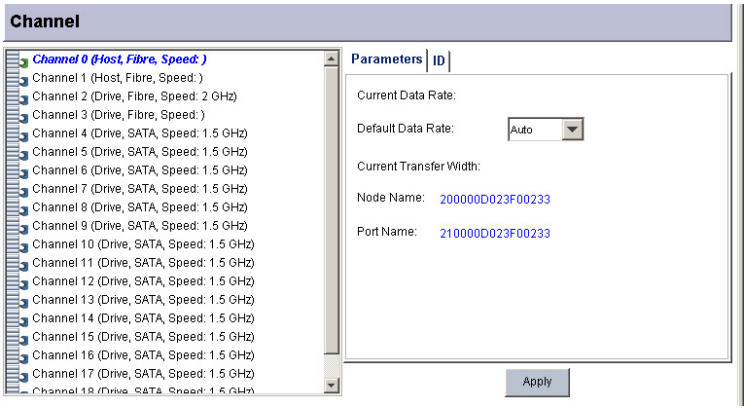

Figure 6-30: Channel Window

On the **Parameters** page, channel mode, current data rate, default data rate and current transfer width are displayed.

Channel Mode: Only applicable on the EonRAID 2510FS series. This option allows you to change the I/O channel operating mode. The channel mode selections can be: host, drive, RCC, drive +RCC.

Default Data Rate: Should only be applied with limitations on current configuration, e.g., when optical cables and adapters are running on different wavelengths.

The **ID** page allows you to add or remove IDs by selecting or deselecting ID boxes.

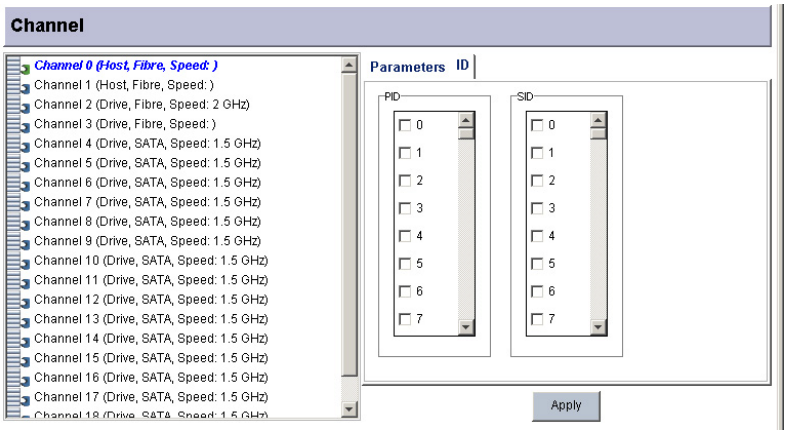

Figure 6-31: Host Channel ID Settings

Be sure to click ***Apply*** for the configuration to take effect. For detail of how to configure channels, please refer to ***Chapter 8*** of this document.

NOTE:

Changing the channel mode or adding/removing IDs requires resetting the controller/subsystem.

6.7.7 Host LUN Mapping Window

The **Host LUN Mapping** window allows you to associate configured arrays with host channel IDs or LUN numbers.

This window allows you to create LUN masking entries with host LUN mapping when access control over a Fibre Channel network is necessary.

- The Host LUN Mapping window contains four sub-windows: Host LUN(s), WWN Names(s), and Logical Drive(s) or Volume(s).

- This window also contains a right-click menu that creates association with either a Primary Controller ID or a Secondary Controller ID.

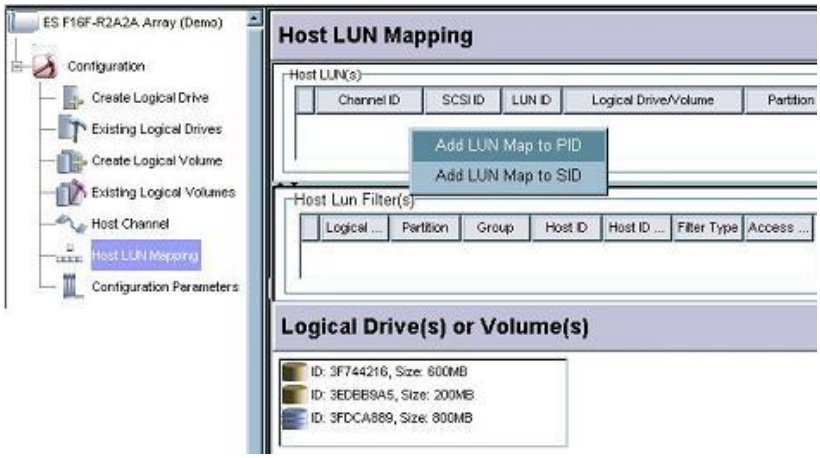

Figure 6-32: Host LUN Mapping Right-click Menu

6.7.8 Configuration Parameters Window

The Configuration Parameters window allows you to change various system preferences options.

This window uses tabbed panels to provide access to the functional sub-windows. Each sub-window provides configurable options using check boxes, check circles, or pull-down menus. Clicking Apply button will complete the configuration process. A mixture of message prompts, file path windows, text fields, and confirm boxes ensure ease of use. Refer to ***Chapter 7*** for details of each configuration options.

6.8 Arranging Windows

Each array configuration window is enveloped in a system view window. The **system view window** is the area where you interact with RAIDWatch program. You can use the mouse to choose commands from outer shell **Window** menu to enlarge, shrink or rearrange currently opened system view window(s) on your screen. You may also select each connected system by clicking the listed systems at the bottom of the Window menu.

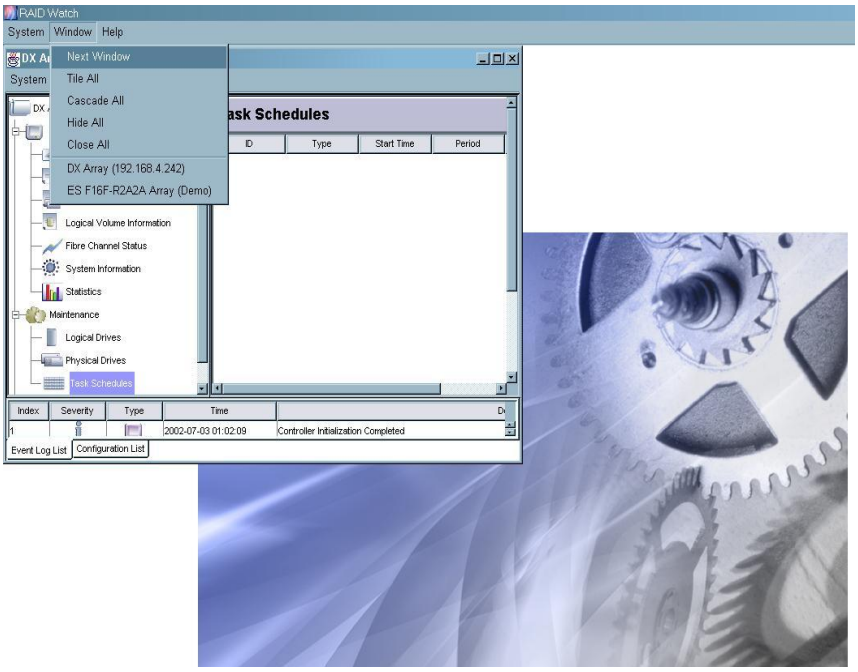

Figure 6-33: The "Outer Shell" System View Window

The window menu includes the following commands:

Next Window: The Next Window command change which window is active. The active window is raised to the top of the screen. If you connect more than one RAID system, this command allows you to switch between different system view windows. The Next Window command is useful if you want to circulate through all the windows on the screen.

Tile All: Use the Tile All command to arrange and display all system view windows. This allows you to view multiple systems simultaneously.

Cascade All: Use the Cascade All command to diagonally arrange and display all system view windows on the screen. This allows you to view multiple systems at a glance.

Hide All: When you select this command, all active system view windows will be minimized to small icons on the bottom left of the RAIDWatch screen. To enlarge the system view window, click on the icon(s).

Close All: If you select this command, all the RAID systems will be discounted and every system view windows will be closed.

System List: A list of connected RAID systems is shown in the Window menu. To view a specific system, mouse click on the system name and its system view window will show up.

6.9 Multi-array Management

Management of multiple arrays is allowed by clicking the **Open Device** command under the **System** menu. The **Exit** command ends the RAIDWatch manager session with all configured arrays. Clicking the **Open Device** command and the connection wizard is followed. Multiple management windows can be opened.

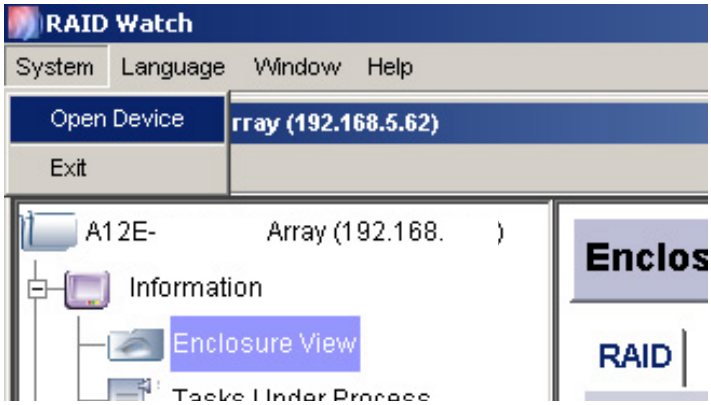

Figure 6-34: Opening Device for Multi-Array Management

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Chapter 7

Configuration Parameters

RAIDWatch Manager enables you to modify the configuration of the disk array controller from your manager console. This chapter describes the following subsystem configuration features:

7.1 Accessing Configuration Parameters Options

To access controller configuration options, either use the Configuration category icons on the Navigation Tree or select the Configuration Parameters command from the command menu to open the **Configuration Parameters**. The configuration window contains many options that are directly related to array performance, and should be configured ***before*** creating logical arrays. (See ***Figure 7-1***)

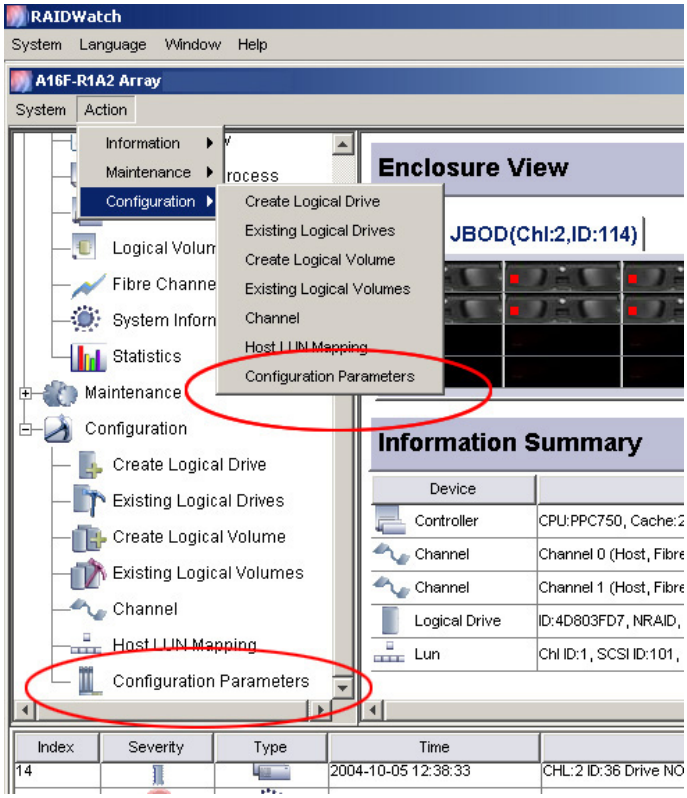

Figure 7-1: Opening the Configuration Parameters Window

The following is a complete list of configuration controls and optional menus that you will have available once the Configuration Parameters option has been selected.

More information about many of these variables is available in the controller hardware and firmware documentation.

7.2 Communications

To configure the Communication options, select the **Communication** page, as shown in ***Figure 7-2***, from the Configuration Parameters window.

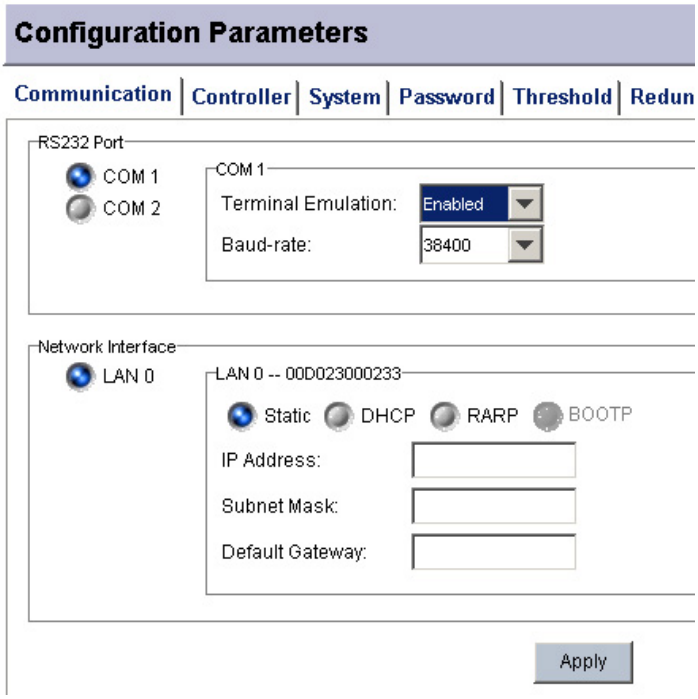

Figure 7-2: The Communication Page

RS-232C Port

Infortrend RAID subsystems/controllers come with one or two serial ports. Before proceeding with configuration, first select COM1 or COM2 by a single mouse click.

- ***Terminal emulation.*** Allows you to enable or disable the terminal emulation option. If you want to connect the COM port to a computer running terminal emulation, enable the option and set the identical baud rate to the computer COM port.

- ***Baud rate***. Allows you to control the serial port baud rate. Select an appropriate value from the pull-down menu.

Network Interface

Depending on your network setting, select a protocol selection circle to obtain adequate TCP/IP support. This column is used to configure the subsystem's Ethernet port. If the **Static** box is selected, consult your network administrator for appropriate IP address, subnet mask and gateway values.

Click **Apply** for the configurations to take effect.

7.3 Controller

"Controller" here refers to the RAID controller unit, which is the main processing unit of a RAID subsystem. The configuration window contains two sub-windows: "Caching" and "Controller Parameters." To configure the controller's caching behaviors, select an appropriate value from each of the pull-down menus, as shown in ***Figure 7-3***.

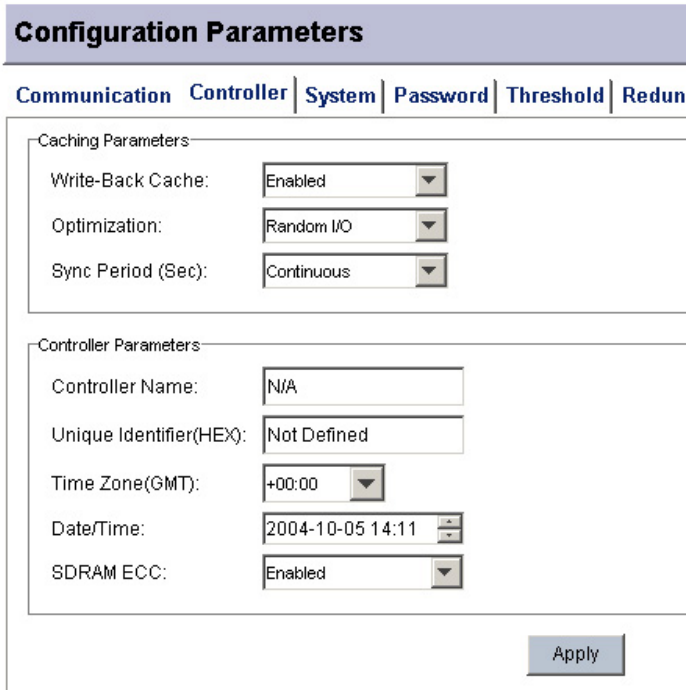

Figure 7-3: The Controller Page

The data cache can be configured for optimal I/O performance using the following variables:

Caching Parameters

- ***Write-Back Cache***
  - ***Enabled, Host Writes are cached before being distributed to hard drives***. Improves write performance, but may require battery backup support for data integrity in a case power outage occurs.
  - ***Disabled, Cache Write-Through.*** Used primarily if no cache battery backup is installed and there is increased likelihood of a power failure.
- ***Optimization Policy***
  - ***Optimization for Random I/O***. More common setting. Use this option for environments (e.g., database maintenance) with smaller I/O transactions.

- ***Optimization for Sequential I/O***. Used for large I/O environments such as video recording and editing. Particularly useful where I/O read/write must be in sequential order.

♦ ***Sync. Period***

This option allows you to select the desired interval for the partner controllers in a dual-controller configuration to synchronize (mirror-copy) their cached data. RAID controllers have defaults for this; however, this option provides more choices with the sync. period.

Controller Parameters

♦ ***Controller Name***

A manually entered nickname for the RAID controller. This name can also be used to recognize a RAID subsystem in an environment where multiple RAID subsystems reside.

♦ ***Unique Identifier (HEX)***

This is a ***MUST*** for subsystem configuration, especially for those with dual-controllers or Fibre host ports. The unique ID is integrated as unique Fibre Channel node name and port names. In the event of controller failover and failback, this ID helps host-side initiators to identify a RAID subsystem.

♦ ***Time Zone(GMT)***

GMT (Greenwich Mean Time) is used with a 24-hour clock. To change the clock to your local time zone, select a time from the drop-down menu. Choose the hour later than the Greenwich mean time following a plus (+) sign. For example, enter "+9" for Japanese time zone.

♦ ***Date/Time***

Enter time and date in their numeric representatives in the following order: month, day, hour, minute, and the year.

♦ ***SDRAM ECC***

If the DIMM module installed for data caching supports ECC, you may select to enable or disable the error check function here.

When preferences have been set with the configurations above, click **Apply** to make the changes.

7.4 System

To access the System-specific functions, select the ***System*** page, as shown in ***Figure 7-4***, from the Configuration Parameters window.

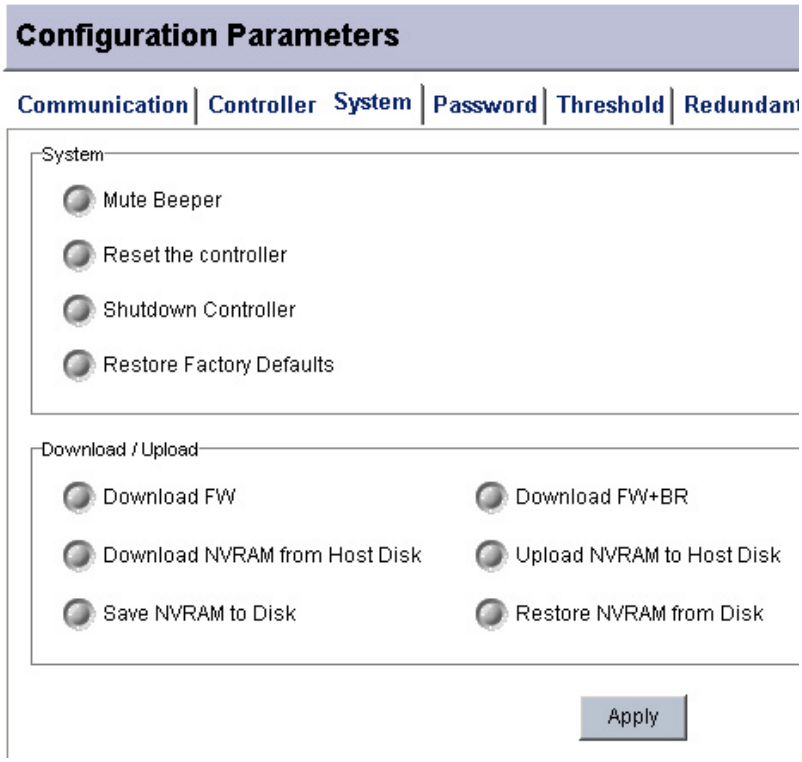

Figure 7-4: The System Page

Each function is executed by a two-step procedure: Click the select button of the function you wish to perform and click the "***Apply***" button for the configuration to take effect.

System Functions

- ***Mute Beeper.*** Turns the beeper off temporarily for the current event. The beeper will still be activated by the next event. Be sure that you have checked carefully to determine the cause of the event.

- ***Reset Controller.*** Resets the subsystem without powering off.

- ***Shutdown Controller.*** This prepares the subsystem to be powered off. This function flushes the unfinished writes still cached in controller memory making it safe to turn off the subsystem.

- ***Restore Factory Default.*** When you apply this function, any settings that you have made in RAIDWatch program will be formated and the original factory default configuration will be restored.

Download/Upload

- ***Download FW.*** Subsystem firmware can be upgraded using the existing management connection (whether Ethernet or in-band). Provide the firmware filename using the file location prompt. RAIDWatch will start to download the firmware. Find an appropriate time to temporarily stop the access from host systems, then reset the controller in order to use the new downloaded firmware.

- ***Download FW+BR.*** This allows you to download the firmware and boot record together. It may not be necessary to upgrade the boot record each time you update your firmware binaries. Please refer to the readme text file that came with each firmware version.

- ***Download NVRAM from Host Disk.*** The subsystem configuration is saved in NVRAM and can be saved to a system drive. This function allows you to retrieve a previously saved configuration profile from a system disk.

- ***Upload NVRAM to Host Disk.*** This allows you to backup your controller-dependent configuration information to a system drive. We strongly recommend using this function to save the configuration profile whenever a configuration change is made.

- ***Save NVRAM to Disk.*** The configuration profile can also be saved to array hard drives. Each array hard drive will have a replica of the NVRAM backup in its reserved space so that when a drive fails or is being regrouped, the backup remains intact.

- ***Restore NVRAM from Disk.*** Retrieve the previously saved NVRAM backup from array hard drives.

Click **Apply** for the configuration to take effect.

All of the Download functions will prompt for a file source from the current workstation. **Upload NVRAM** will prompt for a file destination at the current workstation.

7.5 Password

To configure different levels of the Access authorization **Password**, select the ***Password*** page, as shown in ***Figure 7-5***, from the Configuration Parameter window.

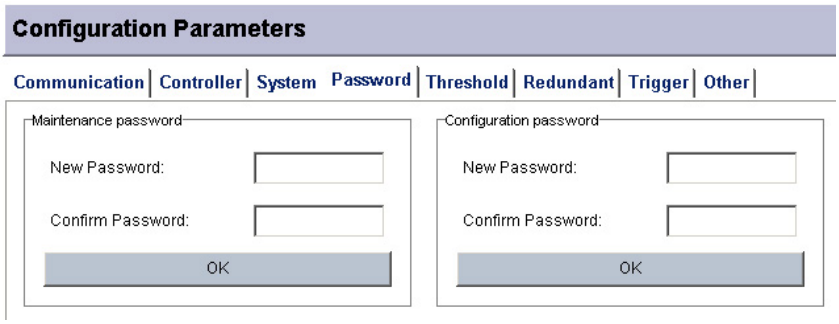

Figure 7-5: The Password Page

Maintenance Password

Users logging in using the Maintainance password will be able to access the first two configuration categories, Information and Maintenance. You may set the password here and click ***OK*** for the change to take effect.

Configuration Password

Users logging in using the Configuration password have full access to all configuration options. A super-user has the right to access all three configuration categories on the navigation tree. You may set the Configuration password here and click ***OK*** for the change to take effect.

7.6 Threshold

To access the event threshold options, click the **Threshold** page in the **Configuration Parameters** window.

This window allows you to change the preset values on thresholds used to monitor the condition of the RAID controller unit(s) in your subsystem. For example, these threshold values can be changed if the controller operates in a system enclosure where the upper or lower limit on ambient temperature is much higher or lower than that on the RAID controller. Adjusting the default thresholds can coordinate the controller status monitoring with that of the system enclosure.

It is not recommended to change the threshold values unless out-of-normal conditions are expected on the installation site.

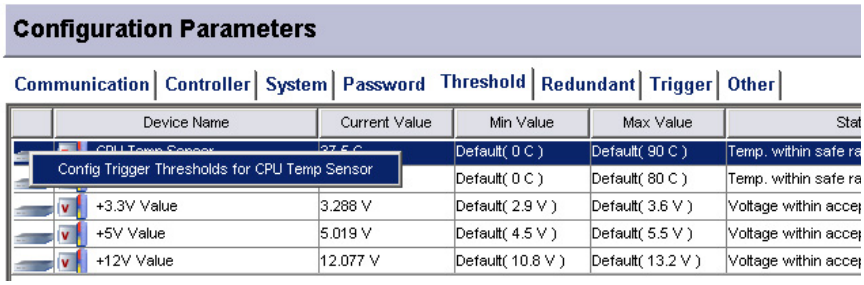

Figure 7-6: The Threshold Page

To change the threshold values on a specific monitored item, for example, the CPU Temp Sensor, right-click on the item. The Configuration button will prompt. (See ***Figure 7-6***) Left-click on the ***Configuration*** button to bring up the configuration prompt window. (See ***Figure 7-7***)

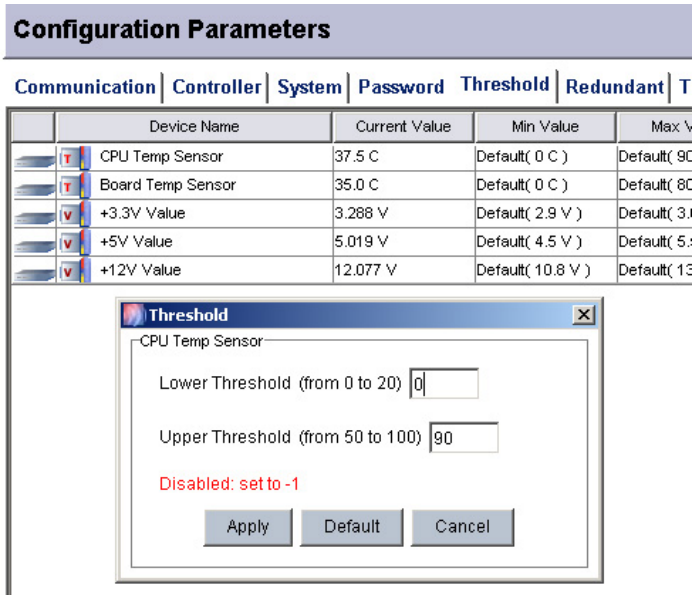

Figure 7-7: The Threshold Configuration Prompt Window

WARNING!

The upper or lower thresholds can also be disabled by entering "-1" in the threshold field. However, users who disable the thresholds do this at their own risk. The controller(s) will not report condition warning when the original thresholds are exceeded.

You may then enter a value in either the lower or upper threshold field.

NOTE:

If a value exceeding the safety range is entered, an error message will prompt and the new parameter will be ignored.

Click **Apply** for the configuration change to take effect.

Click **Default** to restore the default values for both thresholds.

Click **Cancel** to cancel this action and go back to the Threshold page in Configuration Parameter window.

7.7 Redundant Controller Settings

Figure 7-8: The Redundant Page

This sub-window contains configuration options related to redundant controller configurations. (See ***Figure 7-8***) This "Redundant" page only displays if your controller/subsystem comes with dual-redundant RAID controllers.

- **Secondary Controller RS-232 Terminal:** In a redundant controller configuration, the RS-232C port on the Secondary controller is normally nonfunctional. Enable this function if you wish to use the port for debugging purposes.

NOTE:

Access to the Secondary controller only allows you to see controller settings. In a redundant configuration, configuration changes have to be made through the Primary controller.

- **Remote Redundant Controller:** You can enable or disable the remote management on the redundant controller.

- **Cache Synchronization on Write-Through:** If redundant controllers work with Write-Back caching, it is necessary to synchronize the unfinished writes in both controllers' memory. Cache synchronization lets each controller keep a replica of the unfinished writes on its partner, so that if one of the controllers fails, the surviving controller can finish the writes.

If controllers are operating using the Write-Through caching mode, the synchronized cache operation can be manually disabled to save system resources and achieve better performance.

NOTE:

If sync. cache is disabled, the configuration changes made through the Primary controller is still communicated to the Secondary controller.

- **Adaptive Write Policy:** Firmware is embedded with intelligent algorithms to detect and to adapt the array's caching mode to the I/O requests characteristics. The capability is described as follows:

1. When enabled, the adaptive write policy optimizes array performance for sequential writes.

2. The adaptive policy temporarily disables an array's write-caching algorithm when handling sequential writes. Write-caching can be unnecessary with sequential writes so that write requests can be more efficiently fulfilled by writing data onto disk drives in the order in which they are received.

3. The adaptive policy changes the preset write policy of an array when handling I/Os with heterogeneous characteristics. If the firmware determines it is receiving write requests in sequential order, the write-caching algorithm is disabled on the target logical drives.

   If subsequent I/Os are fragmented and received randomly, the firmware automatically restores the original write-cache policy of the target logical drives.

   Adaptation for Redundant Controller Operation

4. If arrays managed by a redundant-controller configuration are configured to operate with write-back caching, cached data will be constantly synchronized between the partner controllers. Upon receiving sequential writes, the firmware disables write-caching on target arrays and also the synchronized cache operation.

IMPORTANT!

The Adaptive Write Policy is applicable to subsystems working under normal conditions. For example, if a drive fails in an array, the firmware automatically restores the array's original write policy.

For the setting to take effect, click ***Apply***.

7.8 Event Triggered Operations

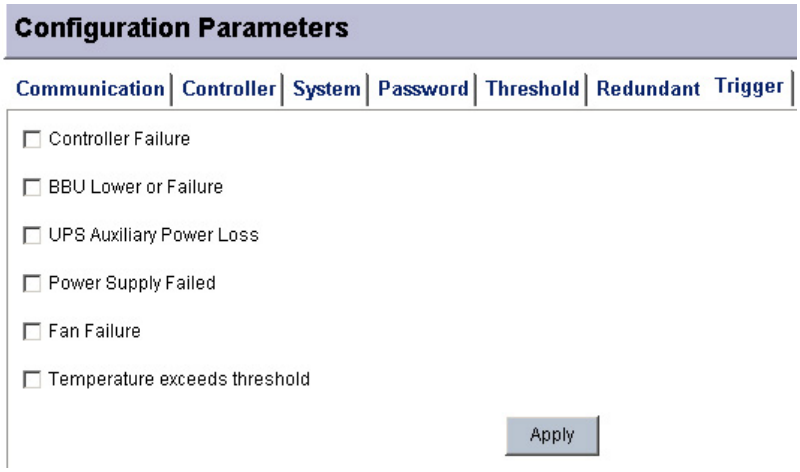

Figure 7-9: The Trigger Page

To reduce the chance of data loss caused by hardware failure, the controller/subsystem can automatically commence an auto cache flush upon the detection of the following conditions. When cache contents are forced to be distributed to hard drives, the Write-Back caching mode is also switched to the Write-Through mode.

1. Controller Failure
2. BBU Lower or Failure
3. UPS Auxiliary Power Loss
4. Power Supply Failed (single PSU failure)
5. Fan Failure
6. Temperature Exceeds Threshold

Select the check box of the events for which you wish the controller/subsystem to commence the cache flush.

NOTE:

The thresholds on temperature refer to the defaults set for "RAID controller board temperature."

7.9 Other

I/O channel host-side, drive-side, and rebuild priority options are included in the **Other** sub-window. To configure these configuration options, select the ***Other*** page, as shown in ***Figure 7-10***, from the Configuration Parameters window.

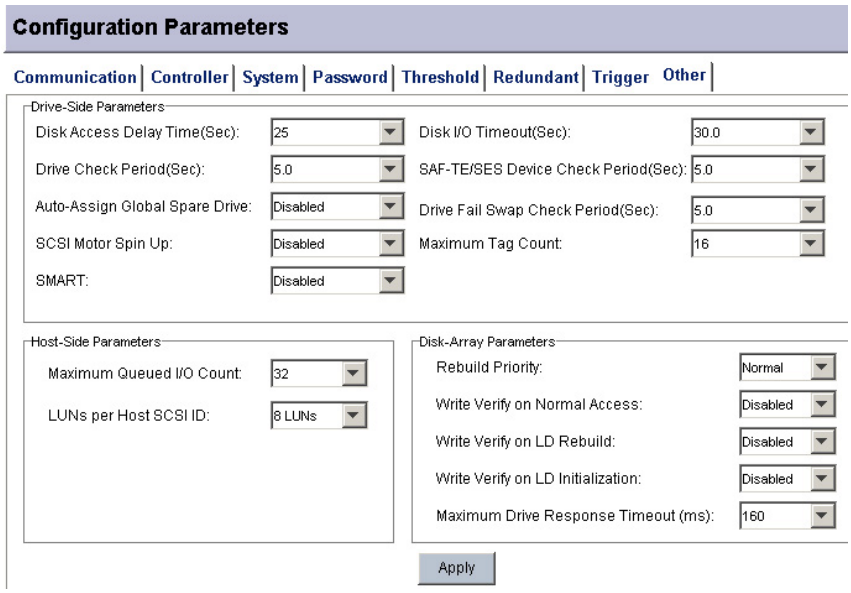

Figure 7-10: The Other Page

Each function is executed by a two-step procedure: Click to select a desired value from the pull-down menu, and then click ***Apply*** for the configuration to take effect. Some configuration changes may only take effect after resetting the subsystem.

Drive-side Parameters

- ***Disk Access Delay Time (Sec)***: Sets the delay time before the subsystem tries to access the hard drives after power-on. Default is 15 seconds.

- ***Drive Check Period (Sec)***: This is the time interval for the controller to check all disk drives that were on the drive buses at controller startup. The default value is "Disabled." Disabled means that if a drive is removed from the bus, the controller will not know it is missing as long as no host accesses that drive. Changing the check time to any other value allows the controller to check all array hard drives at the selected time interval. If any drive is then removed, the controller will be able to know – even if no host accesses that drive.

- ***Auto-assign Global Spare Drive:*** Enable this function to allow the system to auto-assign the Global Spare drive.

- ***SCSI Motor Spin Up.*** Selected when hard drives need to Spin-up by SCSI command. By default, all hard drives will start spinning up

when powered-on. Also refer to the documentation that came with your hard drives.

- ***SMART***: This allows you to configure SMART-related functionality. SMART is short for "Self-Monitoring, Analysis and Reporting Technology." Options provided in the pull-down menu are the actions to be taken if the SMART function detects an unstable drive.

- ***Disk I/O Timeout (Sec)***: This is the time interval for the subsystem to wait for a drive to respond to I/O requests. Selectable intervals range from 1 to 10 seconds.

- ***SAF-TE/SES Device Check Period (Sec)***: If enclosure devices in your RAID enclosure are being monitored via SAF-TE/SES, use this function to decide at what interval the subsystem will check the status of these devices.

- ***Drive Fail Swap Check Period (Sec)****:* The subsystem scans drive buses at this interval to check if a failed drive has been replaced.

- ***Maximum Tag Count*****:** The subsystem supports tag command queuing with an adjustable maximum tag count from 1 to 128. The default setting is "Enabled" with a maximum tag count of 32.

Host-side Parameters

- ***Maximum Queued I/O Count:*** This is the arrangement of the controller internal resources for use with a number of the current host nexus. It is a "concurrent" nexus, so when the cache is cleared up, it will accept a different nexus again. Many I/Os can be accessed via the same nexus.

  This function allows you to configure the maximum number of I/O queues the controller can accept from the host computer.

- ***LUNs per Host ID:*** Each SCSI ID can have up to 32 LUNs (Logical Unit Numbers). A logical configuration of array capacity can be presented through one of the LUNs under each host channel ID. Most SCSI host adapters treat a LUN like another SCSI device.

An additional function is available if you are using an EonStor iSCSI series model. (See ***Figure 7-11***)

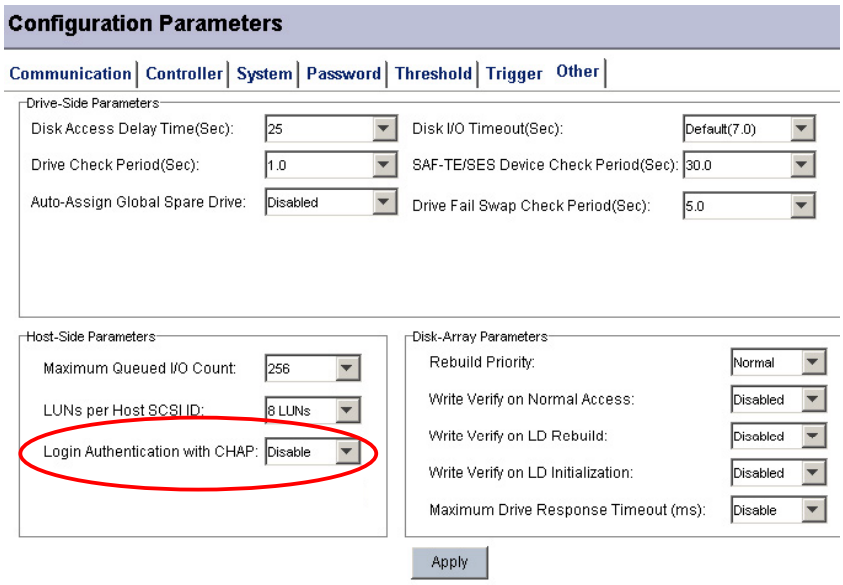

Figure 7-11: The Other Page for iSCSI Models

- ***Login Authentication with CHAP*** allows you to enable or disable the login authentication with the Challenge Handshake Authentication Protocol (CHAP) function. CHAP enables the username and password to be encrypted against eavesdroppers.

Disk-Array Parameters

- ***Rebuild Priority:*** The rebuild priority determines how much of the system resources are applied when rebuilding a logical drive. Available options are Low, Normal, Improved, and High. The higher priority takes up more system resources and the rebuild process completes more rapidly. However, I/O performance in the meantime is inevitably lower due to the resources consumed.

- ***Write-Verify Options:*** Errors may occur when a hard drive writes data. In order to avoid write errors, the controller can force the hard drives to verify the written data. There are three selectable methods:

  1. Verification on LD Initialization Writes:

     Performs Verify-after-Write while initializing the logical drive.

  2. Verification on LD Rebuild Writes:

     Performs Verify-after-Write during the rebuilding process.

  3. Verification on LD Normal Drive Writes:

     Performs Verify-after-Write during normal I/O requests.

- ***Maximum Drive Response Timeout (ms):*** This option prepares the array for applications featuring "no drop-frame" operations and continuous reading such as video streaming.

  In situations such as swapping a failed drive or the occurrence of bad blocks, a read returned after 30 or 50ms would prove too long and cause choppy audio or dropped video frames.

  To ensure a response before guaranteed latency, a timeout value is provided for processing read requests. If a timeout is reported on a specific member of an array, the subsystem immediately retrieves data from the parity data and other members. In this way, causes of delay can be eliminated.

  To prepare the array for AV applications, the following are recommended:

  1. Performance with the Write-Through caching mode is better than the Write-Back mode on subsystems equipped with redundant RAID controllers.

  2. Arrays should not be partitioned.

  3. The priorities for Rebuild or Add-drive expansion should be set to "low."

  4. A maximum latency, the "Drive I/O Timeout" which determines whether a drive has failed to respond to I/O requests, is required as the first-level timeout.

  The option comes available with an OEM append file. The following options in the internal settings are pre-adjusted:

  1. Reads have higher priority.

  2. The Smart Sorting algorithm is disabled to avoid latency that may arise due to sorting. The firmware is forced to receive ordered read requests, i.e., the original receiving order.

Chapter 8

Channel Configuration

Using RAIDWatch Manager, you can modify the configuration of any channel on the controller. With RAID controllers like the EonRAID 2510FS, you can set the channel operation mode to host or drive, enable or disable channel termination, set IDs, set the transfer clock rate for synchronous communication, and select the transfer width.

Channel configuration settings are available under **Physical View** in the RAID View window. This chapter describes the following Channel Configuration features:

8.1 Channel Configuration Window

I/O Channel configuration options are available under the **Configuration** category, which is found in the lower section of the navigation panel.

To access the **Channel** window, use either the command from the Action menu or select the **Channel** icon from the navigation panel. (See ***Figure 8-1***).

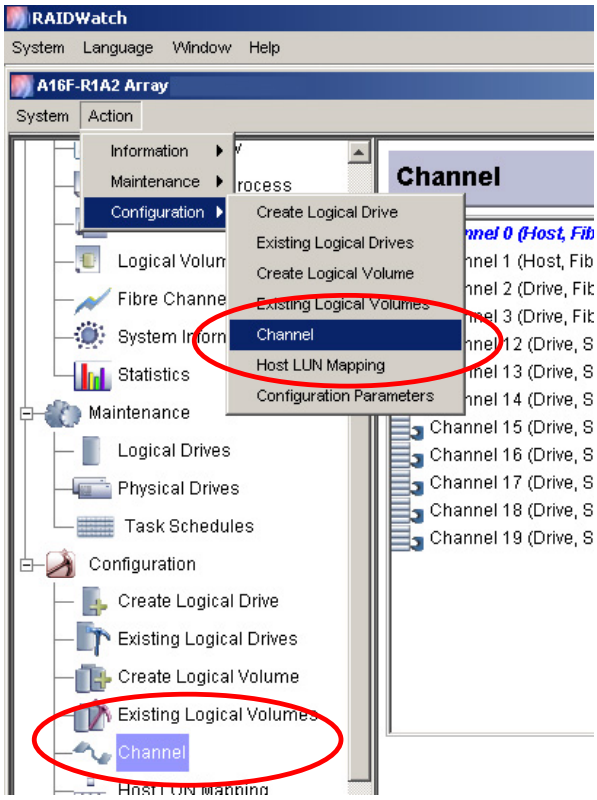

Figure 8-1: Accessing Channel Configuration Window

Once the **Channel** window has been opened and channel items have appeared, click on the channel that needs to be configured and its configuration window will appear on the right. (See ***Figure 8-2***)

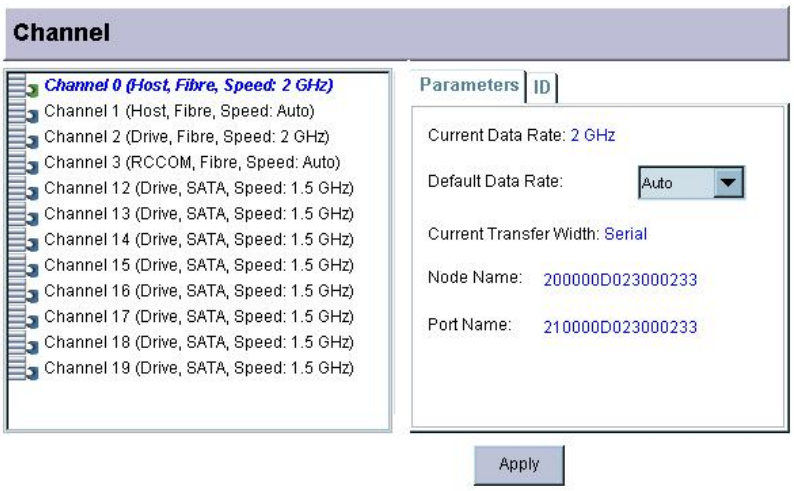

Figure 8-2: Selecting a Channel: Fibre Host

The following sections describe user-configurable channel parameters.

8.2 User-Configurable Channel Parameters

Once the channel has been selected, the screen shown in ***Figure 8-3*** will appear in the content window. The different options are discussed below.

NOTE:

A SCSI host channel is shown in ***Figure 8-3.***

Channel Parameters: EonStor Series

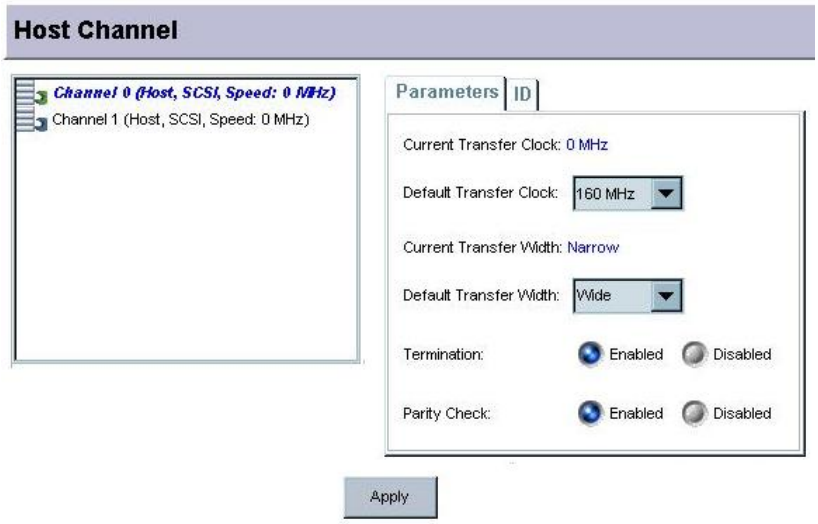

Figure 8-3: Selecting a Host Channel: SCSI Host

Channel Parameters: EonRAID 2510FS Series

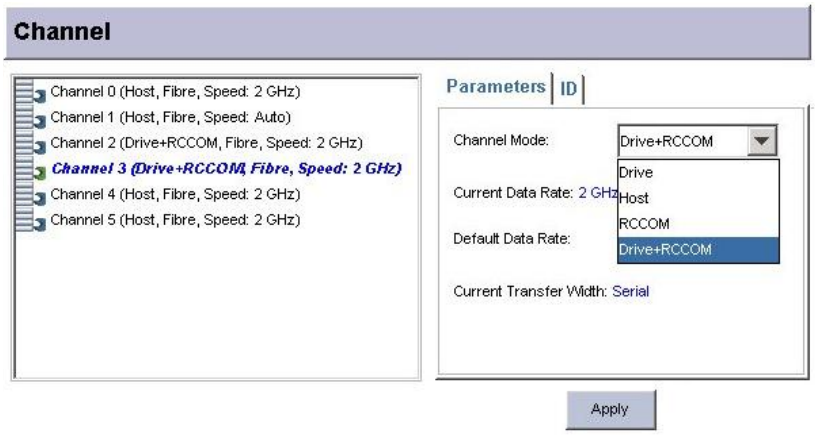

Figure 8-4: Selecting a Drive Channel: EonRAID 2510FS

8.2.1. Channel Mode

This configuration option is exclusively available with the EonRAID 2510FS series.

The EonRAID series controller allows flexible reconfigurations of its I/O channels. An I/O channel can be assigned as **Host**, **Drive**, dedicated **RCC** (**RCCOM**), or **Drive+RCCOM** channels. For example, the combination of I/O channels may look like the following:

Dual-Redundant Controller Models	
EonRAID 2510FS-4RH	2 hosts and 2 drive+RCCOMs; a total of 4 I/O channels
EonRAID 2510FS-6RH	2 hosts, 2 dedicated RCCOMs, and 2 drives; a total of 6 I/O channels

Table 8-1: Dual-Redundant Controller Channel Modes

Dual-Single Controller Models	
EonRAID 2510FS-4D	2 hosts and 2 drives per controller; a total of 8 I/O channels
EonRAID 2510FS-6D	2 hosts and 4 drives or 4 hosts and 2 drives per controller; a total of 12 I/O channels

Table 8-2: Dual-Single Controller Channel Modes

For more information about all possible combinations, please refer to the ***Installation and Hardware Reference Manual*** that came with your controller.

8.2.2. Termination

This parameter enables or disables channel SCSI termination on subsystems featuring SCSI host channels. SCSI buses must be properly terminated at both ends; that is, when connecting one end of a SCSI cable to a host HBA, the termination of the channel must be enabled on the subsystem side. An alternate configuration should be applied when multiple enclosures are being cascaded on the host buses. An enclosure situated in the middle of a SCSI bus should have its termination set to disabled.

8.2.3. Default Transfer Clock (in MHz)

These parameters set the data transfer clock rate for synchronous communication over the SCSI bus, and enable or disable wide transfer, respectively.

Data transferred across the bus in synchronous transfer mode is clocked using a synchronous transfer clock signal. The frequency of this signal determines the rate at which data is transferred. For example, if the synchronous transfer clock is 10 MHz, data transfer rate will be 10 million bytes per second (using narrow transfer).

Data transfer across the SCSI bus can be either 8-bits or 16-bits at a time. The former is referred to as *narrow* transfer, while the latter is referred to as *wide* transfer. According to SCSI channel specifications, transfer speed shown in MHz is the SCSI bus synchronous frequency. At the same synchronous transfer clock rate, 16-bit wide transfer rate is double of 8-bit narrow transfer rate. Please refer to the transfer speed in the table below.

Transfer Rate	Clock Speed in MHz
SCSI-320	160MHz
SCSI-160	80MHz

Table 8-3: SCSI Channels Clock Speeds

NOTE:

Infortrend's SCSI products are backward compatible with older version of SCSI type. However, using older versions of SCSI type may slow down the data transferring speed and do not enjoy some of the new SCSI features.

Under conditions in which SCSI signal quality is poor, such as with extremely long cables, poor connections, or bad termination, it may occasionally be necessary to reduce the synchronous transfer clock to allow the SCSI channel to function normally. Worst case, it may be necessary to switch to asynchronous communication mode.

Furthermore, certain older SCSI devices may only support *narrow* transfer and behave abnormally when attempting to negotiate *wide* transfer. Under such conditions, *wide* transfer may need to be disabled, forcing the controller to use *narrow* transfer mode with that device.

IMPORTANT!

Every time you change the transfer speed, you must reset the controller for the changes to take effect.

8.2.4. ID Pool / PID / SID

The selection with PID (Primary ID) and SID (Secondary ID) only appears with controller/subsystems that come with dual-redundant RAID controllers.

This parameter sets the IDs to appear on the host channels. Each channel must have a unique ID in order to work properly. For a SCSI-host subsystem, IDs range from 0 to 15. For an iSCSI-host subsystem, IDs range from 0 to 3. For a Fibre-host controller/subsystem, IDs range from 0 to 125. ID 0 is the default value assigned for host channels on SCSI-host and iSCSI-host subsystems and ID 112/113 is the default value assigned for host channels on Fibre-host controller/subsystems. Preset IDs are available with drive channels and it is recommended to keep the defaults.

For more information on host channel and drive channel IDs, please refer to the ***Generic Operation Manual*** and the hardware documentation that came with your controller/subsystems.

8.3 Setting the Configurations for a Channel

Step 1. Single-click under the **Channel** window to select a corresponding channel. Channel icons are displayed in the left-side panel of the configuration window. The Channel Settings configuration will appear as two separate pages on the right side: **Parameters** and **ID**. (See ***Figure 8-1***).

Step 2. From the **Parameters** panel, specify a preferred value with configurable items either by checking the pull-down menus or radio buttons of the **transfer clock**, **transfer width**, **termination**, and/or **parity check**. Be sure to click ***Apply*** for the changes to take effect.

Step 3. If you want to assign a different ID to the selected channel, choose the **ID** panel. An **ID pool** scroll menu will appear as shown in ***Figure 8-5***.

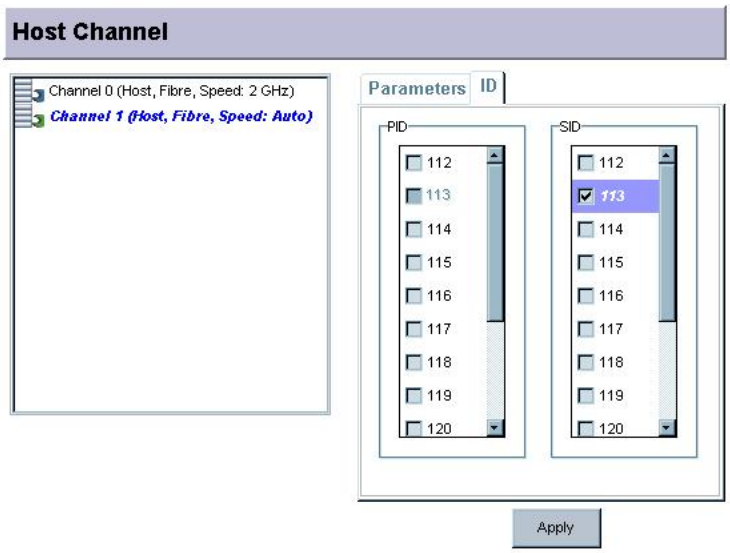

Figure 8-5: ID Pool Menu

When selecting an ID, be sure that it does not conflict with the other devices on the channel. Preset IDs should have been grayed out and excluded from selection. The ID pool lists all available IDs for the current selection. Highlight the IDs you want to use by selecting their check boxes and click ***Apply*** to create either the **PIDs** (Primary ID) or **SIDs** (Secondary ID) for the channel.

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Chapter 9
Drive Management

Using RAIDWatch Manager, you can make and delete Logical Drives (LDs) and Logical Volumes (LVs). Both LDs and LVs can be partitioned. This chapter describes the following drive management features:

9.1. Locating Drives

RAIDWatch uses icons to represent subsystem drive trays. In many configuration windows, a single click on a drive tray icon selects a hard drive. Drive status is indicated and automatically refreshed by displaying different icons. The drive tray icons used in the Front View window to instantly display drive status are shown below. By referring to the drive status in the Front View window, you can start to create or configure a logical array.

Drive Conditions	Graphical Identification
New or Healthy Used Drive	
Bad or Missing Drive	
Spare Drive	

Before you start configuring a logical array, please read the following:

- All members in a logical configuration are displayed in the same unique color.
- Whenever a disk drive is selected by a single mouse click on its icon, the drive's status is displayed on the associated configuration window. For example, when a drive is selected by clicking its icon, it automatically appears in the Selected Members column. In this way, mistakes can be avoided by double-checking the information related to a specific disk drive.

9.2. Logical Drive Management

This section describes how to:

- Access the Logical Drive (LD) Creation and Management Windows
- Create LDs
- Expand LDs
- Delete LDs

NOTE:

When you delete a logical drive, all physical drives assigned to the logical drive will be released, making them available for creation or expansion of logical drives.

9.2.1 Accessing the Create Logical Drive Window

LDs are created in the **Create Logical Drive** window and managed in the **Existing Logical Drives** window. These functional windows are accessed from the command from the Action menu or RAIDWatch's navigation panel on the left of the GUI screen.

Step 1. To manage LDs, such as to create and set related parameters, display the LDs creation window by clicking on the **Create Logical Drive** icon in the functional navigation panel or clicking on the **Action** menu items located on top of the screen.

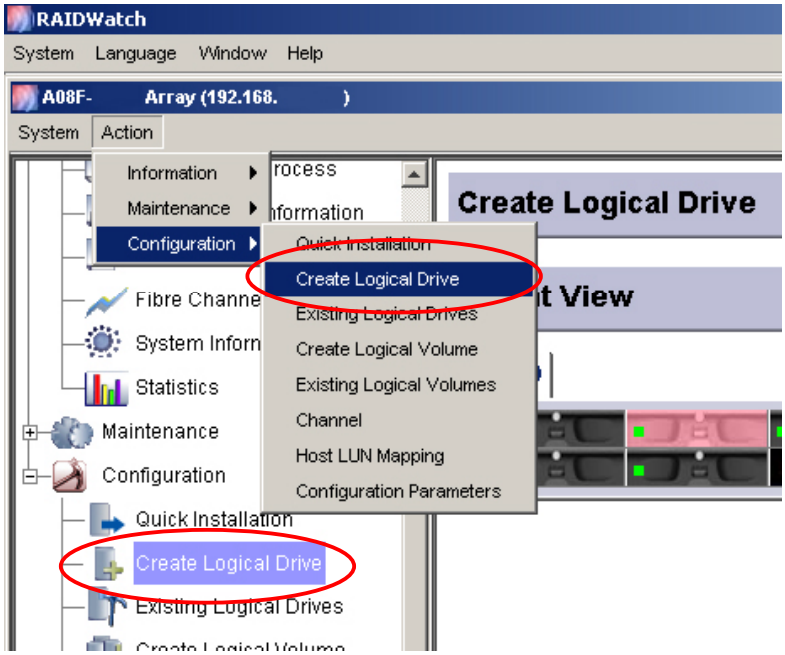

Figure 9-1: Accessing the Create Logical Drive Window

Step 2. The configuration screen shown in ***Figure 9-2*** should appear.

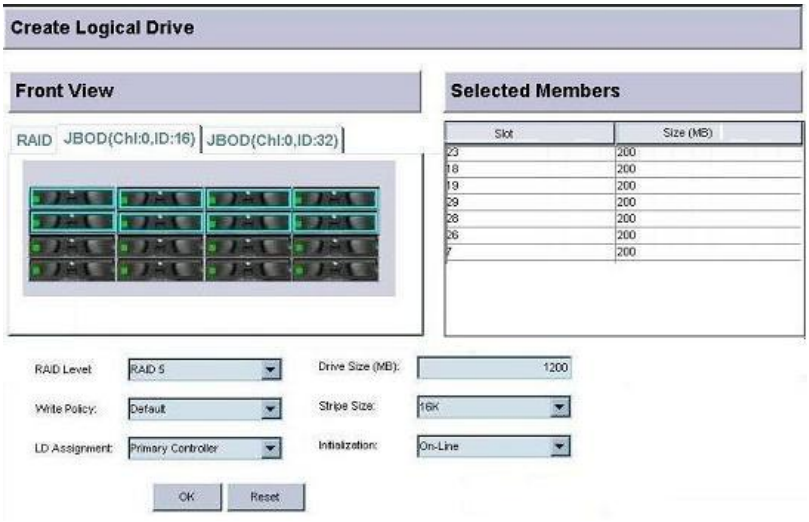

Figure 9-2: The Create Logical Drive Window

9.2.2 Creating Logical Drives

9.2.2.1. LD Creation

To create a logical drive:

Step 1. Select the physical drives that will be used in the LD. (See ***Section 9.2.2.2***)

Step 2. Select the following RAID parameters. (See ***Section 9.2.2.3***)

- RAID Level
- Write Policy
- LD Assignment
- Drive Size
- Stripe Size
- Initialization Mode

Step 3. Click the ***OK*** button. (See ***Section 9.2.2.4***)

9.2.2.2. Selecting Drives

Step 1. Select members for the new logical drive by clicking drive icons in the **Front View** window. Bad drives or drives being used by another logical drive are unavailable for the creation process.

Step 2. Drives selected for a new logical drive will be listed in the **Selected Members** sub-window on the right-hand side of the screen.

Step 3. Continue to set appropriate RAID parameters in the Select menu at the lower part of the configuration screen.

9.2.2.3. Setting RAID Parameters

After the physical drives that will be used in the LD have been selected, the RAID parameters for the LD must be selected. Available RAID parameter options can be accessed at the bottom of the configuration screen.

Select RAID Level

From the **RAID Level** pull-down menu shown, select the RAID level you wish to use when creating the LD.

Write Policy

Define the write policy that will be applied to this array. "Default" means identical to the subsystem's overall setting. The overall setting can be accessed in the Caching Parameters section of the Configuration Parameters sub-window.

LD Assignment

Choose ***Primary Controller*** or ***Secondary Controller*** from the LD Assignment menu. Select the RAID controller that will manage the logical drive in a dual-controller configuration.

Drive Size

The value entered in the ***Drive Size*** field determines how much capacity from each drive will be used in the logical drive.

NOTE:

Enter a smaller number if you do not want to use up all of the capacity at this time. The unused capacity can be utilized later using the Expand Logical Drive function.

Initialization Options

This allows you immediate availability of the array. "Online" means the logical drive is immediately available for I/Os and the initialization process can be automatically completed some time later.

Selecting Stripe Size

The stripe size used when the LD is created can be selected from the **Stripe Size** pull down menu. The following stripe sizes are available: 16KB, 32KB, 64KB, 128KB (Default), or 256KB.

Select a stripe size, but note that stripe size arrangement has a tremendous effect on array performance. Changing strip size is only

recommended for experienced users. Stripe size defaulted to this menu is determined by the subsystem Optimization mode and the RAID level selected.

NOTE:

If the redundant controller function has not been enabled or the SIDs are not assigned on drive channels, the LD Assignment pull down menu will not be available.

9.2.2.4. Click *OK* to Create LD

Once the physical drives that will be used in the LD have been selected and all the desired LD parameters have been selected:

Step 1. Click ***OK*** at the bottom of the LD management window.

Step 2. A confirmation window will appear. If you are certain that you want to create the LD with the settings you have selected, click ***OK***.

Step 4. If you selected ***OK*** in the **Please Confirm** window, the **Create In Progress** content window will display the logical drive creation progress.

Step 5. Click the **Reset** button to redo or abort the process. When the initialization process begins, you can check the **Tasks Under Process** window to view its progress.

9.2.3 Accessing the Logical Drive Configuration Window

Various functions can be performed on configured arrays in the **Existing Logical Drives** window. The window is accessible from the command in the **Action** menu or RAIDWatch's navigation panel on the left of the GUI screen.

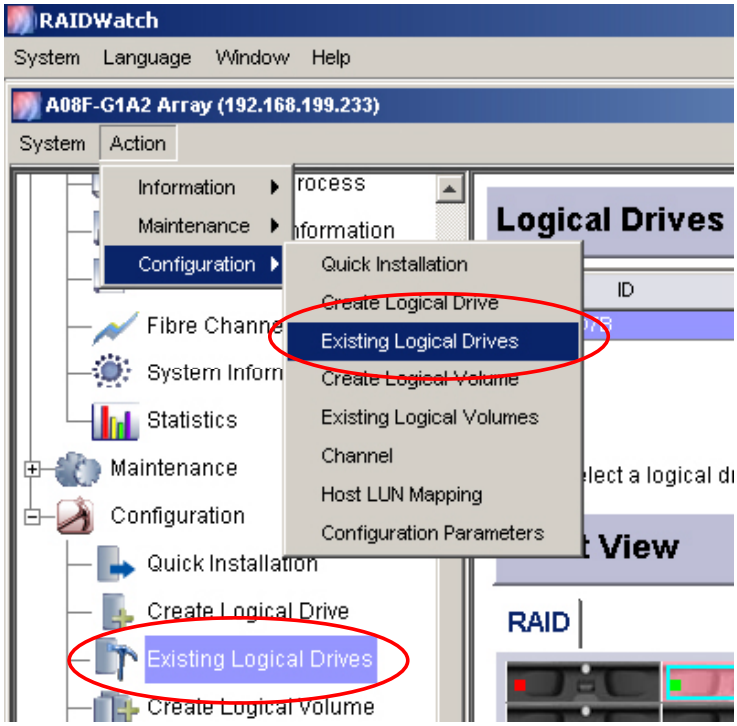

Figure 9-3: Accessing the Existing Logical Drives Window

9.2.3.1. Opening the Existing Logical Drives Window

Step 1. After the **Existing Logical Drives** window is opened**,** the LDs that have been created will appear in the Logical Drives panel.

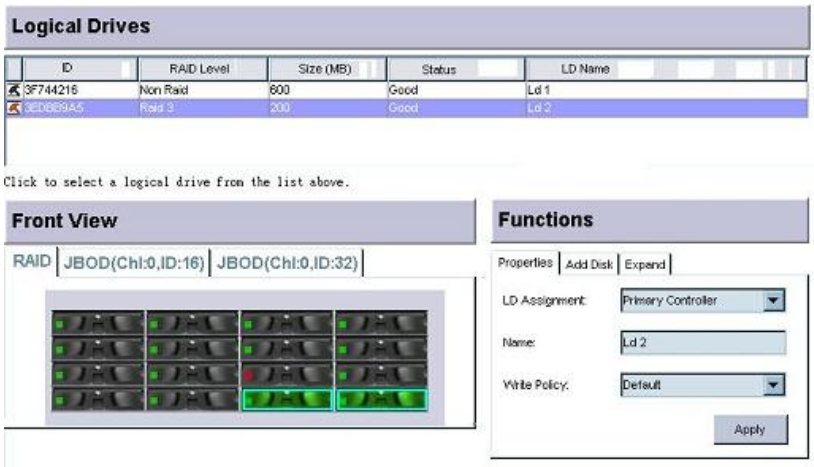

Figure 9-4: List of LDs

Step 2. From the list shown in ***Figure 9-4,*** select the LD for which you wish to change its characteristics or configure. Once this LD has been selected, its members will appear in the Front View sub-window. At the top of the **Functions** window, three tabs (**Properties**, **Add Disk** and **Expand**) will appear.

9.2.3.2. To Expand by Adding Drives

Step 1. Select the logical drive you wish to expand from the LD list on top of the GUI screen.

Step 2. Select the ***Add Disk*** tab to display the content panel.

Step 3. Select by single mouse-click from the **Front View** window one or more drives you wish to add to the logical drive. Once one or more drives are selected, its status is displayed in the **Add Disk** content panel.

Step 4. The Add Disk panel has two functional buttons: **Add Disk** and **Add Spare Drive**. Click on the ***Add Disk*** button to include new members into the array.

Step 5. The Add Disk process should immediately begin. You may check the add drive progress in the **Tasks Under Process** window.

9.2.3.3. Accessing the Expand Command page

To access the **Expand** command page, select a logical drive and click on the ***Expand*** tab under **Functions** window.

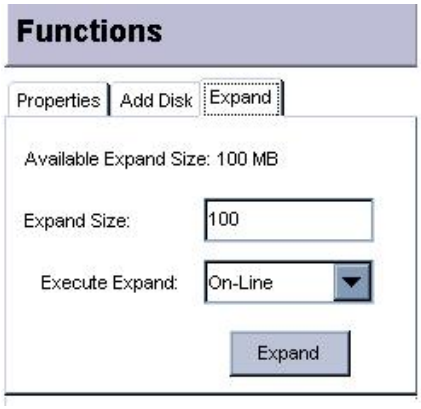

Figure 9-5: The Expand Command Sub-window

Available Expand Size (MB)

If there is an amount of unused capacity in a logical drive, the LD may be expanded. If there is no amount present in the text box, then the LD cannot be expanded.

Set Expansion Size

A value can be entered in this text box if and only if an amount is shown in the ***Available Expand Size*** text box. The value entered into the ***Expansion Size*** text box cannot exceed the amount shown above. The value entered here specifies the size of the LD expansion.

Execute Expand

Execute Expand allows you to determine whether or not the expansion will be done online or offline. If you wish to do an online expansion, then the expand process will be completed once the subsystem finds I/O requests from the host are comparatively low and allows the expand operation. If you wish to do an offline expansion, then the OFFLINE menu item will begin immediately.

9.2.3.4. Click Expand to Initiate LD Expansion

To initiate the LD expansion, follow these steps:

Step 1. Once the LD expansion parameters have been selected, click the ***Expand*** button at the bottom of the Expand page.

Step 2. The expand process begins and you may check the progress in the **Tasks Under Process** window.

Step 3. The logical drive will now have a new last partition the same size as the expansion. You may right-click the logical drive field listed above to display the **Edit Partition** command to verify this.

9.2.4 Dynamic Logical Drive Expansion

9.2.4.1. What Is It and How Does It Work?

Before Dynamic Logical Drive Expansion, increasing the capacity of a RAID system using traditional methods meant backing up, re-creating, and then restoring data. Dynamic Logical Drive Expansion (a new feature in controller firmware versions 2.11 and later) allows you to add new hard disk drives and expand a RAID 0, 3 or 5 logical drive without powering down the system.

9.2.4.2. Two Modes of Dynamic LD Expansion

There are two modes of Dynamic Logical Drive Expansion.

Mode 1 Expansion is illustrated in ***Figure 9-6*** and involves adding more hard disk drives to a logical drive, which may require that the purchase of an enclosure with more drive bays. The data will be re-striped onto the original and newly added disks.

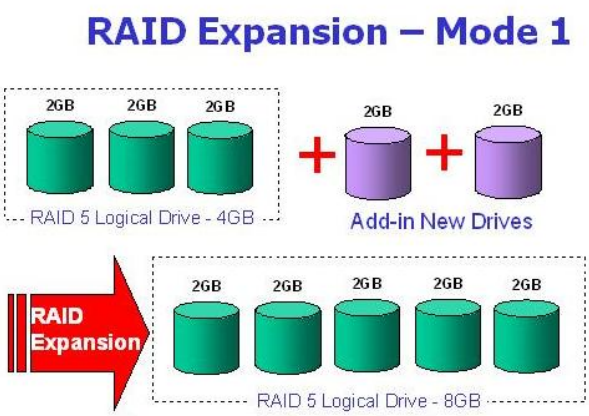

Figure 9-6: RAID Expansion Mode 1

In ***Figure 9-6*** above, new drives are added to increase the capacity of a 4-Gigabyte (GB) RAID 5 logical drive. The two new drives increase the capacity to 8GB.

Mode 2 Expansion, on the other hand, requires the same number of higher-capacity hard disk drives for a given logical drive.

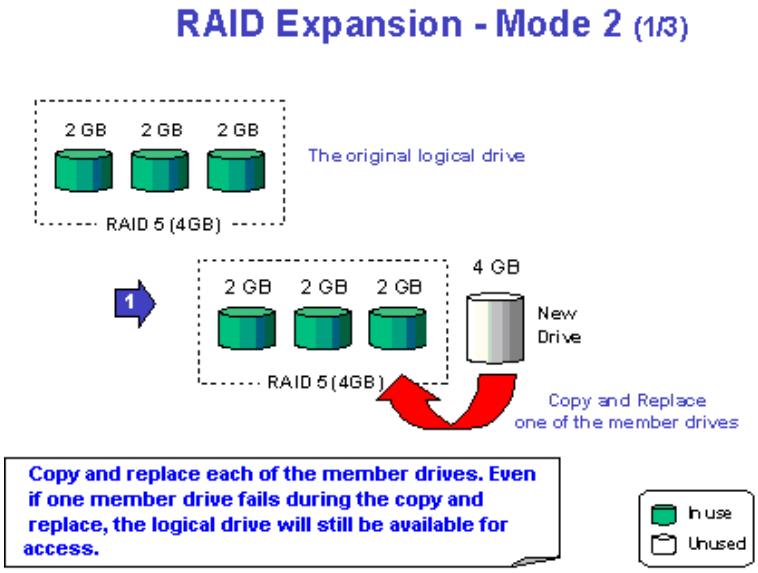

Figure 9-7: RAID Expansion Mode 2 (1/3)

Figure 9-7 above illustrates expansion of the same 4GB RAID 5 logical drive using Mode 2 Expansion. Drives are copied and replaced, one by one, onto three higher-capacity drives.

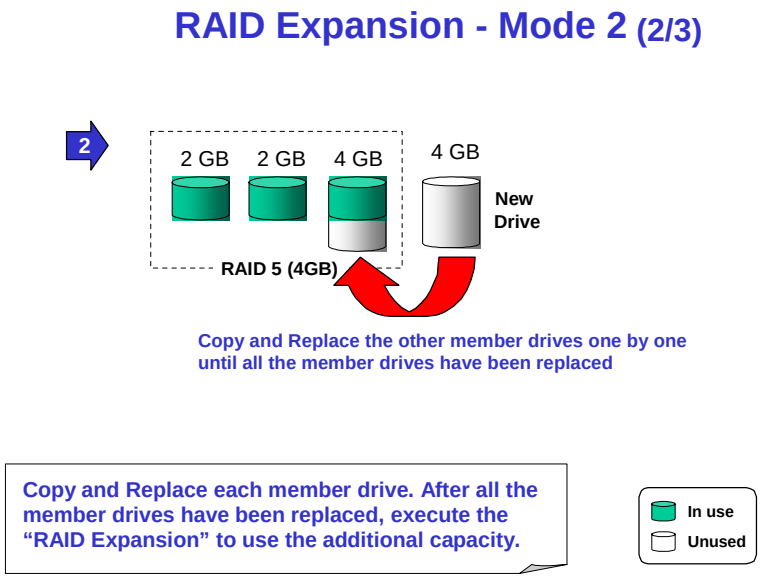

Figure 9-8: RAID Expansion Mode 2 (2/3)

This results in a new 4GB, RAID 5 logical drive composed of three physical drives. The 4GB of increased capacity is in a new partition.

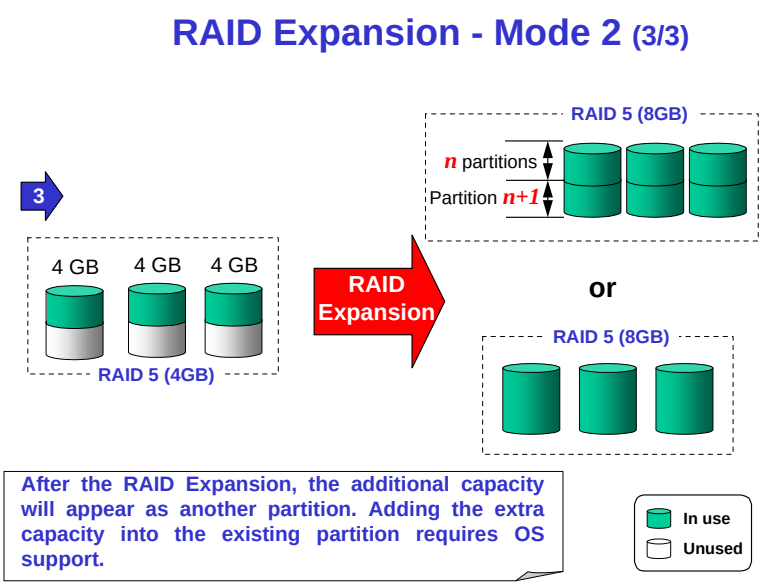

Figure 9-9: RAID Expansion Mode 2 (3/3)

IMPORTANT!

The increased capacity from either expansion type will be listed as a new partition.

Three new drives are scanned in. To add the drives to the logical drive, select the logical drive where they will be added, then choose the **Add Disk** tab to begin the process described above. Select one or more drives to add and click the **Add Disk** button. When you have selected all of the new drives you want to add, click **OK**.

When you return to the partition table, you will notice that either partition 0 or the last partition will now be larger than before.

Follow the directions in the next chapter to map the new partition to a host LUN. The new partition must be mapped to a host LUN in order for the HBA (host-bus adapter) to see it.

9.2.5 Adding Spare Drive Assignments

You can assign spare drives to a logical drive to serve as backups for failed drives. In the event of a drive failure, the spare drive will be automatically configured into the array and reconstruction (or rebuilding) will immediately commence.

Logical drives can support multiple spare drives; however, this configuration is rarely used due to its high cost and the uncommon occurrences of drive failures. A practical configuration calls for one spare drive per logical drive. After rebuilding on this drive, just replace the failed drive and then configure the replacement as the new spare drive.

NOTE:

Adding a spare drive can be done automatically by selecting the RAID 1+Spare, RAID 3+Spare or RAID 5+Spare option from the logical drive RAID Level selection dialog box when creating a logical drive. These options apply to RAID 1, RAID 3, and RAID 5 levels respectively.

9.2.5.1. Accessing the Spare Drive Management Screen

To open the **Spare Drive Management** screen, please follow these steps:

Step 1. Select the logical drive to which you wish to add a dedicated spare from the list of the logical drives above. In the Functions window, click the ***Add Disk*** tab. The functional window is accessed from the Existing Logical Drives window as shown in ***Figure 9-10***, the Add Spare button appears next to the Add Disk button.

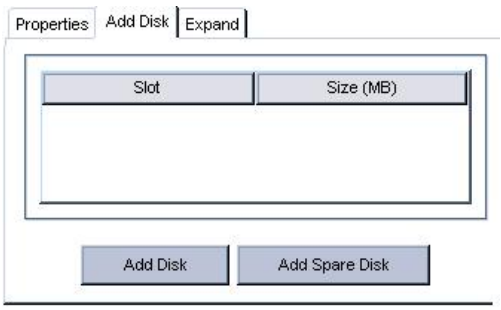

Figure 9-10: The "Add Spare Drive" Button

Step 2. From the Front View window, select the disk drive you want to use as a dedicated spare with a single mouse-click.

Step 3. After selecting the drive that will be used as a spare, the selected drive's status will be displayed and you may click the **Add Spare** button to complete the process.

NOTE:

*Spare drive assignments can also be made in the **Maintenanc**e mode window. Note that a Global Spare cannot be added in the **Existing Logical Drives** window.*

9.2.6 Rebuilding Logical Drives

Depending on whether or not there is a spare drive, rebuilding is initiated automatically or must be started manually. In the presence of a spare drive, the system automatically rebuilds onto the spare drive. This process is done in the background, thus it is transparent to users. However, you should replace the failed drive as soon as possible and insert a new drive and set it as a spare just in case another drive fails and you will need a backup drive.

In the absence of a spare drive, rebuilding must be initiated manually. Before initiating a manual rebuild, you must first replace the failed drive. If you install the replacement drive in the same drive slot (that is, the same channel and ID), then you can proceed with the rebuilding process by clicking on the ***Rebuild*** button; otherwise, you need to scan in the drive first.

A failed drive should be replaced as soon as possible. For a RAID 3 or RAID 5 array, two failed members will cause an irrecoverable loss of data.

The controller/subsystem can be set to rescan the drive bus for a replacement drive at preset intervals. The related setting can be found in Configuration Parameters -> Other -> Drive Side Parameters -> Drive Fail Swap Check Period in second.

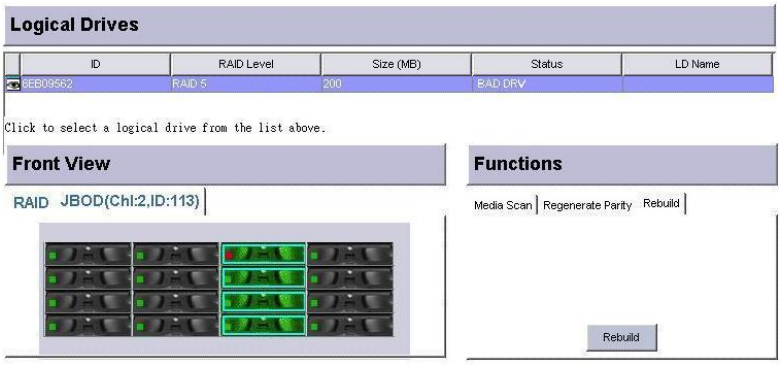

Figure 9-11: Displaying the Rebuild Command Menu

9.2.7 Deleting an LD

If you want to delete an LD from your RAID subsystem, follow the steps outlined below. Remember that deleting an LD results in all the data on the LD being deleted and any data that was previously stored on the LD will be irretrievable.

IMPORTANT!

Deleting a logical drive irretrievably wipes all data currently stored on the logical drive.

Step 1. Select the logical drive you wish to remove with a single mouse-click. **Right-click** on the adjacent screen area. A command menu will prompt as shown in ***Figure 9-12.***

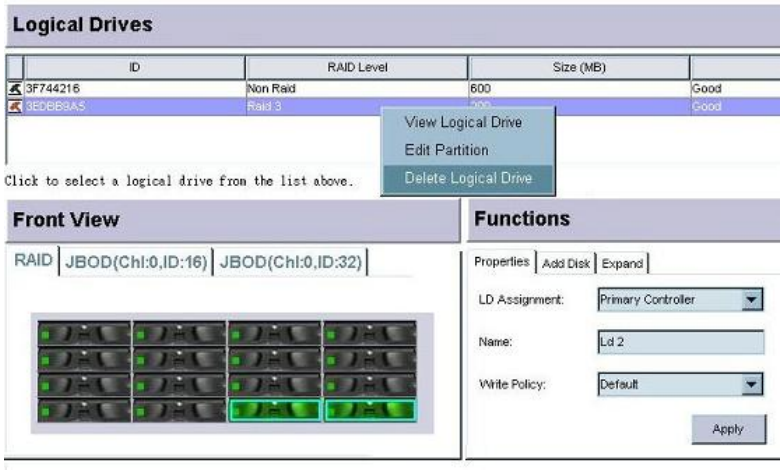

Figure 9-12: Displaying the Logical Drive Command Menu

Step 2. Select the Delete Logical Drive command. The delete process is completed almost immediately.

Step 3. Once the ***Delete*** command has been selected, a confirm box will prompt asking you whether to proceed or not.

Step 4. If you are certain that you wish to delete the LD, press the ***OK*** button. If you are not sure, click the ***Cancel*** button.

9.3. Creating and Deleting Logical Volumes

You can create and delete logical volumes using RAIDWatch Manager. Combining logical drives together creates logical volumes. You can combine logical drives with different capacities and RAID levels into a single logical volume. You can also delete existing logical volumes. Before deleting, make certain that the data stored in the logical volume is

no longer needed. Deleting a logical volume erases all information stored on that logical volume.

NOTE:

When you delete a logical volume, all logical drives assigned to it will be released, making them available for new logical volume creation.

9.3.1 Accessing the Create Logical Volume Window

LVs are created in the **Create Logical View** window, which can be accessed either from the navigation panel icon or the command menu on top of the screen.

Step 1. To create LVs; display the **Create Logical Volume** window by clicking on the associated icon in the GUI's navigation panel or the command in the **Action** menu bar.

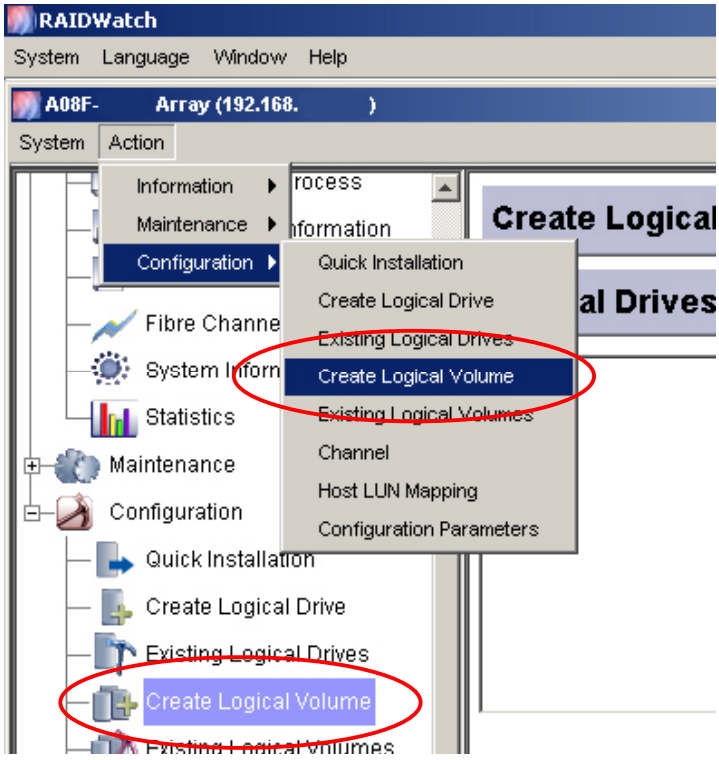

Figure 9-13: Accessing the Create Logical Volume Window

Step 2. The Create Logical Volume window will appear.

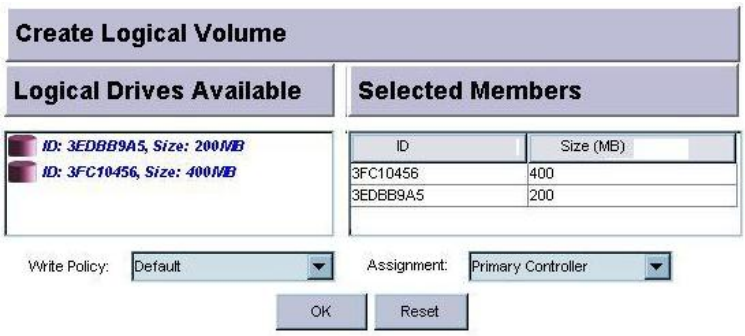

Figure 9-14: The Create Logical Volume Window

9.3.2 Creating Logical Volumes

9.3.2.1. LV Creation

Step 1. Select the LDs that will be used in the LV from the **Logical Drives Available** panel.

Step 2. Select the following RAID parameters:

- Write Policy
- Assignment

Step 3. Information about the selected LDs will appear on the Selected Members panel. Click the ***OK*** button.

9.3.2.2. Selecting LDs

Step 1. Select each logical drive you wish to include in the new logical volume with a single mouse-click. Select the LDs you wish to incorporate into a LV and click the ***Add*** button beneath the ***Available*** menu.

Step 2. All available logical drives are listed on the left. There are no limitations as to the number of logical drives that can be included in a logical volume. Double-check to ensure that you have selected the appropriate members.

9.3.2.3. Setting Logical Volume Parameters

After the LDs that will be used in the LV have been selected, the LV parameters for the LV must be selected. LV parameter options can be accessed at the bottom of the LV creation window as shown in ***Figure 9-14***.

LV Assignment

Choose ***Primary Controller*** or ***Secondary Controller*** from the Logical Volume Assignment menu.

NOTE:

If the redundant controller function has not been enabled or the SIDs are not assigned on drive channels, the LD Assignment pull-down menu will not be available.

Select Write Policy

Use the **Write Policy** menu to select either Default (Global Setting), Write Through, or Write Back. The same policy will automatically apply to all logical drives (members) included in the logical volume.

9.3.2.4. Click OK to Create LV

Once the logical drives that will be used in the LV have been selected and all the desired LV parameters have been selected:

Step 1. Click the ***OK*** button at the bottom of the LV creation window.

Step 2. The creation is completed almost immediately.

9.3.3 To Access the Existing Logical Volumes Window

The Existing Logical Volumes window allows you to perform LV expansion and change related configuration options. As shown below, the configuration window can be accessed either from the functional navigation panel or the command menu on the top of the GUI screen.

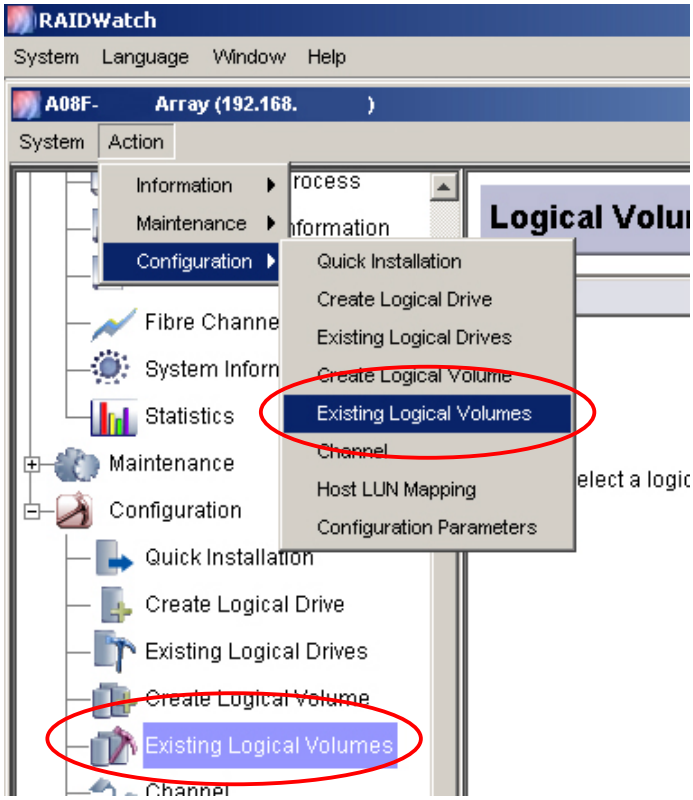

Figure 9-15: Accessing Existing Logical Volume Window

9.3.4 To Expand a Logical Volume

When members of a logical volume have free and unused capacity, the additional capacity can be added to existing logical volumes. The unused capacity can result from the following situations:

- Certain amount of capacity was intentionally left unused when the logical drives were created (configurable with maximum array capacity).
- Some or all of the members of a logical volume have been expanded, either by adding new drives or copying and replacing original drives with drives of larger capacity.

9.3.4.1. Opening the Expand Logical Volume Window

Step 1. Select a configured LV from the Existing Logical Volumes window shown in ***Figure 9-16***. As shown below, all the LVs that have been created will appear below the **Logical Volume Status** panel.

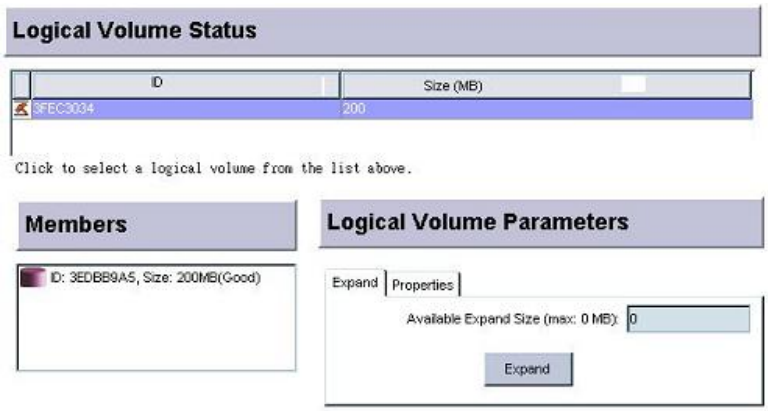

Figure 9-16: Existing Logical Volumes Window

Step 2. The expand command can be found by clicking the ***Expand*** tab under the LV Parameters panel.

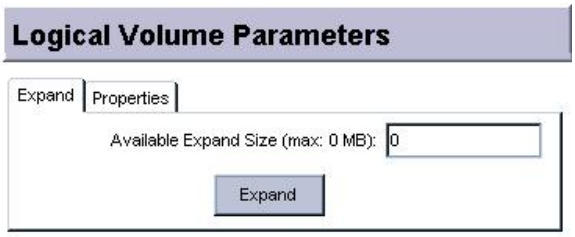

Figure 9-17: Logical Volume Parameters

Step 3. Available expansion size displays in a text box if there is any amount of unused capacity.

Step 4. Click the **Expand** button at the bottom of the configuration panel. The expand process should be completed in a short while because all unused capacity in the members of a logical volume must be made useful by the same expansion process. The expansion process on a logical volume simply lets subsystem firmware recognize the change in the arrangement of free capacity.

NOTE:

*You may combine partitions under **View and Edit LV Partition Table** by expanding the size of earlier partitions (such as increasing the size of partition 0 so that it is as large as all partitions combined to make one partition).*

WARNING!

Combining partitions destroys existing data on all drive partitions.

Step 5. The logical volume will now have a new last partition the same size as the expansion. ***Right-click*** the expanded volume and select the ***Edit Partition*** command to look at the partition verify this.

9.3.5 Delete a Logical Volume

Step 1. Select the configured volume you wish to remove with a single mouse-click. **Right-click** the adjacent area to display a command menu. As shown in ***Figure 9-18***, all the LVs that have been created will appear below the **Logical Volume Status** panel.

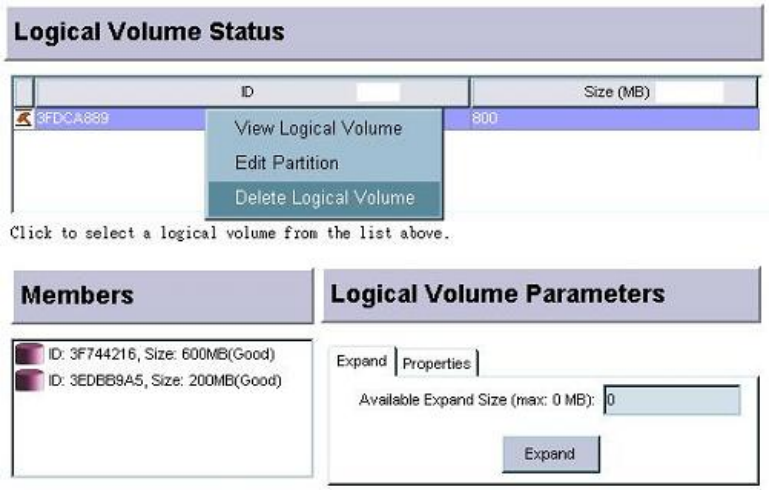

Figure 9-18: Displaying Logical Volume Edit Mode Menu

Step 2. You will be asked to confirm that you wish to delete the selected LV. If you are certain that you want to delete the LV then select **OK**. The logical volume will be deleted and removed from the logical volumes list.

9.4. Partitioning a Logical Configuration

9.4.1 Overview

Partitions can be created in both logical drives (LD) and logical volumes (LV). Depending on your specific needs, you can partition an LD or LV into smaller sizes or just leave it at its default size (that is, one large partition covering the entire LD or LV).

If you intend to map an entire LD or LV to a single host LUN, then partitioning becomes irrelevant. Partitioning can be helpful when dealing with arrays of massive capacities and when rearranging capacities for applications that need to be accessed by many hosts running heterogeneous OSs.

NOTE:

You can create a maximum of eight partitions per logical drive or logical volume. Also, partitioned logical drives cannot be included in a logical volume.

9.4.2 Partitioning a Logical Drive (LD)

WARNING!

Partitioning a configured array destroys the data already stored on it.

Step 1. Select the logical drive you want to partition. Move your cursor to the **Logical Drives** window. **Right-click** to display the Edit Partition command menu.

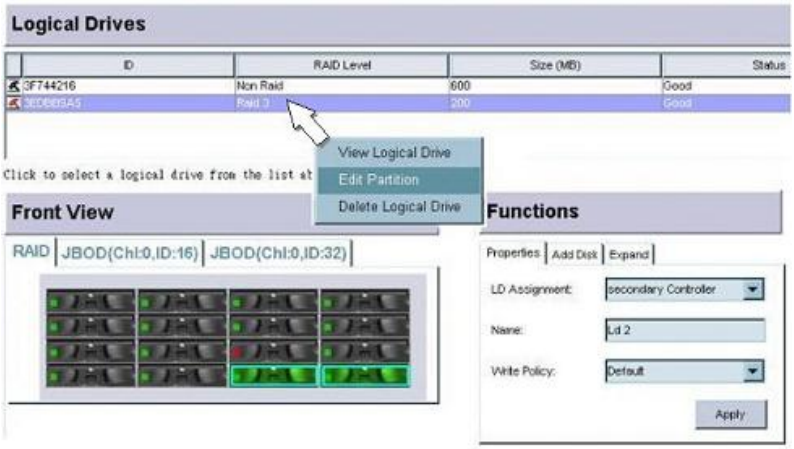

Figure 9-19: The Edit Partition Command

Step 2. Select **Edit Partition** from the menu.

Step 3. The **Edit Partition** window displays. Use the arrow keys on the button on the lower right to switch between partitions.

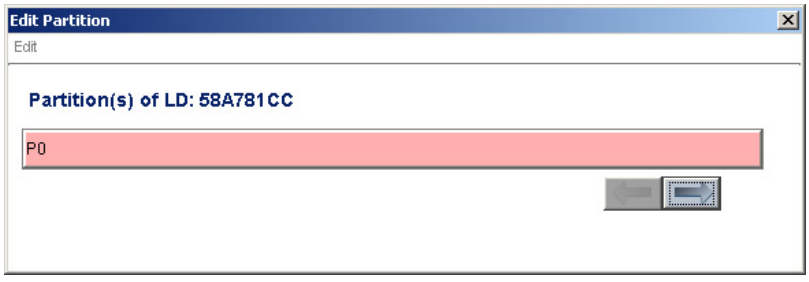

Figure 9-20: The Edit Partition Command Window

Step 4. If the array has not been partitioned, all of its capacity appears as one single partition. Single-click to select the partition (the color bar).

Step 5. **Right-click** or select the **Edit** command to display the **Add Partition** command. Click to proceed.

Step 6. The **Partition Size** window displays. Enter the desired capacity and press OK to proceed.

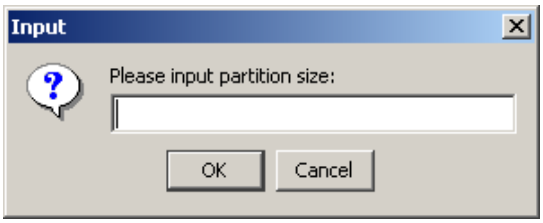

Figure 9-21: The Partition Size Window

Step 7. Shown below is a capacity partitioned into two. Each partition is displayed in a different color. Repeat the above process to create more partitions or click to view its information. A new partition is created from the existing partition.

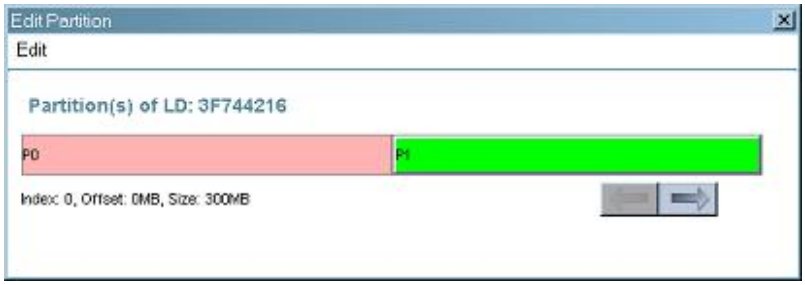

Figure 9-22: The Edit Partition Command Window

The **arrow** buttons help you travel from one partition to another.

9.4.3 Partitioning a Logical Volume (LV)

Step 1. Select the logical volume you wish to partition. Move your cursor onto the **Logical Volume Status** window. **Right-click** to display the Edit Partition command menu.

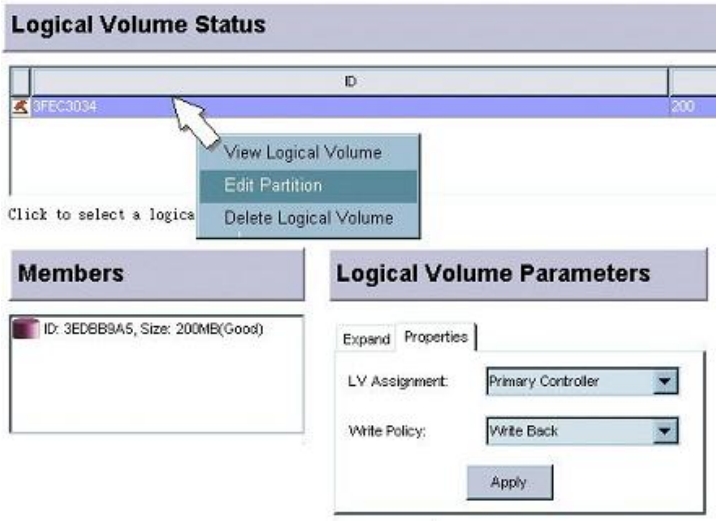

Figure 9-23: The Edit Partition Command

Step 2. Select **Edit Partition** from the menu.

Step 3. The **Edit Partition** mode window displays as shown below.

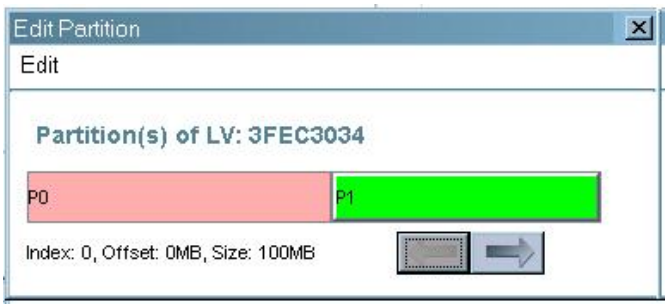

Figure 9-24: The Edit Partition Window

Step 4. If the volume has not been partitioned, all of its capacity appears as one single partition. Single-click to select the partition (the color bar).

Step 5. **Right-click** or select the **Edit** command to display the **Add Partition** command. Click to proceed.

Step 6. The **Partition Size** window displays. Enter the desired capacity and press **OK** to proceed.

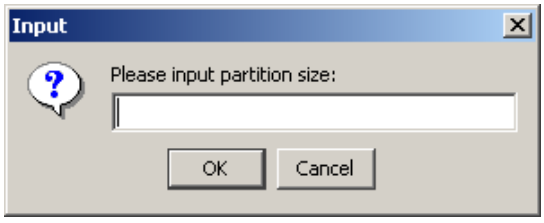

Figure 9-25: The Partition Size Window

Step 7. Shown below is a capacity partitioned into two. Each partition is displayed in a different color. Repeat the above process to create more partitions or click to view its information.

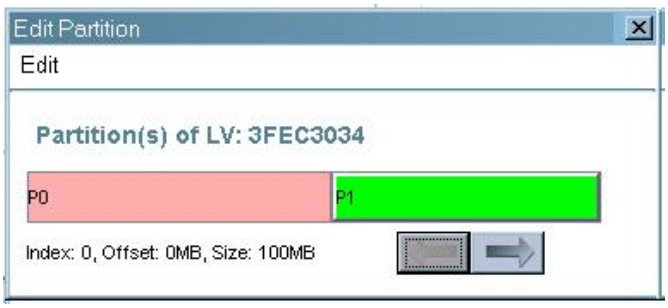

Figure 9-26: The Edit Partition Window

The **arrow** buttons help you travel from one partition to another.

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Chapter 10
LUN Mapping

After creating a logical drive (LD) or logical volume (LV), you can map it as is to a host LUN; or, if partitions are set, you can map each partition to a specific host LUN. RAIDWatch supports eight LUNs per host channel (numbered 0 - 7), each of which appears as a single drive letter to the host if mapped to an LD, LV, or a partition of either. Existing host LUN mappings can also be deleted. In cases where certain mappings are found to be useless, or the disk array needs to be reconfigured, you can delete unwanted mappings in your system.

This chapter explains the following LUN mapping features:

10.1. Accessing the LUN Map Table

When you want to either create or delete a LUN mapping or an extended LUN mapping, it is necessary to access the **LUN Map Table**. The **LUN Map Table** lists the LDs, LVs and partitions that have previously been mapped. To access the LUN Map Table, please follow these steps:

Step 1. In the navigation panel under the **Configuration** category, click on the **Host LUN Mapping** where you can find the configuration options with the mapping operation. (See ***Figure 10-1***).

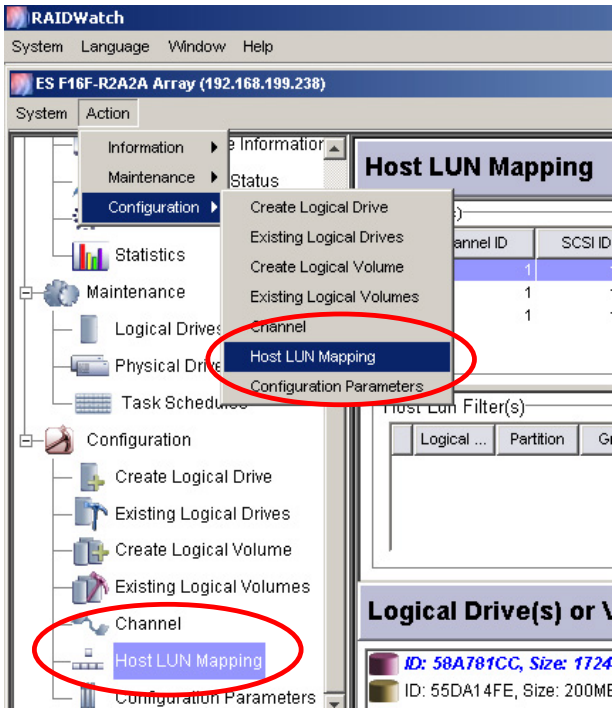

Figure 10-1: Select the Host LUN Mapping Window

Step 2. The Host LUN Mapping window should appear on the right. Right-click on the Host LUN(s) sub-window to display **PID** (Primary controller ID)/**SID** (Secondary controller ID) command menu as shown in ***Figure 10-2***. Infortrend's controllers or subsystems always come with pre-configured IDs. If it is necessary to add alternative IDs, please select the **Channel** window from the navigation panel.

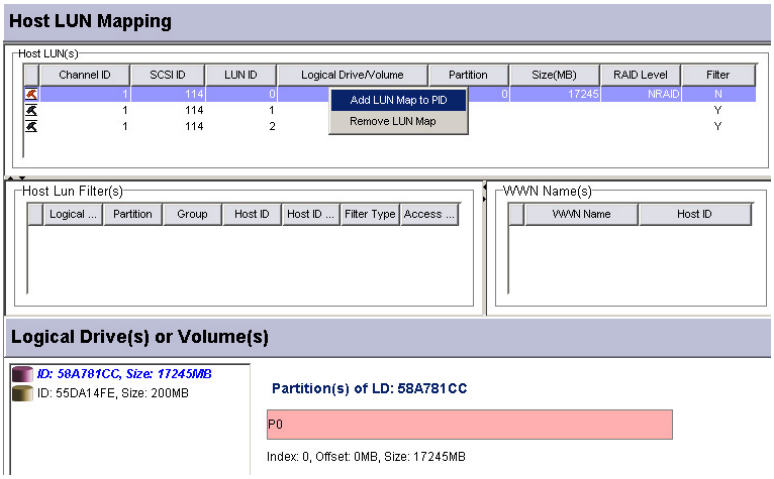

Figure 10-2: Selecting the Host Channel ID Number

Step 3. After selecting the ID, the **LUN Map Setting** window appears as shown in ***Figure 10-3***.

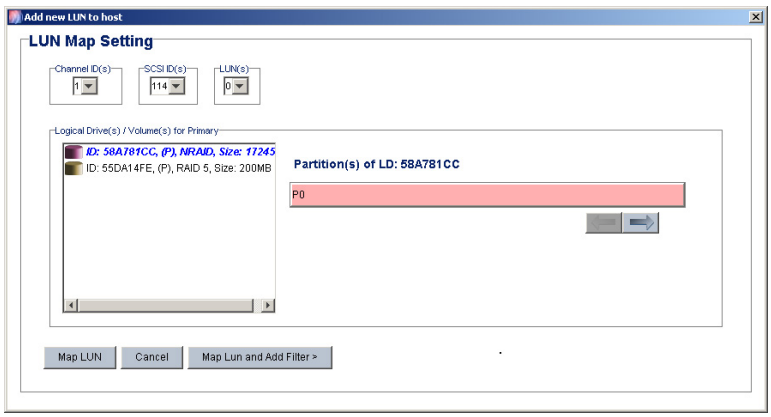

Figure 10-3: LUN Map Setting Window

10.2. LUN Mapping

10.2.1. Mapping a Complete LD or LV

Step 1. If you want to map a complete LD or LV, make sure that the LD or LV has not been partitioned.

Step 2. Follow the steps listed in ***Section 10.1*** above to access the ***Host LUN Mapping*** window shown in ***Figure 10-3***.

Step 3. Select the appropriate **Channel**, **SCSI ID**, and **LUN** numbers from the separate pull-down lists above.

Step 4. Select a Logical Drive or Logical Volume and then select the Partition color bar with a single mouse-click. The partition bar

appears on the right-hand side of the screen. An LD or LV that has not been partitioned should have only one partition.

Step 5. Click on the **Map LUN** button to complete the process. (See ***Figure 10-4***)

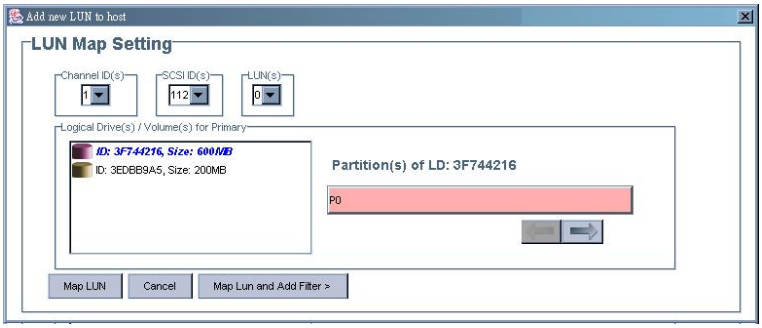

Figure 10-4: LUN Map Setting Window: Single Partition

10.2.2. Map a Logical Drive or Volume Partition to a Host LUN

Step 1. First, partition the logical drive or logical volume.

Step 2. Follow the steps listed in ***Section 10.1*** above to access the ***LUN Map Setting*** window shown in ***Figure 10-3***.

Step 3. When the LUN Map window appears, select the appropriate **Channel**, **SCSI ID**, and **LUN** numbers from the separate pull-down lists above.

Step 4. Select a Logical Drive or Logical Volume with a single mouse-click. With a single mouse-click on the Partition color bar, select one of the partitions that you wish to associate with the selected channel ID/LUN number. See ***Figure 10-5*** for the configuration screen.

Figure 10-5: Select Add New LUN to Host

Step 5. Click on the **Map LUN** button to complete the process.

10.2.3. Deleting a Host LUN Mapping

Step 1. Follow the steps listed in ***Section 10.1*** above to access the **LUN Map Setting** window shown in ***Figure 10-2***.

Step 2. **Left-click** on a configured LUN and then **right-click** on the adjacent area. A command menu displays as shown in ***Figure 10-6.*** Select ***Remove LUN Map*** to complete the process.

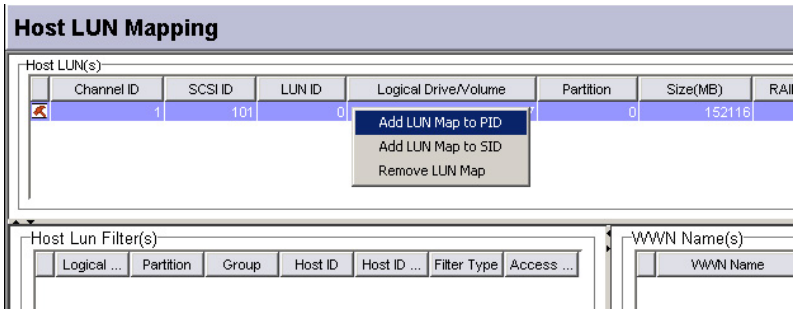

Figure 10-6: Delete LUN Command

Step 3. When prompted for a password or an answer, enter it and click **OK**. The LUN mapping should no longer be listed in the **LUN Map** table. After deleting the LUN mapping it no longer appears in the host LUN(s).

Step 4. To remove additional LUN mappings, repeat ***Step 2***.

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Chapter 11

System Monitoring and Management

11.1 RAID Information

Unlike its predecessor, RAIDWatch presents access to all informational services under one Array Status category. Users logged in using the Information authorization will be allowed to access the information windows while being excluded from other configuration options.

Support for device monitoring via SAF-TE, SES, and I^2C data buses is the same. However, RAIDWatch now uses a more object-oriented approach by showing the enclosure graphics, which are identical to your EonRAID or EonStor enclosures. RAIDWatch reads identification data from connected arrays and presents a correct display as an enclosure graphic. This process is automatically completed without user's setup.

NOTE:

RAIDWatch does not support the display of drive enclosures provided by other vendors.

11.1.1 The Information Category

Once properly set up and connected with a RAID array, a navigation panel displays on the upper left of the screen. RAIDWatch defaults to the Enclosure View window at startup.

To access each informational window, single-click a display icon on the navigation panel. You may also access each window by selecting from the **Action** menu on the menu bar at the top of the screen. See ***Figure 11-1*** for access routes.

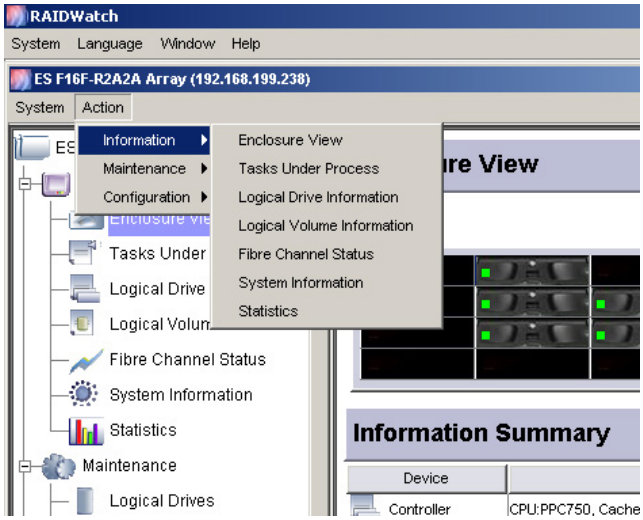

Figure 11-1: Selecting Information Windows

The Array Information category provides access to seven display windows as listed below:

Icon	Description
	Icon for the Array Information category
	Opens the **Enclosure View** window
	Displays the **Configuration Tasks** currently being processed by the subsystem
	Opens the **Logical Drive** information window
	Opens the **Logical Volume** information window
	Opens the **Fibre Channel Status** window
	Opens the **System View** window
	Opens the **Statistics** window

Table 11-1: Array Information Icons

11.1.2 Date and Time

Once date and time has been configured on your subsystem, they are displayed on the bottom right corner of the manager's screen.

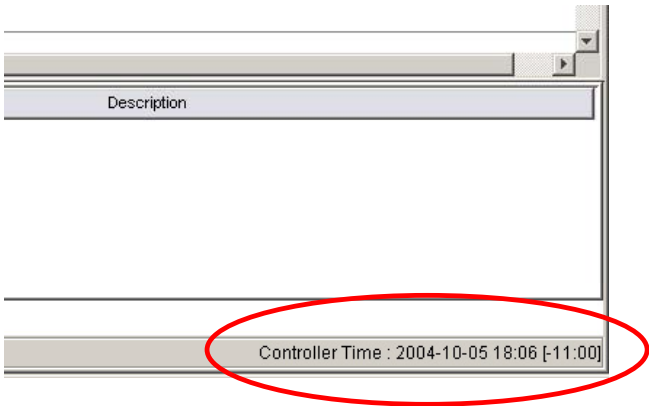

Figure 11-2: Selecting Information Windows

Maintaining the system date and time is important, because it is used for tracking a pending task, past events, configuring a maintenance task schedule, etc. Date and time are generated by the real-time clock on the RAID controller/subsystems.

11.1.3 Enclosure View

The Enclosure View window displays both the front and the rear views of connected enclosures. For the EonStor subsystems, RAIDWatch displays drive trays in the front view, and system modules (power supplies, cooling modules, etc.) in the rear view. For the EonRAID controllers, RAIDWatch displays FC port modules and LEDs in the front view; powers supplies, cooling modules, and controller modules display in the rear view.

If multiple enclosures are cascaded and managed by a RAID subsystem, RAIDWatch defaults to the display of RAID enclosures and the graphics of the cascaded JBODs can be accessed by clicking the tab buttons.

RAIDWatch is capable of displaying any information provided by an SES, SAF-TE or I^2C data bus. Various kinds of information is typically provided including the status of:

- Power supplies
- Fans
- Ambient temperature
- Voltage
- UPS
- Disk drives
- System module LEDs

To read more information about enclosure devices, place your cursor either over the front view or rear view graphic. An information text field displays as shown below.

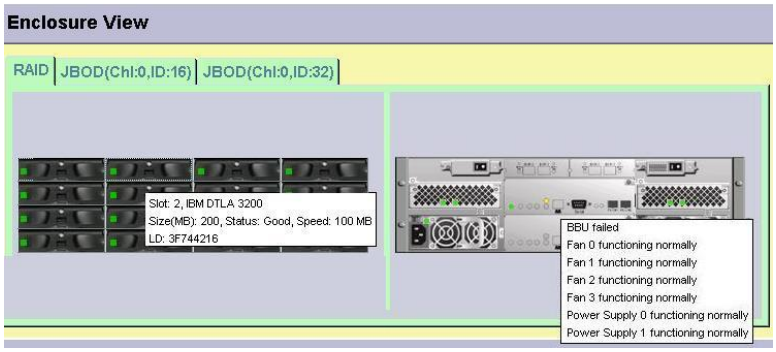

Figure 11-3: Displaying Enclosure Device Information

More information about each enclosure device can also be found in the System Information window.

11.1.4 Task Under Process

Access the Task Under Process window by clicking on the display icon in the RAIDWatch navigation panel.

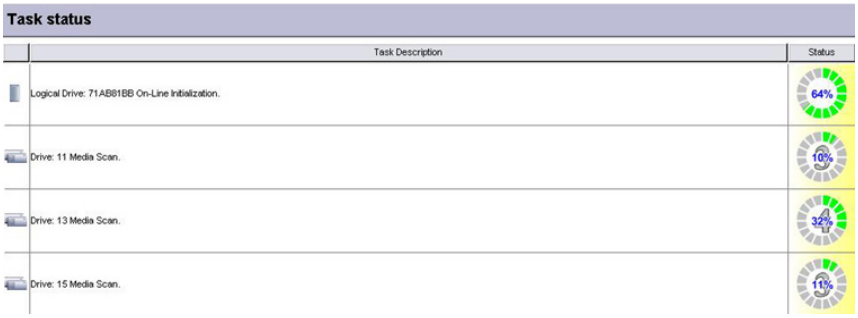

Figure 11-4: Tasks Currently Being Processed

- This window shows the unfinished tasks currently being processed by the subsystem. The Task Status display includes disk drive maintenance tasks such as Media Scan or Regenerate Parity, and array configuration processes such as logical drive initialization and capacity expansion.

- If you find that you have made the wrong configuration choice, you may also left-click and then right-click on the task information to display the **Abort** command.

- A brief task description, start time, and a percentage indicator are available with each processing task.

11.1.5 Event Log List/Configuration List Window

In the bottom of RAIDWatch program shows **Event Log List** and **Configuration List** windows. You can switch between the two windows by clicking on the tabbed panel on the bottom left of RAIDWatch screen.

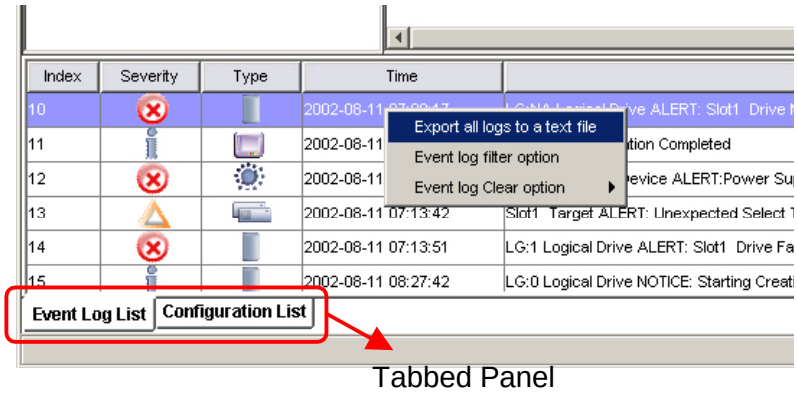

Figure 11-5: Event Log List and Configuration List Window Tabbed Panel

Event Lot List Window

The **Event Lot List** window generates the system's event log list in the bottom of the RAIDWatch screen. The Event Log window give user the real-time monitoring, alerting as well as status reporting of the RAID systems.

When a new event is generated, the icon under **Severity** column will flash to draw user's attention. The severity icons also indicate the severity level of an event. (See ***Table 11-2***) You can easily read the time of an event occurred by viewing the **Time** column.

Icon	Definition	Explanation
	Information	A notice of an action begin/complete or status change of the RAID system.
	Warning	This is a warning message that an event happened that may cause damage to the system.
	Critical	A critical condition happened. RAIDWatch program strongly suggest you to check your system immediately.

Table 11-2: Severity Level Icons

The Event log list function allow you to export the logs to a text file, and the event log filter option enable user to easily filter through stores of log files for specific event logs and then view, filter, export, and report on those events of interest.

To export or filter the event logs, mouse right-click on the event log list window. A list of three selections will appear on the screen. You may select **Export all logs to a text file**, **Event log filter option** or **Event log clear option**.

- **Export All Logs to a Text File**: This option will export all logs start from the time you accessed the RAID system to a text file. You may select a location where you like to save the file in a prompt up **Save** window. If you like to export any specific events, set the **Event log Filter** option before export the logs to a text file.

- **Event Log Filter Option**: When you click this option, an Event View Option window will prompt up.

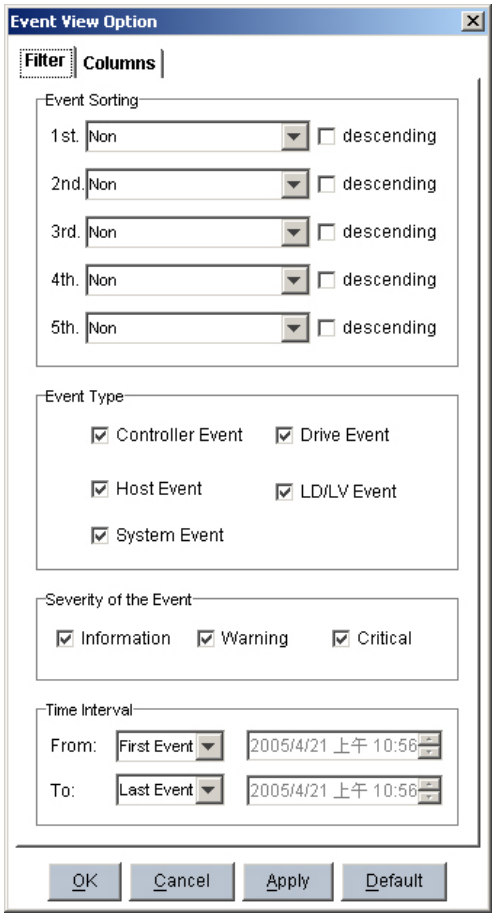

Figure 11-6: Event View Option Window

In the **Event View Option** window, the tabbed panel on the top of the window allow you to switch between **Filter** and **column** pages.

You may set the event sorting criteria, the type of event you like to export, the severity of the event and the time occurrence range in the **Filter** page of the **Event View Option** window. Switch to **Column** page allows you to set the column you like to view. Click **Apply** for the changes to take effect. The **Event Log List** window will immediately shows the event list follows the new criteria. Click **OK** to exist the window, or click **Default** to return to the system default settings.

- **Event Log Clear Option**: This option allow you to clear the event logs in the **Event Log List** window. All event logs will be erased when you select **Clear All Logs** option. Select the **Clear Log Precede Index: X** option will erase the beginning of the events to the one before you selected.

Configuration List Window

Every detail of the RAID system is presented in the Configuration List window. The information will include system information, controller settings, logical drive setting(s), logical volumn setting(s), channel

setting(s), host LUN list, drive-side parameters, caching parameters, and communication information.

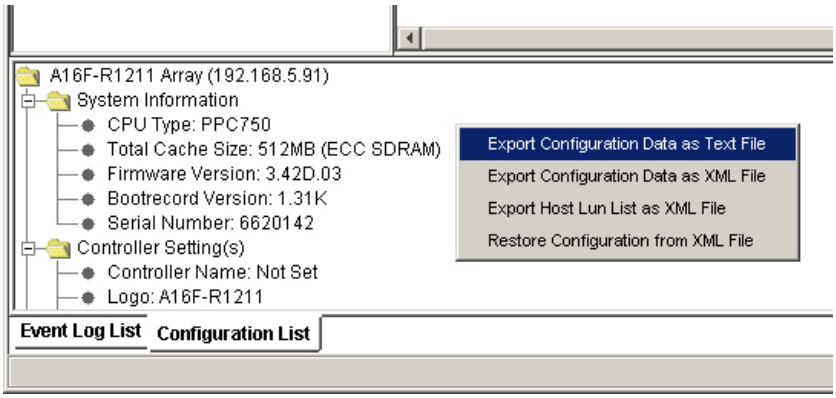

Figure 11-7: Configuration List Window

Right-click on the Configuration List window will allow you to select four (4) options and they are explained as below:

Export Configuration Data as Text File: When you select this option, the program will save the system's configuration data to a text file. You may select a file destination in a prompt up **Save** window.

Export Configuration Data as XML File: Select a file location where you like to save the system's configuration data as an XML file in a prompt up **Save** window when you select this option.

Export Host LUN List as XML File: This option will only export Host LUN list to a XML file. You may select a file destination in a prompt up **Save** window.

Restore Configuration from XML File: You may retrieve the configuration data that you export earlier to the system. Browse the file in the prompt up **Open** window.

11.2 Logical Drive Information

Logical Drive Information helps you to identify the physical locations and logical relationship among disk drive members. In a massive storage application, a logical array may consist of disk drives installed in different drive enclosures.

The Logical Drive information is designed for today's complicated configurations of RAID arrays. The information window helps to achieve the following:

- Having a clear idea of the logical relationship can help avoid removing the wrong drive in the event of drive failure. A logical

drive (RAID) configuration of disk drives cannot afford two failed disk drives.

- A logical drive may include members that reside on different enclosures or different drive channels. Doing so can help reduce the chance of downtime if a hardware failure should occur.

- With operations such as manual rebuild or capacity expansion using the "Copy and Replace" methodology, it is crucial to correctly identify an original member and a replacement drive.

11.2.1 Accessing Logical Drive Information

Step 1. To access the ***Logical Drive Information***, single-click its display icon on the GUI navigation panel or select the command from the ***Action*** command menu. After opening the information window, select the logical drive with a single mouse-click. A display window as shown in ***Figure 11-8*** should appear.

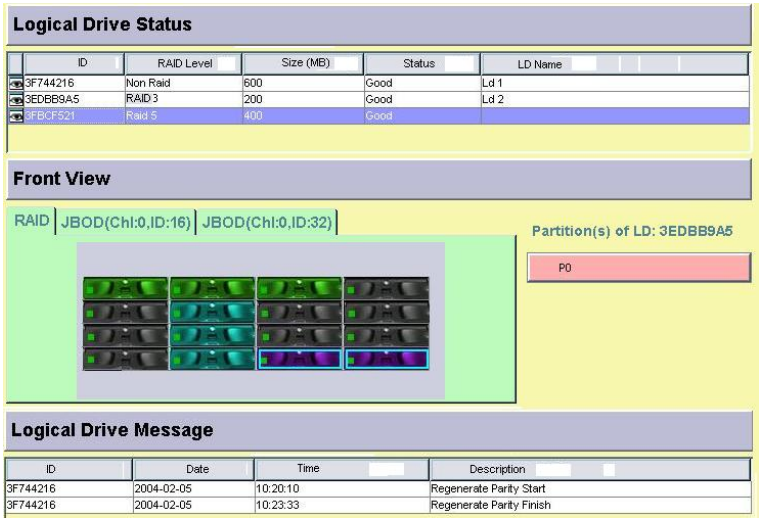

Figure 11-8: Opening Logical Drive Information Display

Step 2. As shown above, once a configured array is selected, its members will be displayed as highlighted drive trays in the Front View window. The array's logical partition is displayed on the right. Each logical configuration of drives is displayed in a different color. If a selected array includes members on different enclosures, click the JBOD tab button on top of the enclosure graphic to locate its positions.

NOTE:

*The **Logical Drive Messages** column only displays messages that are related to a selected array.*

11.3 Logical Volume Information

A logical volume consists of one or many logical drives. Data written onto the logical volume is striped across the members.

11.3.1 Accessing Logical Volume Information

Step 1. To access the ***Logical Volume Information***, single-click its display icon on the navigation panel or select the command from the ***Action*** command menu. After opening the information window, select a logical volume by single mouse-click. The window defaults to the first volume on the list. A display window as shown in ***Figure 11-9*** should appear.

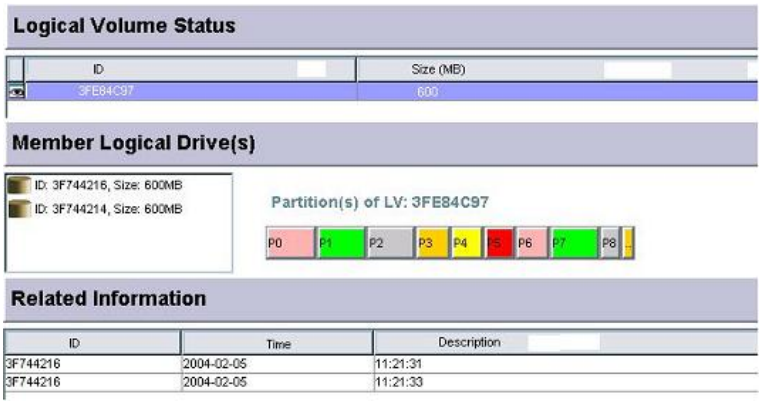

Figure 11-9: Opening Logical Volume Information Display

Step 2. As shown above, once a configured volume is selected, its members will be displayed in the Members column. The volume's logical partition(s) are displayed on the right as a segmented color bar. Each segment represents a partition of the volume capacity.

NOTE:

*The **Related Information** column only displays messages that are related to the selected volume.*

11.4 Fibre Channel Status

This window is automatically grayed out on subsystems featuring SCSI or iSCSI host channels. The Fibre Channel Status window displays information such as WWN port name and node name. This information is necessary in storage applications managed by SAN management software or failover drivers.

Step 1. To access the window, click on the **Fibre Channel Status** icon on the GUI navigation panel or select the command from the ***Action*** command menu.

The events in the window are listed according to the date and time they occurred with the most recent event at the bottom. A description of each event is provided.

Step 2. A Refresh button allows you to renew the information in cases when loop IDs are changed or an LIP has been issued.

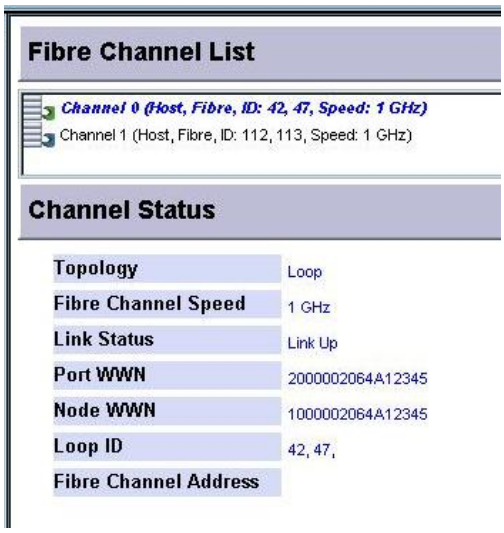

Figure 11-10: Fibre Channel Status Window

11.5 System Information

This is a view-only window. This window contains information about the operating status of major components including CPU, board temperature, and enclosure modules like cooling fan and power supply units.

If the application includes multiple cascaded enclosures, you may also refer to the Enclosure View window where a faulty unit is indicated by the lit red LED. The color display of the LEDs shown on enclosure graphics corresponds to the real situation on the enclosure modules.

Figure 11-11: System Information Window

Step 1. To access the window, click on the **System Information** icon on the GUI navigation panel or select the command from the ***Action*** command menu.

Step 2. Carefully check the display icons in front of the Device Name. Devices are categorized by the data bus by which they are connected. See the icon list below for more information:

Icon	Description
	RAID controller status
	Status of I^2C bus devices
	Status of SAF-TE devices
	Status of SES devices
	Temperature sensors

Table 11-3: Device Icon

A Refresh button allows you to renew the information in cases when loop IDs are changed or when an LIP has been issued.

NOTE:

Place your cursor on a specific item to display its device category.

Component status is constantly refreshed, yet the refresh time depends on the value set for device bus polling intervals, e.g., polling period set for SAF-TE or SES devices.

The EonStor subsystem series supports auto-polling of cascaded enclosures, meaning the status of a connected enclosure is automatically added to the System Information window without the user's intervention.

11.6 Statistics

RAIDWatch Manager includes a statistics-monitoring feature to report the overall performance of the disk array system. This feature provides a continually updated real-time report on the current throughput of the system, displaying the number of bytes being read and written per second, and the percentage of data access being cached in memory. These values are displayed by numeric value and as a graph.

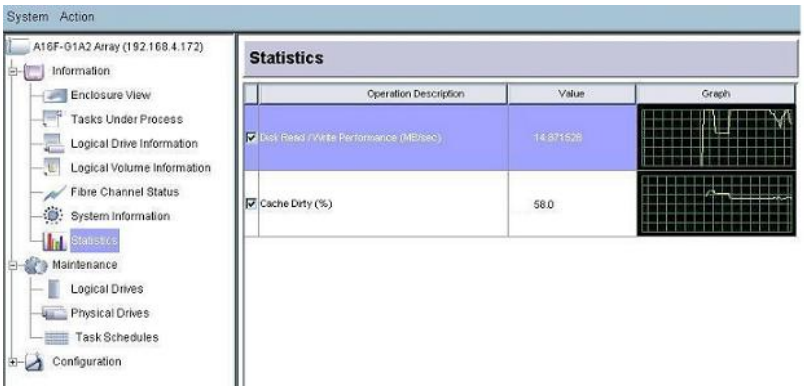

Figure 11-12: Statistics Display Window

To access the Statistics window, click on the **Statistics** icon on the GUI navigation panel or select the **Statistics** command from the **Action** menu. Then choose either **Cache Dirty (%)** or **Disk Read/Write Performance (MB/s)** by checking the respective select box.

- The **Cache Dirty** statistics window displays what percentage of data is being accessed via cache memory.

- The **Read/Write Performance** window displays the amount of data being read from or written to the disk array system, in MB per second.

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Chapter 12
Enclosure Display

This chapter introduces the enclosure display using the Enclosure View window in the RAIDWatch's main program. The following topics are discussed:

12.1 About The Enclosure View Window

The RAIDWatch Enclosure View is a specialized customization that shows a visual representation of physical RAID controller/subsystem components in the Enclosure View window of the RAIDWatch screen. The Enclosure View allows you to quickly determine the operational status of critical RAID device components.

The Enclosure View window shows both the front and rear panel (e.g., the EonRAID 2510FS controller head series, see ***Figure 12-1***). The Enclosure View of each RAIDWatch session defaults to the display of the connected RAID controller or RAID subsystem. The tabbed panel provides access to other cascaded enclosures (e.g., JBODs, the EonStor series, see ***Figure 12-2***), so you can monitor multiple enclosures by your computer screen.

Figure 12-1: EonRAID 2510FS Enclosure View

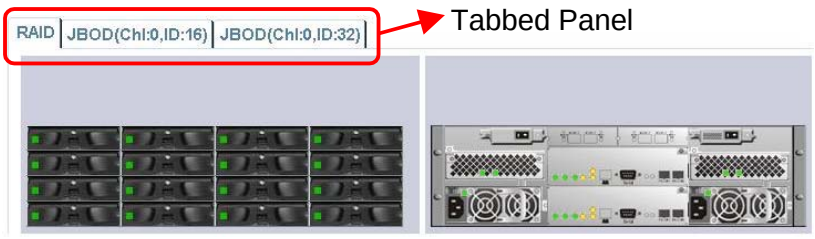

Figure 12-2: EonStor F16F Series Enclosure View

12.2 Accessing the Enclosure View

12.2.1 Connecting to the RAID Agent

To open the Enclosure View window, it is necessary to access the RAIDWatch program. Connecting to the RAID Agent is fully described in ***Chapter 3*** of this manual. Please refer to that chapter for further instructions on how to open the RAIDWatch program.

12.2.2 Opening the Enclosure View Window

Once RAIDWatch is successfully connected to a RAID device, the Enclosure View of the device you are using will appear immediately. If it doesn't appear or if you have closed the Enclosure View window but wish

to access it again, you can either select the Enclosure View icon from the navigation tree or go to the Action Command menus and then select Information/Enclosure View on the top of the screen. (See ***Figure 12-3***)

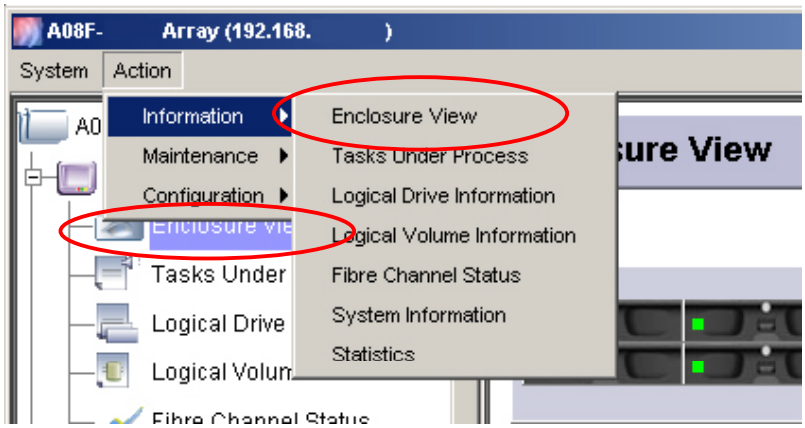

Figure 12-3: Accessing the Enclosure View

12.2.3 Component Information

The front and rear view of a RAID system in the Enclosure View window presents a graphical display of different components. This window is particularly useful in monitoring the status of the physical drives. It provides a real-time report on the drive status, using LED colors to represent various operating conditions.

Using the RAIDWatch Enclosure View, it is possible to obtain information about the following RAID device components:

- ***RAID Controller*** – The RAID controller is the heart of any RAID device and controls the flow of data to and from the storage devices.

- ***I/O Channels*** – An I/O channel is the channel through which data flows to and from the RAID controller.

- ***Battery Backup Unit (BBU)*** – The BBU provides power to the memory cache when power outage occurs or the power supply units fail.

NOTE:

The BBU is an optional item for some subsystem models.

- ***Power Supply Unit (PSU)*** – All RAID devices should come with at least one PSU that provides power to the RAID device from the main power source.

- ***Cooling Module*** – All RAID devices should come with at least one cooling module. The cooling modules keep the RAID device temperature down to prevent the RAID device from overheating.

12.3 LED Representations

As described earlier (see ***Section 12.1***), the Enclosure View is a direct representation of the physical device. Almost every major component has its status-indicating LEDs. When a component fails (or some other event occurs), the related LEDs will flash or change the display color. The physical status of the LEDs will be reflected by the LEDs shown in the Enclosure View window. That is, if an LED on the physical device changes its display color, then the display color of the corresponding LED in the Enclosure View window will also change.

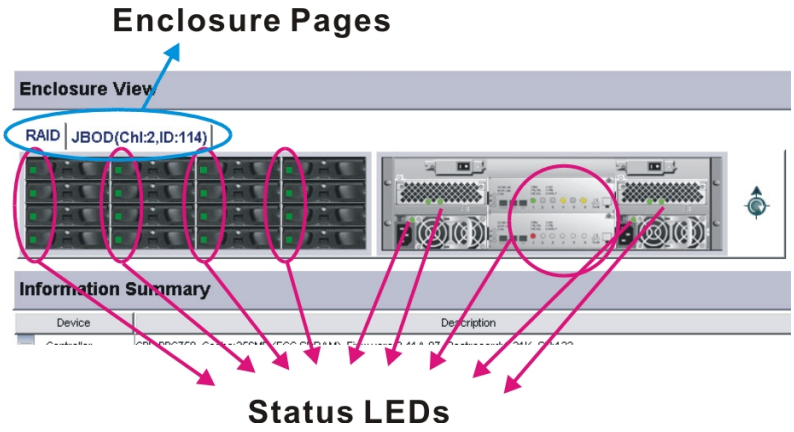

Figure 12-4: Enclosure Tabbed Panel and Component LED Display

The definition for each LED has been completely described in the ***Installation and Hardware Reference Manual*** that came with your RAID controller/subsystem. Please refer to the manual to determine what the different LEDs represent.

12.4 Enclosure View Messages

The messages shown in the Enclosure View window provide easy access to information about components on the RAID device that is being monitored. The message tag reports the status of major devices.

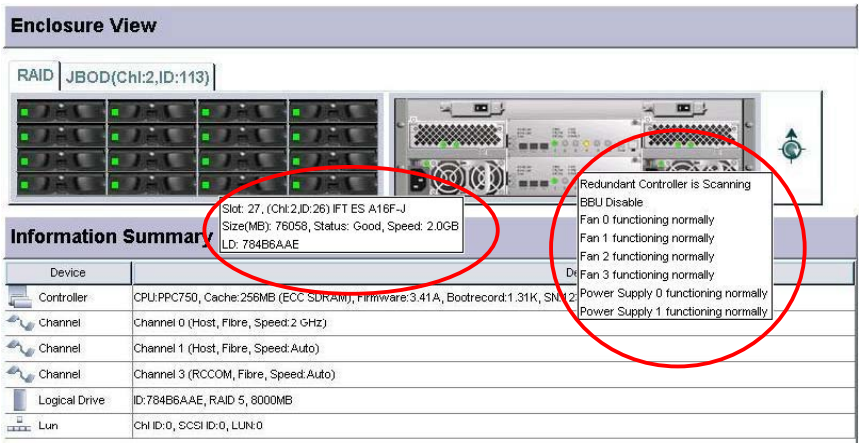

Figure 12-5: Component Information Message Tags

To generate the message tags, move the mouse cursor onto the relevant RAID device component. For example, if you wish to determine the operational status of a RAID subsystem, move the cursor onto the enclosure graphic and the corresponding message tag will appear.

The enclosure front view message tag displays the current configuration of the drive, including the channel number of the drive slot on the subsystem to which the drives are connected, the drive's capacity, transfer rate, and current status.

The enclosure components displays as a summary of module operating status. The operating status of each module is shown either as operating normally or failed.

NOTE:

Messages do not always appear instantaneously. After the cursor has been moved onto the component, there is usually a delay of a second before the message tag appears.

NOTE:

More device-dependent information is provided in the System Information window. To access the System Information window, please refer to ***Chapter 6****.*

12.5 Information Summary

The Information Summary window displays key information on the subsystem currently selected, including the RAID controller(s), I/O channels, connecting speeds, logical drive status, LUN mapping status…etc.

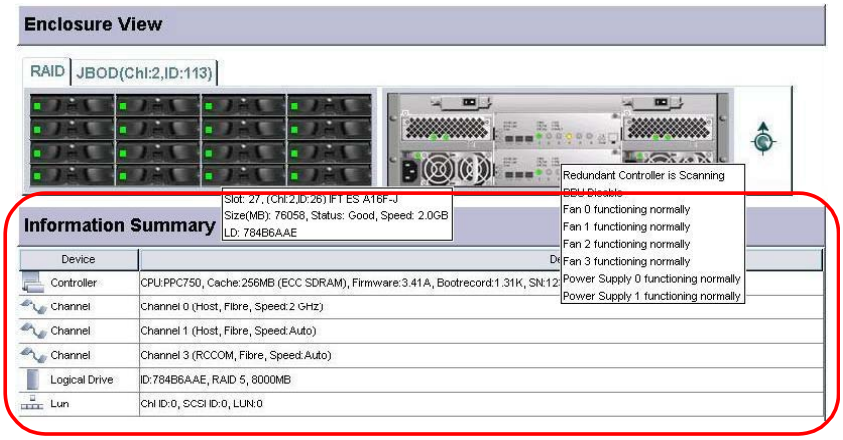

Figure 12-6: Information Summary

Chapter 13

NPC Utility Coupled with Mode Three Installation

This chapter introduces the NPC utility. The following topics are discussed:

13.1. The NPC Utility

13.1.1 Introduction

NPC is stands for "Notification Processing Center." This utility is used to send event messages when the main RAIDWatch modules are installed to a RAID subsystem's segregated disk capacity, the reserved space. NPC is implemented to manage event notification functions since the Configuration Client utility is not available with the Mode 3 installation scheme. With Mode 3 installation, arrays are accessed directly through network connections without installing the manager software and utilities onto a server. The NPC utility is automatically distributed to a disk array's reserved space when installing RAIDWatch using the Mode 3 scheme.

13.1.2 To Access the Utility

The NPC utility is easily accessed using a web browser over the network.

Step 1. Open a web browser program.

Step 2. Enter "**http://<controller IP>/configure.htm**" in the web browser's URL field.

Step 3. A safe content warning message might prompt. Click **Yes** to proceed. (See ***Figure 13-1***)

Figure 13-1: Security Warning

Step 4. The configuration utility starts as a Java Applet. (See ***Figure 13-2***)

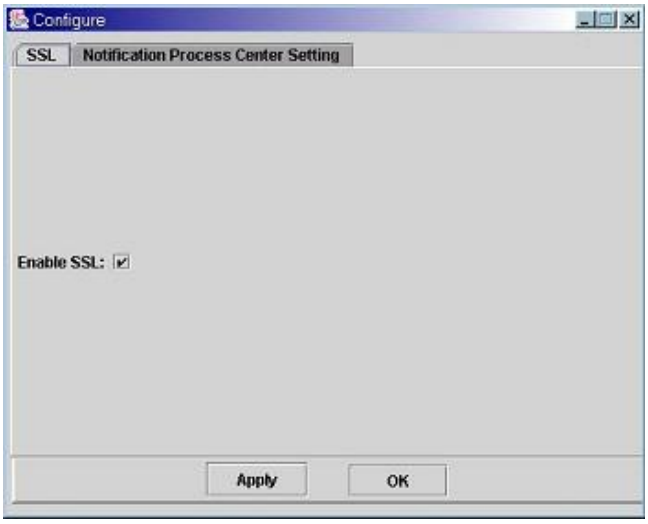

Figure 13-2: The NPC Initial Screen

13.2. Configuring the Utility Options

13.2.1 SSL

SSL stands for "Secure Sockets Layer Handshake Protocol." As shown in ***Figure 13-2*** above, the initial screen defaults to the SSL option. Select the check box if you want to enable SSL connection for the management session with the array.

NOTE:

The configuration will take effect after you restart the network connection or reset the management station.

13.2.2 Email Notification

Follow the steps below to configure email notification:

Step 1. Click on the ***Notification Process Center Setting*** tab. Open the ***Base Setting*** page.

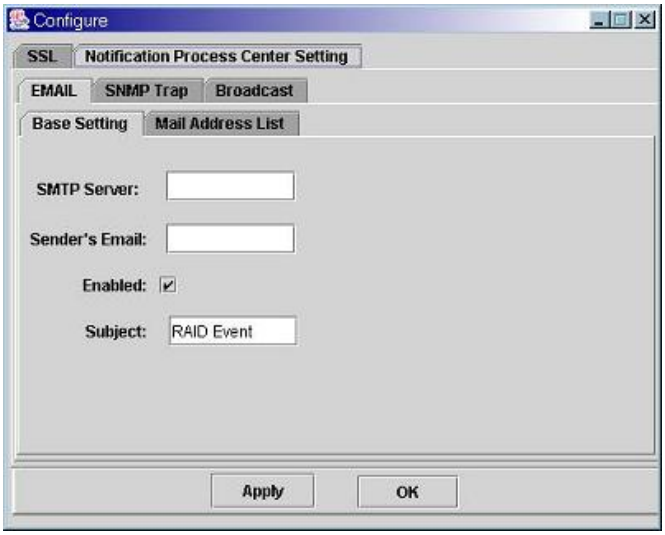

Figure 13-3: Email Notification – Sender Side Settings

Step 2. Fill in or select the following configuration fields:

SMTP Server: The Internet mail server used to send event notification.

Sender's email: Enter a valid mail address, the "From" part of email notification functionality.

Enabled: Select this check box to enable email notification.

Subject: Allows you to append a subject matter to event notification emails; e.g., "Events from RAID 3 array."

Step 3. Click **Apply** or **OK** to proceed with configuration. Note that the configuration will be saved to the reserved space on the array and may cause a short delay.

Step 4. Click **Mail Address List** from the tabbed panel above.

Fill in or select the following configuration fields:

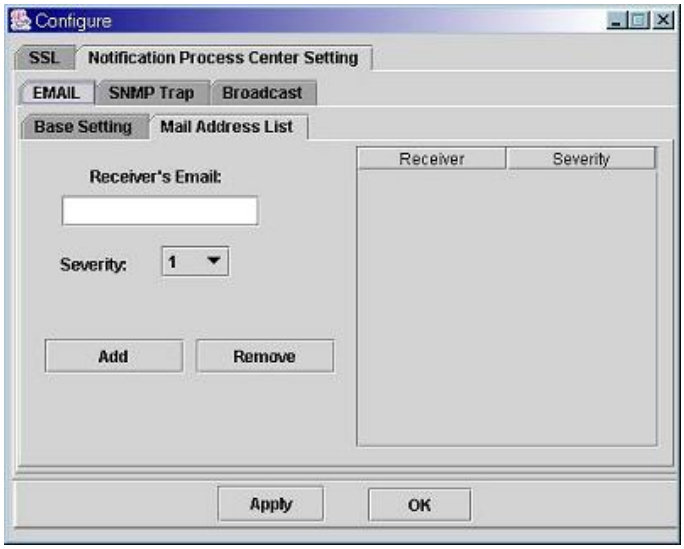

Figure 13-4: Email Notification – Receiver Side Settings

Receiver's email: Shows a list of all the email addresses that the NPC will send a message to. Addresses added will be listed on the right.

Severity: Select the severity level of events to be sent to the receiver station.

Step 5. Click **Apply** or **OK** to complete the configuration.

13.2.3 SNMP Traps

Step 1. Click on the ***Notification Process Center Setting*** tab and **SNMP Trap** to display SNMP settings.

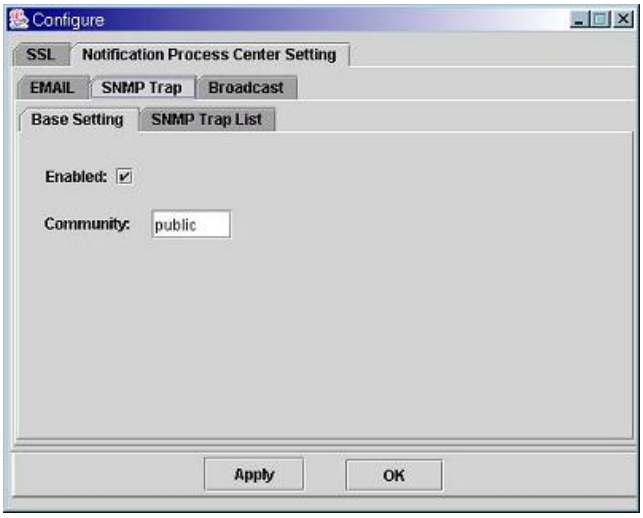

Figure 13-5: SNMP Traps – Sender-side Settings

Step 2. Fill in or select the following configuration fields:

Enabled: Select this check box to enable the notification.

Community: This is just a string authentication and can be seen as a plain text password.

Step 3. Click **Apply** or **OK** to proceed with configuration. Note that the configuration will be saved to the reserved space on the array and may cause a short delay.

Step 4. Click **SNMP Trap List** from the tabbed panel above.

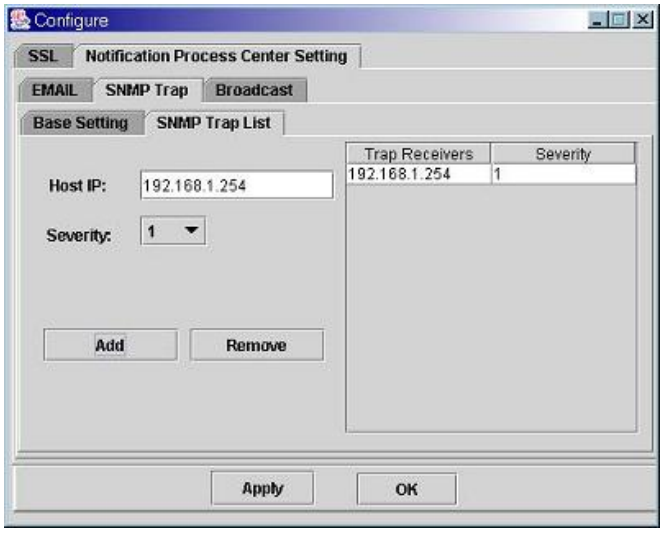

Figure 13-6: SNMP Traps – Receiver Side Settings

Host IP: The port number of the agents listening for traps.

Severity: Select the severity level of events to be sent to the receiver station.

Trap receivers will be added to the **Trap Receivers** list on the right.

Step 5. Click **Apply** or **OK** to complete the configuration.

13.2.4 Broadcast Notification

Step 1. Click on the ***Notification Process Center Setting*** tab and **Broadcast** to display Broadcast settings.

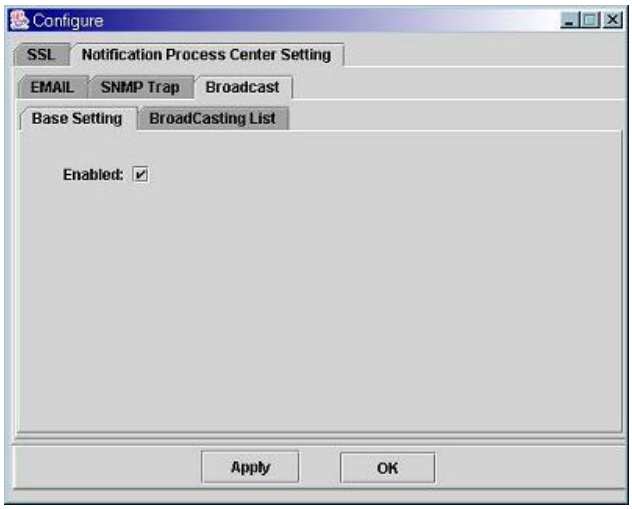

Figure 13-7: Broadcast – Sender-side Settings

Step 2. Fill in or select the following configuration fields:

Enabled: Select this check box to enable the notification.

Step 3. Click **Apply** or **OK** to proceed with configuration. Note that the configuration will be saved to the reserved space on the array and may cause a short delay.

Step 4. Click **Broadcasting List** from the tabbed panel above.

Host IP: The IP address a broadcast message will be sent to.

Severity: Select the severity level of events to be sent to the receiver station.

Computers receiving broadcast messages will be added to the Host Name list on the right.

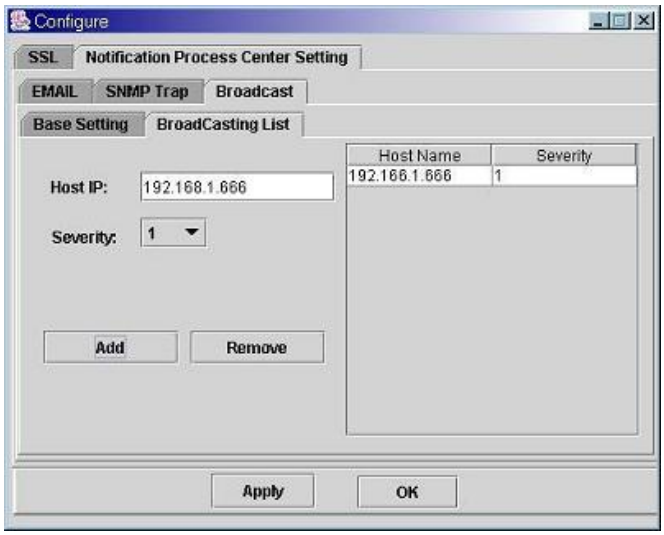

Figure 13-8: Broadcast – Receiver-side Settings

Step 5. Click **Apply** or **OK** to complete the configuration.

IMPORTANT!

In a massive capacity configuration, it takes a while for the RAID subsystem to write the NPC configuration profile to every disk member. DO NOT reset or power down the subsystem before the configuration can be safely distributed to the array.

Also make sure the subsystem's Ethernet port and related TCP/IP settings have been properly configured for the NPC functionality to take effect.

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Appendices

The following Appendices are provided:

Appendix A. Command Summary

This appendix describes the commands available in RAIDWatch Manager. These commands are presented either in each configuration window, as command buttons on pull-down menus, or on pop-up menus triggered by a mouse right-click.

A.1. Menu Commands

This section lists and explains the commands available from the menus in the menu bar.

A.1.1 RAID Watch Program Commands

RAIDWatch System Menu Commands (Base-level Window)

Command	Description
Open Device	Connects RAIDWatch Manager to a particular disk array system for management.
Auto Discovery	Search the available RAID systems in the specific range on the network.
Exit <X>	Closes the RAIDWatch Manager application.

RAIDWatch Language menu Commands (Base-level Window)

Command	Description
English	The RAIDWatch GUI, online help will show in English.
Deutsch	The RAIDWatch GUI, online help will show in Deutsch.
Japanese	The RAIDWatch GUI, online help will show in Japanese.

RAIDWatch Window Menu Commands (Base-level Window)

Command	Description
Next Window	This command allows you to switch to the display of the next array being connected.
Tile All	This command arranges currently open windows so that they are all visible and occupy an equal part of the RAIDWatch application window.
Cascade All	This command arranges currently open windows so that one is placed over the other but every window is still visible.
Hide All	This command functions like the minimize caption button.
Close All	This command closes all currently open windows and ends all software connections.

RAIDWatch Help Menu Commands (Base-level Window)

Command	Description
About <A>	Displays information about the RAIDWatch Manager program.
What's this?	Produces an interactive arrow mark. By placing the arrow mark over and clicking on a functional menu or push button, the related help content page displays.
Help Topic	Displays RAIDWatch Manager online help.

RAIDWatch System Menu Commands (Each Connection Window)

Command	Description
Refresh	Refreshes the status display of the current connection in cases when configuration changes are made through a terminal connection to the same array.
Logout	Closes the currently open window and ends the software's connection with the array

RAIDWatch Action Menu Commands (Each Connection Window)

Command	Description
Array Information	Displays the second-level menu which provides access to all information windows. Access to the information windows can also be found on the navigation panel.
Maintenance	Displays the second-level menu which provides access to all maintenance tasks windows. Access to the maintenance task windows can also be found on the navigation panel.
Configuration	Displays the second-level menu which provides access to all configuration windows. Access to the configuration windows can also be found on the navigation panel.

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A.2. Configuration Client Utility Commands

File Menu Commands

Command	Description
Add Host	Creates a new entry by entering Root Agent server IP.
Exit	Closes the Configuration Client application.

Language Commands

Command	Description
English	The Configuration Client, online help will show in English.
Deutsch	The Configuration Client, online help will show in Deutsch.
Japanese	The Configuration Client, online help will show in Japanese.

Help Menu Commands

Command	Description
About	Displays information about the Configuration Client program.

Tool Bar Commands

Command	Description
Open Bookmark File	Opens a previously saved connection view profile. This profile contains information about the Root Agent server and the RAID arrays being managed by a Root Agent.
Save Bookmark File	Saves the current connection view profile onto your system drive. The default file name is "default.npc."
Connect RootAgent Server	Connects to a Root Agent servers, usually the one that you choose as a management and install the Configuration Client utility. However, you may connect to multiple Root Agent server from a single workstation.
Disconnect RootAgent	Disconnects from a currently connected Root Agent server.
Help Cursor	Helps linking and displaying the associative help topics with a screen element.
Help	Displays RAIDWatch Manager online help. Details about the Configuration Client utility are also included.

Root Agent Right-click Menu Commands

Command	Description
Add Host	Connects to a Root Agent servers, usually the one that you choose as a management and install the Configuration Client utility. However, you may connect to multiple Root Agent server from a single workstation.
Delete Host	Deletes a Root Agent entry from the connection view
Disconnect	Disconnects from a currently connected Root Agent server.
Generate Dummy Events	Creates dummy events for testing the notification functions.
Refresh	Refreshes the connection view status. Updates the connection information about Root Agent(s) and the RAID arrays being managed.

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Appendix B. Glossary

Fibre

(Also known as "Fibre Channel") A device protocol (in the case of RAID, a data storage device) capable of high data transfer rates. Fibre Channel simplifies data bus sharing and supports greater speed and more devices on the same bus. Fibre Channel can be used over both copper wire and optical cables.

Fiber

An optical network data transmission type of cable, which is unrelated to the Fibre Channel described above.

HBA

Host-**B**us **A**dapter – an HBA is a device that permits a PC bus to pass data to and receive data from a storage bus (such as SCSI or Fibre Channel).

Host

A computer, typically a server, which uses a RAID system (internal or external) for data storage.

Host LUN

(See Host and LUN). "Host LUN" is another term for a LUN.

I^2C

Inter-Integrated Circuit – a type of bus designed by Philips Semiconductors, which is used to connect integrated circuits. I^2C is a *multi-master bus*, which means that multiple chips can be connected to the same bus and each one can act as a master by initiating a data transfer.

In-Band SCSI

(Also known as "in-band" or "In-band".) A means whereby RAID management software can use SCSI cabling and protocols to manage a controller. (Note: in-band SCSI is typically used in place of RS-232 for controller management.)

In-band is also implemented with a Fibre Channel host connection.

iSCSI

iSCSI is Internet SCSI (Small Computer System Interface), an Internet Protocol (IP)-based storage networking standard for linking data storage facilities, developed by the Internet Engineering Task Force (IETF).

ISEMS

Infortrend **S**imple **E**nclosure **M**anagement **S**ystem – an I^2C-based enclosure monitoring standard developed by Infortrend Technologies, Inc.

JBOD

Just a **B**unch **o**f **D**isk – non-RAID use of multiple hard disks for data storage.

JRE

Java **R**untime **E**nvironment – the Solaris Java program used to run .JAR applications locally, over a network, or the Internet.

Logical Drive

Typically, a group of hard disks logically combined to form a single large storage unit. More broadly, the assignment of an ID to a drive or drives used in storage management. Often abbreviated "LD."

Logical Volume

A group of logical drives logically combined to form a single large storage unit. Often abbreviated "LV."

LUN

Logical **U**nit **N**umber **–** A 3-bit identifier used on a bus to distinguish between up to eight devices (logical units) with the same ID.

Mapping

The assignment of a protocol or logical ID to a device for the purposes of data storage, data transfer, or device management.

Mirroring

A form of RAID where two or more identical copies of data are kept on separate disks. Used in RAID 1.

Configuration Client

An independently run software application included with RAIDWatch, which permits centralized management using the Root Agent as the bridging element and event notification via various methods including e-mail and fax.

NRAID

Non-RAID. The capacities of all the drives are combined to become one logical drive (no block striping). In other words, the capacity of the logical drive is the total capacity of the physical drives. NRAID does not provide data redundancy.

Parity

Parity checking is used to detect errors in binary-coded data. The fact that all numbers have parity is commonly used in data communications to ensure the validity of data. This is called parity checking.

RAID

Redundant Arrays of Independent Disks (Originally "Redundant Arrays of Inexpensive Disks"). The use of two or more disk drives instead of one disk, which provides better disk performance, error recovery, and fault tolerance, and includes interleaved storage techniques and mirroring of important data. See ***0***.

RAID Agent

The RAIDWatch module which manages and monitors a RAID controller and receives RAIDWatch Manager commands via the RAID Agent.

RAID Agent comes embedded with RAID array firmware. RAID Agent can also be manually installed onto a server which is directly-attached with a RAID array and communicates with it using the in-band protocols. See description of in-band.

RAIDWatch Manager

The RAIDWatch management software interface. It's part of the RAIDWatch software.

SAF-TE

SCSI **A**ccessed **F**ault-**T**olerant **E**nclosures – an evolving enclosure monitoring device type used as a simple real-time check on the go/no-go status of enclosure UPS, fans, and other items.

SAN

Storage **A**rea **N**etwork – is a high-speed subnetwork of shared storage devices. A storage device is a machine that contains nothing but a disk or disks for storing data. A SAN's architecture works in a way that makes all storage devices available to all servers on a LAN or WAN. Because stored data does not reside directly on the network's servers, server power is utilized for applications rather than for data passing.

SASL

SASL is the **S**imple **A**uthentication and **S**ecurity **L**ayer, a mechanism for identifying and authenticating a user login to a server and for providing negotiating protection with protocol interactions.

SCSI

Small **C**omputer **S**ystems **I**nterface (pronounced "scuzzy") – a high-speed interface for mass storage that can connect computer devices such as hard drives, CD-ROM drives, floppy drives, and tape drives. SCSI can connect up to sixteen devices.

S.E.S.

SCSI **E**nclosure **S**ervices is a protocol used to manage and sense the state of the power supplies, cooling devices, temperature sensors, individual drives, and other non-SCSI elements installed in a Fibre Channel JBOD enclosure.

S.M.A.R.T.

Self-**M**onitoring, **A**nalysis and **R**eporting **T**echnology – an open standard for developing disk drives and software systems that automatically monitor a disk drive's health and report potential problems. Ideally, this should allow users to take proactive actions to prevent impending disk crashes.

SMS

The **S**hort **M**essage **S**ervice (SMS) is the ability to send and receive text messages to and from mobile telephones. SMS was created and incorporated into the Global System for Mobiles (GSM) digital standard.

Spare

Spares are defined as dedicated (Local) or Global. A drive designation used in RAID systems for drives that are not used but are instead "hot-ready" and used to automatically replace a failed drive. RAIDs generally support two types of spare, Local and Global. Local Spares only replace drives that fail in the same logical drive. Global Spares replace any drive in the RAID that fails.

Stripe

A contiguous region of disk space. Stripes may be as small as one sector or may be composed of many contiguous sectors.

Striping

Also called RAID 0. A method of distributing data evenly across all drives in an array by concatenating interleaved stripes from each drive.

Stripe Size

(A.k.a. “chunk size.”) The smallest block of data read from or written to a physical drive. Modern hardware implementations let users tune this block to the typical access patterns of the most common system applications.

Stripe Width

The number of physical drives used for a stripe. As a rule, the wider the stripe, the better the performance.

Write-back Cache

Many modern disk controllers have several megabytes of cache on board. Onboard cache gives the controller greater freedom in scheduling reads and writes to disks attached to the controller. In write-back mode, the controller reports a write operation as complete as soon as the data is in the cache. This sequence improves write performance at the expense of reliability. Power failures or system crashes can result in lost data in the cache, possibly corrupting the file system.

Write-through Cache

The opposite of write-back. When running in a write-through mode, the controller will not report a write as complete until it is written to the disk drives. This sequence reduces read/write performance by forcing the controller to suspend an operation while it satisfies the write request.

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Appendix C. RAID Levels

This appendix provides a functional description of Redundant Array of Independent Disks (RAID). This includes information about RAID and available RAID levels.

C.1. RAID Description

Redundant Array of Independent Disks (RAID) is a storage technology used to improve the processing capability of storage systems. This technology is designed to provide reliability in disk array systems and to take advantage of the performance gains multiple disks can offer.

RAID comes with a redundancy feature that ensures fault-tolerant, uninterrupted disk storage operations. In the event of a disk failure, disk access will still continue normally with the failure transparent to the host system.

RAID has several different levels and can be configured into multi-levels, such as RAID 10, 30, and 50. RAID levels 1, 3 and 5 are the most commonly used levels, while RAID levels 2 and 4 are rarely implemented. The following sections described in detail each of the commonly used RAID levels.

RAID offers the advantages of Availability, Capacity, and Performance. Choosing the right RAID level and drive failure management can increase data Availability, subsequently increasing system Performance and storage Capacity. Infortrend external RAID controllers provide complete RAID functionality and enhance drive failure management.

C.2. Non-RAID Storage

One common option for expanding disk storage capacity is simply to install multiple disk drives into the system and then combine them end-to-end. This method is called *disk spanning*.

In disk spanning, the total disk capacity is equivalent to the sum of the capacities of all SCSI drives in the combination. This combination appears to the system as a single logical drive. For example, combining four 1GB drives in this way would create a single logical drive with a total disk capacity of 4GB.

Disk spanning is considered non-RAID due to the fact that it provides neither redundancy nor improved performance. Disk spanning is inexpensive, flexible, and easy to implement; however, it does not improve the performance of the drives and any single disk failure will result in total data loss.

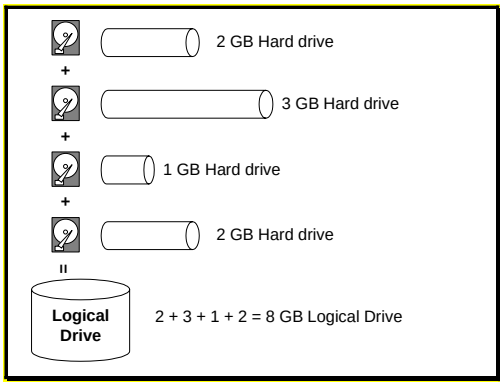

Figure C-1: Non-RAID Storage

C.3. RAID 0

RAID 0 implements *block striping* where data is broken into logical blocks and striped across several drives. Although called RAID 0, this is not a true implementation of RAID because there is no facility for redundancy. In the event of a disk failure, data is lost.

In block striping, the total disk capacity is equivalent to the sum of the capacities of all drives in the array. This combination of drives appears to the system as a single logical drive.

RAID 0 provides the highest performance without redundancy. It is fast because data can be simultaneously transferred to/from multiple disks. Furthermore, read/writes to different drives can be processed concurrently.

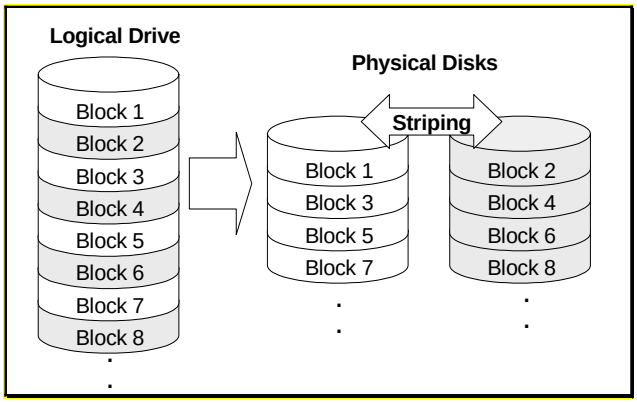

Figure C-2: RAID0 Storage

C.4. RAID 1

RAID 1 implements *disk mirroring* where a copy of the same data is recorded onto two sets of striped drives. By keeping two copies of data on separate disks or arrays, data is protected against a disk failure. If a disk on either side fails at any time, the good disks can provide all of the data needed, thus preventing downtime.

In disk mirroring, the total disk capacity is equivalent to half the sum of the capacities of all drives in the combination. For example, combining four 1GB drives would create a single logical drive with a total disk capacity of 2GB. This combination of drives appears to the system as a single logical drive.

RAID 1 is simple and easy to implement; however, it is more expensive as it doubles the investment required for a non-redundant disk array implementation.

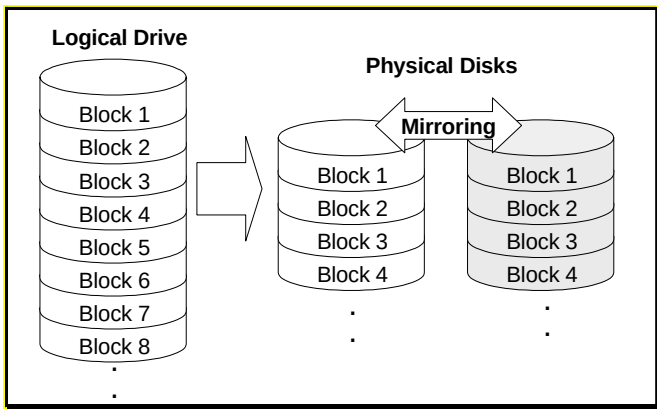

Figure C-3: RAID1 Storage

In addition to the data protection RAID 1 provides, this RAID level also improves performance. In cases where multiple concurrent I/Os are occurring, these I/Os can be distributed between two disk copies, thus reducing total effective data access time.

C.5. RAID 1(0+1)

RAID 1(0+1) combines RAID 0 and RAID 1 – *mirroring and disk striping.* RAID (0+1) allows multiple drive failure because of the full redundancy of the hard disk drives. If more than two hard disk drives are chosen for RAID 1, RAID (0+1) will be performed automatically.

IMPORTANT!

RAID (0+1) will not appear in the list of RAID levels supported by the controller. If you wish to perform RAID 1, the controller will determine whether to perform RAID 1 or RAID (0+1). This will depend on the drive number that has been selected for the logical drive.

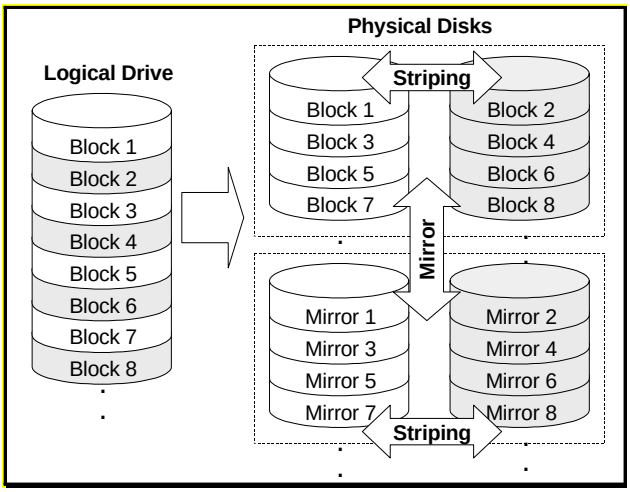

Figure C-4: RAID 1(0+1) Storage

C.6. RAID 3

RAID 3 implements *block striping with dedicated parity*. This RAID level breaks data into logical blocks, the size of a disk block, and then stripes these blocks across several drives. One drive is dedicated to parity. In the event a disk fails, the original data can be reconstructed from the parity information.

In RAID 3, the total disk capacity is equivalent to the sum of the capacities of all drives in the combination, excluding the parity drive. For example, combining four 1GB drives would create a single logical drive with a total disk capacity of 3GB. This combination appears to the system as a single logical drive.

RAID 3 provides increased data transfer rates when data is being accessed in large chunks or sequentially.

However, in write operations that do not span multiple drives, performance is reduced since the information stored in the parity drive needs to be recalculated and rewritten every time new data is written to any of the data disks.

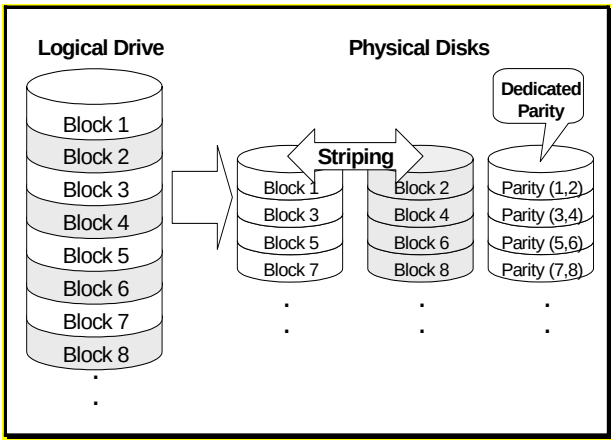

Figure C-5: RAID 3 Storage

C.7. RAID 5

RAID 5 implements *multiple-block striping with distributed parity*. This RAID level offers the same redundancy available in RAID 3, though the parity information is distributed across all disks in the array. Data and relative parity are never stored on the same disk. In the event a disk fails, original data can be reconstructed using the available parity information.

For small I/Os, as few as one disk may be activated for improved access speed.

RAID 5 offers both increased data transfer rates when data is being accessed in large chunks or sequentially and reduced total effective data access time for multiple concurrent I/Os that do not span multiple drives.

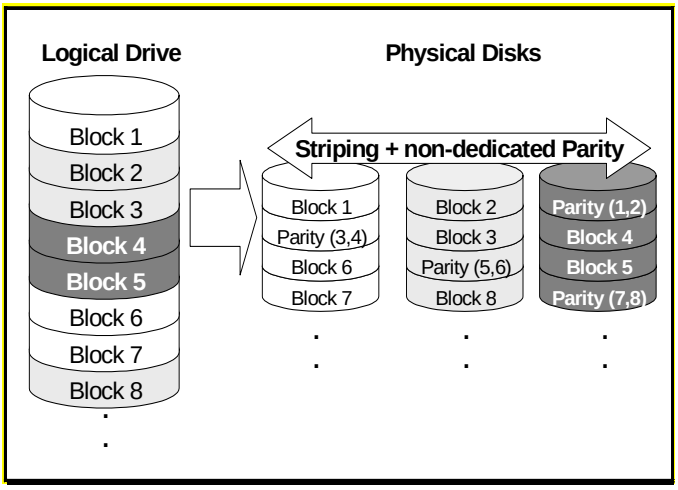

Figure C-6: RAID 5 Storage

C.8. RAID 10, 30, and 50

Infortrend implements RAID 10, 30, and 50 in the form of logical volumes. Each logical volume consists of one or more logical drives. Each member logical drive can be composed of a different RAID level. Members of a logical volume are striped together (RAID 0); therefore, if all members are RAID 3 logical drives, the logical volume can be called a RAID 30 storage configuration.

Using logical volumes to contain multiple logical drives can help manage arrays of large capacity. It is, however, difficult to define the RAID level of a logical volume when it includes members composed of different RAID levels.

Appendix D. Additional References

This appendix provides direction to additional references that may be useful in creating and operating a RAID, and in using RAIDWatch and RAIDWatch Manager.

D.1. Java Runtime Environment

JRE (Java Runtime Environment) is a shareware product from Sun/Solaris. Two websites that may be of use relative to JRE are:

The main Java website URL: **java.sun.com**

The JRE download website URL:

www.sun.com/software/solaris/jre/download.html

D.2. RAIDWatch Update Downloads & Upgrading

Infortrend will provide RAIDWatch Agent and RAIDWatch Manager updates periodically both via our ftp server and as new CD releases. Our ftp site can be accessed via our website at:

ftp.infortrend.com.tw

D.3. Uninstalling RAIDWatch

RAIDWatch agents, Configuration Client and RAIDWatch Manager can be uninstalled. Choose the Uninstall icon in the RAIDWatch group. Click on the Uninstall button on the bottom of the uninstallation program window to start the uninstall process. The RAIDWatch program will be uninstalled and files will be removed from your computer.

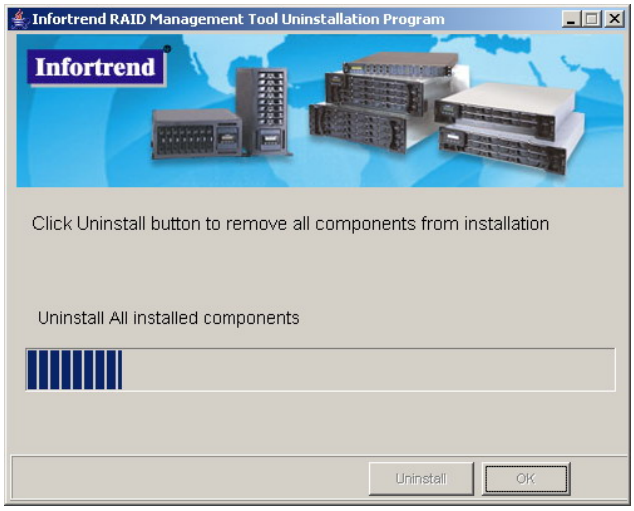

Figure D-1: RAIDWatch Uninstallation Program

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