

# **USER'S GUIDE**

## **Global Array Manager Transition Tool Server Software**

**May 2003**

*First Edition*

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# Preface

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This installation guide explains how to install and use the Global Array Manager<sup>®</sup> Server Software.

In addition, this document explains how to install and use SNMP, SANArray Manager (SAM), GAM TT Event Logging, creation of GAM TT Server diskettes, and GAM TT Server for Failover or Failback in MSCS.

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## Audience

This manual is intended for

- Network Administrators
- 

## Organization

This document has the following chapters and appendixes:

[Chapter 1, Introduction](#), describes GAM TT Server functions and GAM TT Server requirements under supported operating systems.

[Chapter 2, NetWare](#), describes installation, verification, and startup of the GAM TT Server software for Novell<sup>®</sup> NetWare.

[Chapter 3, Windows 2000, 2003 and XP](#), describes installation, verification, and startup of the GAM TT Server software for Microsoft Windows

[Chapter 3, Windows 2000, 2003 and XP](#), describes installation, verification, and startup of the GAM TT Server software for Microsoft Windows 2000/2003/XP.

[Chapter 4, UnixWare](#), describes information about the following installation, verification, and startup of the GAM TT Server software for UnixWare 7.1.

[Chapter 5, Linux](#), describes installation, startup, and troubleshooting of the GAM TT Server software for the Linux operating system with the following distributions: Red Hat 7.2, 7.3, SuSE 7.3

[Appendix A, SNMP Installation, Operation, and Definition](#), describes the installation of the SNMP agent including configuring traps, and device information.

[Appendix B, GAMEVENT](#), describes how to enable event notification to the GAM TT Client and saving and restoring the event log file.

[Appendix C, Creating a GAM TT Server Installation Diskette](#), describes how to create GAM Server installation diskettes.

[Appendix D, Installation of GAM TT Server for Failover or Failback in MSCS](#), describes how to use GAM TT Server as a resource for Microsoft Clustering Service (MSCS)

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## Related Documents

For information on defining and setting RAID (Redundant Array of Independent Disks) levels as well as configuring the array, consult the following documents:

- *Global Array Manager Transition Tool Client* manual DB15-000278-00
- *Integrated Disk Array Controller BIOS and Configuration Utility User Reference Guide*
- *Integrated Disk Array Controller BIOS and Configuration Utility Quick Configuration Guide*.

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## Conventions Used in This Manual

Throughout the manual, the following conventions are used to describe user interaction with the product:

<b>bold</b>	The user must enter the bold text exactly as shown.
↵	Press the Enter key.
<b>Enter</b>	Press the key labeled “Enter” (or “Delete”, etc.).
<b>File-&gt;Run</b>	Select the Run option from the pull-down menu activated when the File menu pad is selected.

Note: Notes contain supplementary information that can have an effect on system performance.



# Contents

---

## Chapter 1 Introduction

1.1	Overview	1-1
1.1.1	NetWare, Windows 2000, 2003, and XP	1-1
1.1.2	UnixWare	1-1
1.1.3	Linux	1-2
1.2	Global Array Manager Transition Tool Server Overview	1-2
1.2.1	GAM TT Server Components	1-2
1.2.2	Monitoring Functions	1-3
1.2.3	Management Functions	1-4
1.2.4	Configuration Functions	1-4
1.3	Requirements	1-4
1.3.1	Server Hardware and Software – NetWare	1-5
1.3.2	Server Hardware and Software – Windows 2000, 2003, or XP	1-5
1.3.3	Server Hardware and Software – UnixWare	1-5
1.3.4	Server Hardware and Software – Linux	1-5

---

## Chapter 2 NetWare

2.1	Overview	2-1
2.2	Global Array Manager Transition Tool Server Software for NetWare 5.1 and 6	2-1
2.2.1	Installing Global Array Manager Transition Tool Server Software	2-1
2.2.2	Running Global Array Manager Transition Tool Server 2- 2	
2.2.3	Troubleshooting Server Software Installation	2-4
2.3	DMI CI Manual Configuration for Netware	2-4

2.3.1	DMI Service Provider	2-4
2.3.2	Mylex RAID Component	2-5
2.3.3	Mylex DMI CI Management Information	2-5
2.3.4	Optional DMI CI Parameters	2-6

---

## Chapter 3

### Windows 2000, 2003 and XP

3.1	Overview	3-1
3.2	Global Array Manager Transition Tool Server Software for Windows 2000, 2003, and XP	3-1
3.2.1	Installation Overview	3-1
3.2.2	Installing Global Array Manager Transition Tool Server Software	3-1
3.2.3	Running Global Array Manager Transition Tool Server 3-11	
3.2.4	Troubleshooting Server Software Installation	3-12
3.3	DMI CI Manual Configuration for Windows	3-12
3.3.1	DMI Service Provider	3-13
3.3.2	DMI CI Files	3-13
3.3.3	DMI CI Manual Configuration	3-14
3.3.4	Mylex RAID Component	3-15
3.3.5	Mylex DMI CI Management Information	3-15
3.3.6	Optional DMI CI Parameters	3-15

---

## Chapter 4

### UnixWare

4.1	Overview	4-1
4.2	Global Array Manager Transition Tool Server Software for UnixWare 7.1	4-1
4.2.1	Installing Global Array Manager Transition Tool Server Software	4-1
4.2.2	Running Global Array Manager Transition Tool Server 4-3	
4.2.3	Manually Starting and Stopping GAM TT Server	4-3
4.2.4	Troubleshooting Server Software Installation	4-3
4.2.5	Uninstalling the Server Software	4-4

---

## Chapter 5 Linux

5.1	Overview	5-1
5.2	Global Array Manager Transition Tool Server Software for Linux	5-1
5.2.1	Installation Overview	5-1
5.2.2	Installing Global Array Manager Transition Tool Server Software	5-2
5.2.3	Editing GAMEVENT and GAMEVLOG	5-3
5.2.4	Running Global Array Manager Transition Tool Server	5-3
5.2.5	Troubleshooting Server Software Installation	5-4
5.2.6	Uninstalling the Server Software	5-5

---

## Appendix A SNMP Installation, Operation, and Definition

A.1	Introduction	A-1
A.2	SNMP Installation Overview	A-1
A.3	SNMP Installation for NetWare	A-2
A.3.1	Using the TRAPTARG.CFG File	A-2
A.3.2	Starting the NetWare Agent	A-3
A.3.3	Optional SNMP Parameters for NetWare	A-4
A.4	SNMP Installation for Windows 2000/2003, and XP	A-5
A.4.1	Install the SNMP Subagent	A-5
A.4.2	Enable/Disable the SNMP Subagent for Windows	A-6
A.4.3	Optional SNMP Parameters for Windows 2000, 2003, and XP	A-6
A.5	SNMP Installation for UnixWare	A-7
A.5.1	Install the SNMP Subagent	A-7
A.5.2	Enable/Disable SNMP Subagent	A-8
A.5.3	Optional SNMP Parameters for UnixWare	A-8
A.6	SNMP Installation for Linux	A-9
A.6.1	Install UC Davis SNMP Agent	A-9
A.6.2	Example of /etc/rc.d/init.d/snmpd File	A-10
A.6.3	Installing the SNMP Subagent Files	A-12
A.6.4	Starting gamdrvd, snmpd, and gamagent	A-13

	A.6.5	Uninstalling gamagent Files	A-13
	A.6.6	Optional SNMP Parameters for Linux	A-14
A.7		MIB Compilation and Definition File Creation	A-15
A.8		MYLEXRAIDMIB Object Definitions	A-16
	A.8.1	Traps	A-16
	A.8.2	Controller Information Group	A-28
	A.8.3	Logical Drive Information Group	A-36
	A.8.4	Physical Device Information Group	A-38
	A.8.5	RAID Management Software Group	A-41
	A.8.6	Logical Drive Statistics Group	A-42
	A.8.7	Physical Drive Statistics Group	A-43
	A.8.8	Fault Management Cabinet Information Group	A-44
	A.8.9	RAID Event Information Group	A-46
	A.8.10	Battery Backup Unit Information Group	A-47

---

## Appendix B GAMEVENT

B.1		Introduction	B-1
B.2		NetWare	B-2
	B.2.1	Enabling Event Notification	B-2
	B.2.2	Enabling a GAM TT Event Log File	B-3
	B.2.3	Saving and Restarting	B-3
B.3		Windows 2000, 2003, and XP	B-4
	B.3.1	Enabling Event Notification	B-4
	B.3.2	Enabling a GAM TT Event Log File	B-5
	B.3.3	Saving and Restarting	B-5
	B.3.4	GAMEVENT LOG Options	B-6
B.4		UnixWare	B-6
	B.4.1	Enabling Event Notification	B-6
	B.4.2	Enabling a GAM TT Event Log File	B-7
	B.4.3	Saving and Restarting	B-7
B.5		Linux	B-8
	B.5.1	Enabling Event Notification	B-8
	B.5.2	Enable GAM TT Event Logging	B-9
	B.5.3	Saving and Restarting	B-9

---

## Appendix C

## **Creating a GAM TT Server Installation Diskette**

C.1	Introduction	C-1
C.1.1	When to Create a GAM TT Server Installation Diskette	C-1
C.2	Creating a GAM TT Server Software Installation Diskette	C-2

---

## **Appendix D**

### **Installation of GAM TT Server for Failover or Failback in MSCS**

D.1	Preparation	D-1
D.2	Using Virtual Cluster IP Address	D-1
D.3	Installing GAM TT Server for Failover or Failback in MSCS	D-1



---

## Figures

1.1	GAM TT Server and GAM TT Client Interactions	1-3
3.1	Loading the Installation Wizard	3-2
3.2	Welcome Dialog Box	3-2
3.3	Select Components to Install	3-3
3.4	Sub-Components List	3-4
3.5	Previous GAM TT Server Found	3-5
3.6	Installation Summary Screen	3-6
3.7	Error – PCI Driver Must Be Version 6.90-00 or Higher	3-6
3.8	Installation Progress Display	3-7
3.9	Modify Server Configuration File Dialog Box	3-8
3.10	Enter Event Recipients Dialog Box	3-9
3.11	Server Event Logging Dialog Box	3-10
3.12	Directory Path Information for gamscm.ini File	3-10
3.13	Setup Complete	3-11
C.1	DOS Shell	C-2
D.1	GAM Configuration	D-2





---

## Tables

A.1	NetWare SNMP File	A-2
A.2	Location for MIB	A-2
A.3	Traps and Trap Numbers	A-16
A.4	Controller Information Group	A-28
A.5	Logical Drive Information Group	A-36
A.6	Physical Device Information Group	A-38
A.7	RAID Management Software Group	A-41
A.8	Logical Drive Statistics Group	A-42
A.9	Physical Drive Statistics Group	A-43
A.10	Fault Management Cabinet Information Group	A-44
A.11	RAID Event Information Group	A-46
A.12	Battery Backup Unit Information Group	A-47
C.1	GAM TT Server Installation Diskettes	C-1



# Chapter 1

## Introduction

---

### 1.1 Overview

This manual explains how to install the Global Array Manager Transition Tool (GAM TT)<sup>®</sup> Server software for several supported operating systems.

This chapter describes:

- GAM TT Server functions
- GAM TT Server requirements under supported operating systems

Global Array Manager Transition Tool Server software is delivered on the web ([www.lsiillogic.com](http://www.lsiillogic.com)), and is used to install GAM TT Server software on a server running a particular network operating system.

Note: This manual assumes that the network administrator will install the GAM TT Server software for the appropriate operating system.

#### 1.1.1 NetWare, Windows 2000, 2003, and XP

Install GAM TT Server Software for NetWare<sup>®</sup> 5.1/6, Windows 2000/2003, or Windows XP<sup>®</sup> (32-bit) by downloading the driver files from <http://www.lsiillogic.com/GAMTT>. See the appropriate chapter in this manual.

#### 1.1.2 UnixWare

Install GAM TT Server software for UnixWare<sup>®</sup> 7.x by downloading the driver files from <http://www.lsiillogic.com/GAMTT> and creating a GAM TT Server installation diskette. See [Appendix C, “Creating a GAM TT Server Installation Diskette”](#) for details.

### 1.1.3 Linux

Before installing the GAM TT Server for Linux on a MegaRAID or Mylex PCI controller, you must first download and install the MegaRAID or Mylex PCI operating system driver. You can get this from the appropriate web site (see [Chapter 5, “Linux”](#)).

---

## 1.2 Global Array Manager Transition Tool Server Overview

Global Array Manager Transition Tool (GAM TT) Server Software is used to manage disk array subsystems attached to a MegaRAID or Mylex Disk Array Controller.

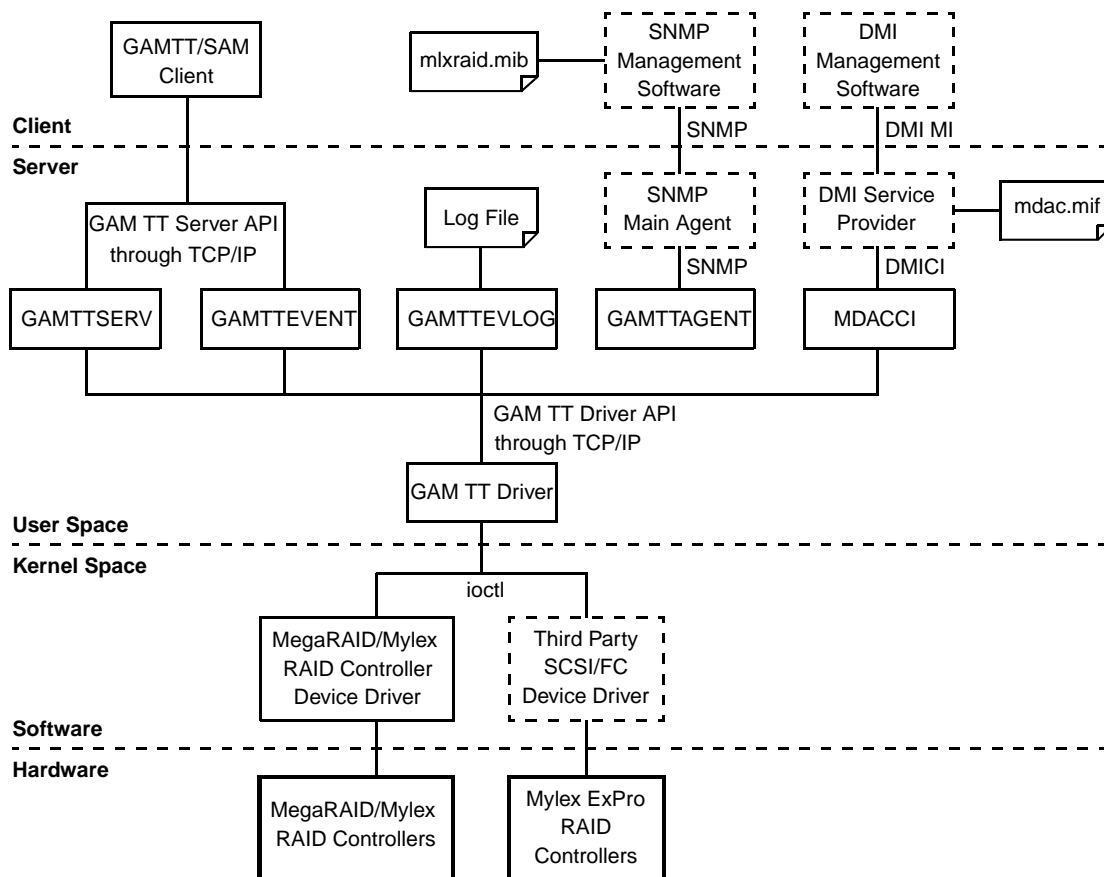
### 1.2.1 GAM TT Server Components

GAM TT Server Software consists of the following major components:

- GAM TT Driver — communicates with the device driver and upper level components to relate RAID device management information.
- GAM TT Server — the interface between GAM TT Server software and GAM/SAM client, providing remote management.
- GAM TT Event Forwarding Utility — a software utility that forwards GAM TT event information to designated GAM TT Client.
- GAM TT Event Logging Utility — a software utility that logs GAM TT event information to a file.
- GAM TT SNMP Subagent — provides management information through the SNMP protocol.
- GAM TT DMI Component Instrumentation — provides management information through the DMI 2.0 standard.
- MegaRAID or Mylex Version Utility — displays the version information about the above components.

The following diagram ([Figure 1.1](#)) illustrates GAM TT Server and GAM TT Client interactions. The items in solid line boxes are GAM TT software components; the items in dash line boxes are third party software components.

**Figure 1.1 GAM TT Server and GAM TT Client Interactions**



## 1.2.2 Monitoring Functions

The Global Array Manager Transition Tool Server software collects and disseminates information on disk array status and resource utilization. The GAM TT and SANArray Manager (SAM) Client software organizes this information through a graphical display.

### 1.2.2.1 SNMP/DMI Support

The GAM TT Server software includes SNMP and DMI support, allowing stand-alone monitoring of performance and fault information. This is useful if a management package is already in use. Support for these protocols includes “read only” functions.

### 1.2.3 Management Functions

The GAM TT Server software executes the management instructions the GAM TT Client specifies. GAM TT Server software offers fault management, reliable messaging, and superior operating system support. GAM TT Client software manages or performs maintenance on individual disk arrays and drives (with the appropriate authentication), again through means of the graphical user interface.

### 1.2.4 Configuration Functions

GAM TT Client software provides disk array configuration and remote TCP/IP support functions. If your goal is monitoring and simple maintenance or messaging, GAM TT Server is sufficient for these tasks.

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## 1.3 Requirements

This section specifies the hardware and software requirements for the GAM TT Server software under several network operating systems.

The person performing the installation must have Administrator access for the system onto which GAM TT Server will be installed.

The instruction in this manual assume that the hardware installation for external or PCI products, the system configuration, and the disk array controller configuration are properly completed. If not, see the *PCI Disk Array Controller Drivers Installation Guide and User Manual* and the *Integrated Disk Array Controller BIOS and Configuration Utility User Reference Guide* or *Integrated Disk Array Controller BIOS and Configuration Utility Quick Configuration Guide*. If you are installing the controller into an external product, see the appropriate external installation guide. Complete the required procedures described in those manuals before proceeding with installation of GAM TT Server discussed herein. Before starting, be sure to read through all applicable instructions to determine the specific requirements for this installation.

The correct environment must be present on the server for the Global Array Manager Transition Tool Server software to work properly. The environment is a combination of hardware and software which meets the following requirements:

### **1.3.1 Server Hardware and Software – NetWare**

- A server running Novell® NetWare 5.1/6
- 10 Mbytes of free hard disk space on the SYS: volume
- Properly installed and configured MegaRAID or Mylex Disk Array Controller with the appropriate NetWare drivers
- (Optional) If SNMP participation is desired, SNMP support should be installed.
- TCP/IP must be installed

### **1.3.2 Server Hardware and Software – Windows 2000, 2003, or XP**

- A server running Microsoft Windows 2000/2003 on x86 Professional, Server, or Advanced Server with SP2 or higher (optional), OR Windows XP Professional Edition
- 10 Mbytes of free hard disk space
- Properly installed and configured MegaRAID or Mylex Disk Array Controller with the appropriate Windows 2000/2003/XP drivers
- (Optional) If SNMP participation is desired, SNMP support (available from third parties) should be installed.
- TCP/IP must be installed

### **1.3.3 Server Hardware and Software – UnixWare**

- A server running UnixWare (version 7.x on x86)
- 10 Mbytes of free hard disk space
- Properly installed and configured MegaRAID or Mylex Disk Array Controller with the appropriate UnixWare drivers from the Software Kit
- TCP/IP must be installed

### **1.3.4 Server Hardware and Software – Linux**

- A server running Linux version:
  - Red Hat® 7.2, and 7.3 (external products support only 7.1)
  - SuSE® 7.3
- 10 Mbytes of free hard disk space

- Properly installed and configured MegaRAID or Mylex Disk Array Controller with the appropriate Linux drivers found on the web site to be used with the Software Kit (see [Chapter 5, "Linux"](#)).
- TCP/IP must be installed
- Inetd or Xinetd must be running
- SNMP (Optional)



# Chapter 2

## NetWare

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### 2.1 Overview

This chapter describes installation, verification, and startup of the Global Array Manager Transition Tool Server software for Novell® NetWare. The software is provided on the web ([www.lsillogic.com](http://www.lsillogic.com)).

Note: This chapter assumes that the network administrator for this site will perform these installation procedures.

---

### 2.2 Global Array Manager Transition Tool Server Software for NetWare 5.1 and 6

#### 2.2.1 Installing Global Array Manager Transition Tool Server Software

The Global Array Manager (GAM TT) Server software for NetWare has an automated installation utility which is run from the NetWare *server console*. This utility places the Global Array Manager Transition Tool Server application in the correct server directory and modifies the NetWare startup file, AUTOEXEC.NCF, to launch the application when the server is started.

Global Array Manager Transition Tool Server software can be downloaded from <http://www.lsillogic.com/GAMTT>. Once you download and unzip the GAM TT Server, use the following procedure for installation. Follow the steps below to install the GAM TT Server software.

1. At the console, type the following command and press **Enter** to run the installation.

```
: Mylex_520:gam\netware\install
```

Note: Do not type *any* extension. Type only ....**install**.

2. The Global Array Manager Transition Tool Server software installation screen displays.
  - To install the GAM TT Server software, select Install.
  - To cancel the installation, select Exit.

As the software is installed, the server's AUTOEXEC.NCF file is updated to start the Global Array Manager Transition Tool Server application whenever the server runs this file.

3. Press the **Enter** key at the Update AUTOEXEC.NCF message.
4. Installation is complete. Edit AUTOEXEC.NCF as follows:

Modify the GAMEVENT and GAMEVLOG lines manually. After each -h parameter, change the GAMEVENT line to include the IP addresses of the client systems you will use to record events. Modify the pathname and filename in the GAMEVLOG command line if you wish to. Refer to [Appendix B, "GAMEVENT,"](#) for more information.
5. Be sure to remove comment markers (such as the character #) from any command line which you intend to enable.
6. Save the modified AUTOEXEC.NCF and exit.
7. Create a user account called gamroot.
8. To load the GAM TT Server components, see [Section 2.2.2.1, "Loading Global Array Manager Transition Tool Server Manually,"](#) [page 2-3](#), after verifying correct server software installation.

## 2.2.2 Running Global Array Manager Transition Tool Server

The Global Array Manager Transition Tool Server runs on the server and delivers the following information to the Global Array Manager Transition Tool Client:

- Monitors the controller(s) and disks in the server.
- Manages the controller(s) and associated disk subsystems in the server.

### 2.2.2.1 Loading Global Array Manager Transition Tool Server Manually

The Global Array Manager Transition Tool Server can be loaded manually from the NetWare server console prompt by typing the following two commands:

```
load gamserv ↵  
load gamevent -h <IP Address or Name of Client>  
(repeat...)
```

### 2.2.2.2 Loading Global Array Manager Transition Tool Server Automatically

The Global Array Manager Transition Tool Server can be custom-made to start up automatically on a NetWare server when it is restarted after installation of Global Array Manager. This capability are available because the following two files are automatically copied into AUTOEXEC.NCF, at the end of the file, during the GAM TT installation.

```
load gamserv  
load gamevent -h <IP Address or Name of Client>  
(repeat...)
```

Remember that you must edit the IP address line. See [Section 2.2.2.3, “Enabling the Event Comment Line,”](#) in the next section to add an IP address line, as needed.

### 2.2.2.3 Enabling the Event Comment Line

To enable event notification to GAM TT Clients, both local and remote, add “-h DNS\_NAME” or “-h IP\_NUMBER” to the end of the “load gamevent” line for each GAM TT Client and uncomment the line. DNS\_NAME and IP\_NUMBER are the workstation’s Computer Name or IP Address. You can add up to 50 clients. To use “DNS \_NAME,” the “DNS\_NAME” must be listed in the “etc/hosts” file or “DNS\_NAME” must be resolved by DNS lookup.

#### Usage:

```
load gamevent -h <IP Address or Name of Client>  
(repeat...)
```

For example:

```
load gamevent -h 192.128.2.3 -h 192.128.2.4  
-h host1
```

## 2.2.3 Troubleshooting Server Software Installation

**Problem:** The message “Error in connecting selected server” is displayed or an error is encountered when trying to connect to a server.

Check: Is the IP address correct?

Check: Is the server software, GAMSERV.NLM, installed and loaded on the server(s)? Use the following NetWare console command to verify that the GAMSERV module is loaded:

```
modules GAMSERV ↵
```

Check: Is the Ethernet connection good?

Check: Is TCP/IP set up correctly? Try Ping to find the server.

**Problem:** Global Array Manager Transition Tool Server does not load.

Check: Is the installation complete? The files GAMSERV.NLM, GAMDRV.NLM, and GAMEVENT.NLM should be contained in the SYS:SYSTEM directory of the server.

---

## 2.3 DMI CI Manual Configuration for Netware

Mylex DMI CI monitors the status of a Mylex RAID device and is available for Netware 5.1 and Netware 6. Mylex DMI CI is a component of GAM TT Server and is DMI 2.0 conformant. For information about the DMI standard, see the DMI 2.0 specification on <http://www.dmtf.org>.

DMI CI for Netware includes the following two files that GAM TT Server installs to your SYS:SYSTEM directory:

- MDAC.MIF — the MIF file for Mylex DMI CI
- MDACCI.NLM — the Mylex DMI CI

### 2.3.1 DMI Service Provider

The DMI CI relies on the DMI Service Provider to report DMI information about Mylex RAID devices. Therefore, you must install and launch the appropriate DMI Service Provider before you use Mylex DMI CI.

Mylex DMI CI requires a compatible DMI Service Provider to the service provider of SmartDMI™ Service Provider SDK v1.20 for Netware from Smart Technology Enablers, Inc. You can use the SmartDMI™ SP from Smart Technology Enablers, Inc. From more information, visit the web site <http://www.enablers.com>.

**Note:** In order for SmartDMI™ SP to launch properly on Netware 6, choose to install the IPX protocol and to enable the Transaction Tracking System (TTS) when you install the operating system. You can enable the TTS by creating a traditional NetWare volume.

## 2.3.2 Mylex RAID Component

When MDACCI starts, it checks to determine if the MIF database of the DMI SP contains the corresponding component. If the component is not there, MDACCI imports the component information from MDAC.MIF and creates a component, called “Mylex RAID,” in the MIF database.

**Note:** Be sure that MDACCI.NLM and the “Mylex RAID” component in the MIF database are consistent. Otherwise, you may get wrong DMI information.

If you have previously launched MDACCI on your system, the “Mylex RAID” component may be in the MIF database. However, when you upgrade GAM TT Server, the “Mylex RAID” component is not upgraded. Therefore, always remove this component from the MIF database before you upgrade the DMI CI or GAM TT Server. You can remove the “Mylex RAID” component through a DMI browser.

## 2.3.3 Mylex DMI CI Management Information

The MDAC.MIF file describes Mylex DMI CI management information. This file defines 13 information groups. Groups with ID two through ten define Mylex RAID management information. You can browse this information with a DMI browser or DMI management application.

Mylex DMI CI sends DMI indication when it detects any GAM TT events. The indication from DMI CI should be consistent with events from the GAM TT Event Forwarding utility (GAMEVENT.NLM) or the event logs from the GAM TT Event Logging utility (GAMEVLOG.NLM).

## 2.3.4 Optional DMI CI Parameters

After the installation of the DMI CI subcomponent, you have the option to specify additional parameters, known as the GAM IPC Port and the Update Time Interval.

The default IPC port number for the GAM TT Server driver and Mylex CI port is 43162; however, this number may be modified. The update time interval specifies the interval in seconds for the DMI CI to update the controller status, e.g. inserted or removed, to provide timely information. This is useful on a hot-plug or hot-swap enabled system. If not specified, the default value of 60 seconds is used.

The IPC Port number for the GAM TT Server driver and the Mylex CI port number must match for proper communication. Therefore, if either the GAM TT Server driver port number or the Mylex CI port number is changed, be sure to change the other port number to match.

You can specify this parameter through the command line. The full command line format of Mylex CI is:

```
mdacci [-p <GAM IPC port>] [-t <update time interval>]
```

-p specifies the IPC port number by which the DMI CI component communicates with the GAM Driver.

**Note:** If “GamIpcPort” is not specified, the default port number is used.

**Note:** The value of update time interval can affect DMI CI performance. If the time interval is too small, the CI would occupy much of the system’s resources by updating the status too frequently. If the time interval is too big, the CI may not be able to report controller changes in time.

Therefore, be careful when changing this parameter.

# Chapter 3

## Windows 2000, 2003 and XP

---

### 3.1 Overview

This chapter describes installation, verification, and startup of the Global Array Manager Transition Tool (GAM TT) Server software for Microsoft Windows 2000, 2003, and XP. The software is provided by downloading the files from <http://www.lsillogic.com/GAMTT>.

Note: This chapter assumes that the network administrator for this site will perform these installation procedures.

---

### 3.2 Global Array Manager Transition Tool Server Software for Windows 2000, 2003, and XP

#### 3.2.1 Installation Overview

Installation of the Global Array Manager Transition Tool Server component requires the Windows 2000/2003/XP operating systems.

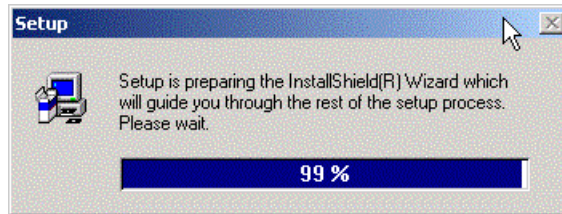
You may also choose to install GAM TT Client or SANArray Manager (SAM) Client at the same time, on the same system. Refer to the *Global Array Manager Transition Tool Client Software Installation Guide and User Manual* for GAM TT Client installation instructions. Refer to the *SANArray Manager Client Software Installation Guide and User Manual* for SAM Client installation instructions.

#### 3.2.2 Installing Global Array Manager Transition Tool Server Software

Global Array Manager Transition Tool Server software can be downloaded from <http://www.lsillogic.com/GAMTT>. Once you download and unzip the GAM TT Server, use the following procedure for installation on Windows 2000/2003/XP.

1. Make sure TCP/IP is installed and functioning properly.
2. Double-click **Setup.exe**.  
Global Array Manager Setup loads the installation wizard (Figure 3.1).

**Figure 3.1 Loading the Installation Wizard**



3. After a few moments, the Welcome dialog box displays (Figure 3.2). After reading the Welcome information, click Next to proceed with the installation, or click Cancel to end the installation procedure and return to the menu.

**Figure 3.2 Welcome Dialog Box**



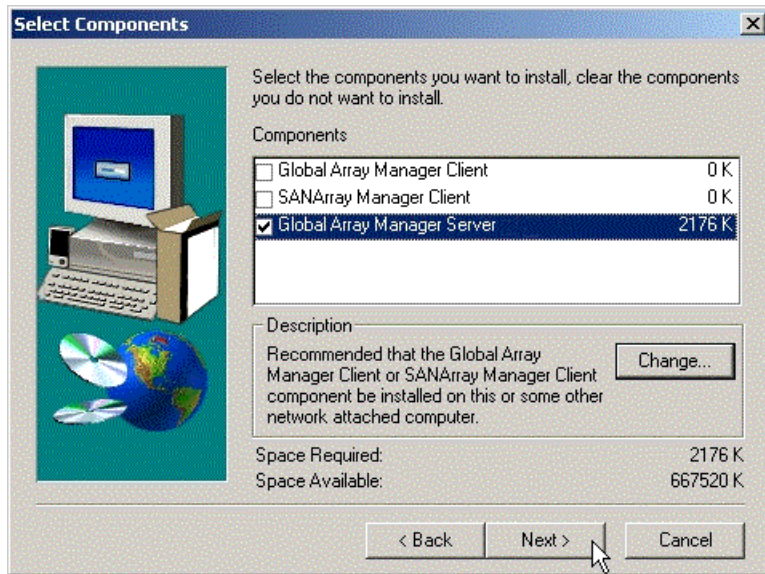
4. When the Software License Agreement screen appears, click Yes to accept the terms of the agreement and continue.



If you click No, you will not be allowed to continue GAM TT Server installation.

The Select Components dialog box is displayed, as shown in [Figure 3.3](#). At this point you select the component(s) you wish to install.

**Figure 3.3 Select Components to Install**



5. To select Global Array Manager Transition Tool Server for installation, click the box to check the Global Array Manager Transition Tool Server option.

**Note:** You may also choose to install Global Array Manager Transition Tool Client or SANArray Manager Client at this time. If you wish to install **both** GAM TT Server **and** GAM TT Client or SAM Client, refer to either the *Global Array Manager Transition Tool Client Installation Guide and User Manual* for GAM TT Client installation instructions or *SANArray Manager Client Installation Guide and User Manual* for SAM Client installation instructions.

6. When you select and highlight the Global Array Manager Transition Tool Server option, the Change button becomes active to allow you to choose a sub-component.

7. Click Change if you want to see the Select Sub-components screen ([Figure 3.4](#)). The Program Files are normally selected. DMI and/or SNMP may be selected or deselected as needed:
  - If you select DMI, Setup copies the DMI files to the server directory, but it does not configure the DMI files. Refer to [Section 3.3, “DMI CI Manual Configuration for Windows,”](#) and [Section 3.3.6, “Optional DMI CI Parameters,”](#) near the end of this section.
  - If you select SNMP, the SNMP files are copied to the server directory and configured automatically. For more information about SNMP and Optional SNMP Parameters support in MegaRAID or Mylex products, see [Appendix A, “SNMP Installation, Operation, and Definition.”](#)

**Note:** The DMI and SNMP selections may not be present in the Select Sub-components screen. If one or both are not displayed, then the setup has detected that your system does not support one or both of them.

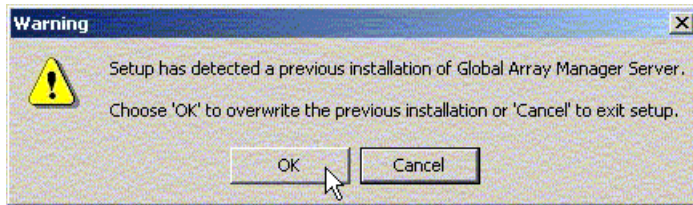
**Figure 3.4 Sub-Components List**



8. Make your subcomponent selections, then click Continue to return to the “Select Components” dialog box ([Figure 3.3](#)).

9. Click Next from the “Select Components” dialog box to continue with the installation.
10. **Special Condition: GAM TT Server Installation**  
If setup finds a previous installation of GAM TT Server software, the following message appears ([Figure 3.5](#)):

**Figure 3.5 Previous GAM TT Server Found**

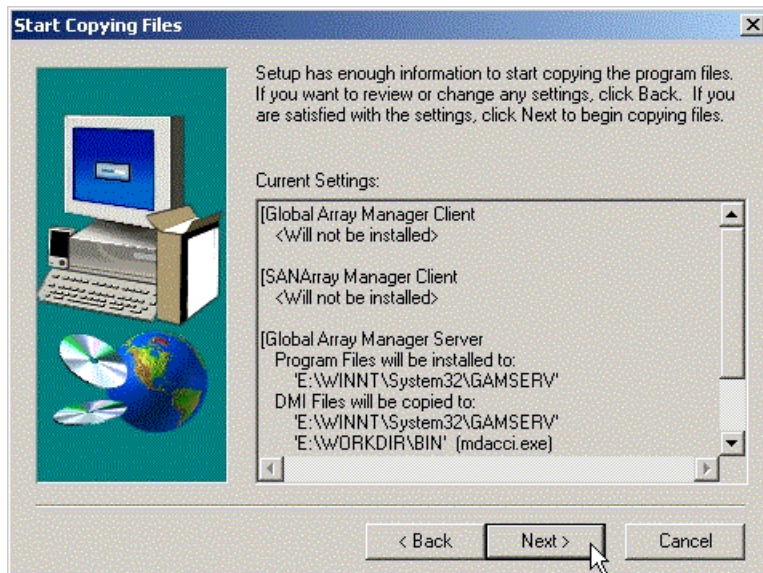


Click OK to replace the existing GAM TT Server and GAM TT Driver with the new installation, OR

Click Cancel to retain your existing GAM TT Server/GAM TT Driver installation. Since only one GAM TT Server/GAM TT Driver can be present on a server system, setup exits if you click Cancel.

11. The Installation Summary screen ([Figure 3.6](#)) summarizes the components and subcomponents you've selected for installation. Click Next to continue, or click Back to change selected components.

**Figure 3.6 Installation Summary Screen**



**12. *Special Condition: Old PCI Controller Drivers***

If setup finds that an installed PCI driver for any of your Mylex PCI RAID Controllers is older than version 6.90-00, you will see a message of the following type<sup>1</sup> (Figure 3.7):

**Figure 3.7 Error – PCI Driver Must Be Version 6.90-00 or Higher**



If you intend to use GAM TT Server only with Mylex *External* RAID Controllers, you should choose to continue installation by clicking OK.

---

1. The actual driver identified in the message depends on which driver is found to be older than version 6.90-00.

However, if you intend to use GAM TT Server with Mylex *PCI* RAID Controllers, your PCI Controller Drivers must be version 6.90-00 or higher in order to install and run GAM TT Server. Click Cancel, and setup will exit.

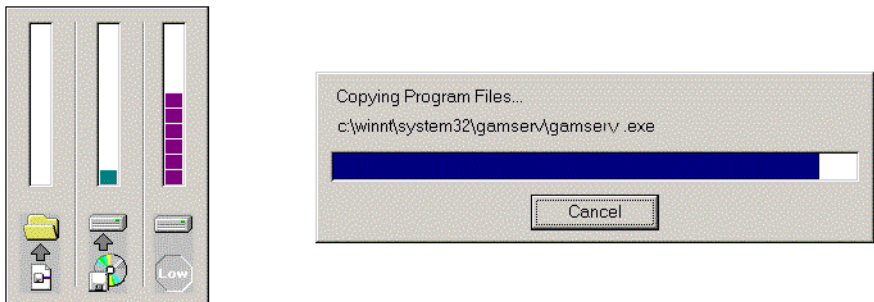
After clicking Cancel, follow the instructions in the *PCI Disk Array Controller Drivers Installation Guide and User Manual* to update your PCI driver(s). Then rerun GAM TT Server installation as described herein.

If the above Special Condition does not apply, installation continues. Go on to [step 13](#).

13. During installation, files are decompressed and copied to the destination folder ([Figure 3.8](#)).

Wait for this process to complete.

**Figure 3.8 Installation Progress Display**



14. If the Setup function detects an existing Global Array Manager Transition Tool Server configuration file, the following Configuration File Selection/Modification dialog box opens so that you can select whether or not to modify the existing file ([Figure 3.9](#)).



**Figure 3.9 Modify Server Configuration File Dialog Box**



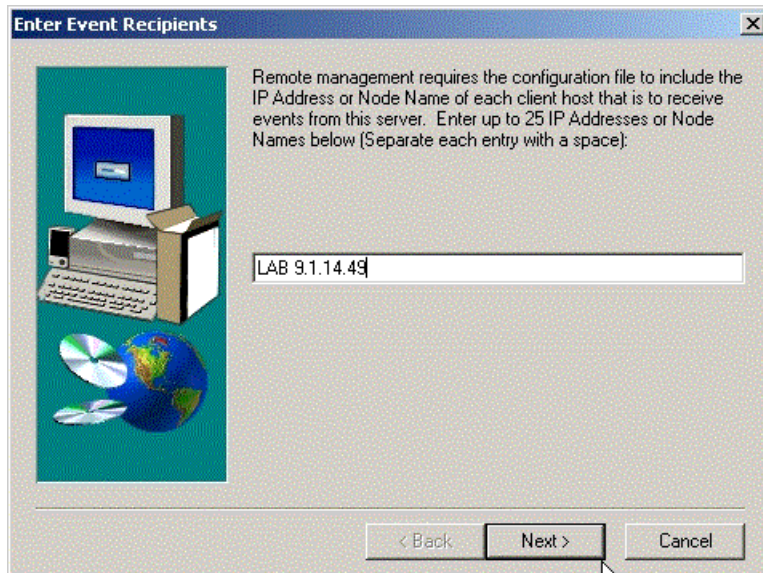
If no existing configuration file is found, Setup creates one. Proceed to [step 15](#).

- If you select “Use the existing file without modification” and click Next, your existing configuration file will continue to be used. Skip ahead to [step 16](#).
- If you select “Modify the existing file” and click Next, your configuration file is changed to include features new to this version of GAM TT Server. Proceed to [step 15](#).
- If you select “Modify the default file. (Existing file will be saved.)” and click Next, a new default configuration file is used which includes features new to this version of GAM TT Server. Your original file is also saved unchanged. Proceed to [step 15](#).

“Modify the default file. (Existing file will be saved).” must be selected if you want to use the External Client controllers.

15. The Enter Event Recipients dialog box opens ([Figure 3.10](#)). Add IP addresses or node names of client workstations that will receive event notifications from this server. Enter up to 25-50 IP addresses or node names (limit is 1028 bytes) with a space separating each entry.

**Figure 3.10 Enter Event Recipients Dialog Box**



**Note:** Event notifications cannot be received by a client unless its IP address or node name is identified. You may include additional IP addresses or node names by editing the GAMSCM.INI (configuration file) later. See [Appendix C, “Creating a GAM TT Server Installation Diskette.”](#)

Click Next. If you did not enter any IP addresses or node names in the Enter Event Recipients dialog box, a message appears asking if you want to continue. Click Yes to continue or No to go back and enter IP Addresses or node names.

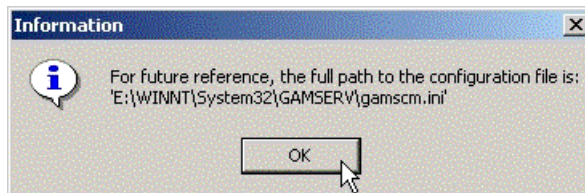
When IP addresses or node names are complete and you click Yes, the Server Event Logging dialog box opens ([Figure 3.11](#)). Select “Enable event logging on the server machine” and click Next to enable event logging. See [Appendix C, “Creating a GAM TT Server Installation Diskette,”](#) to configure event logging.

**Figure 3.11 Server Event Logging Dialog Box**



16. The full path for the configuration file is identified for future reference (Figure 3.12).

**Figure 3.12 Directory Path Information for gamscm.ini File**



Click OK.

17. The Setup Complete dialog box displays (Figure 3.13).



**Figure 3.13 Setup Complete**



Setup has finished copying files to your computer.

Click Finish.

18. Create a user account called `gamroot`.

Setup of Global Array Manager Transition Tool Server is complete.

### **3.2.3 Running Global Array Manager Transition Tool Server**

The Global Array Manager Transition Tool Server runs on the server and delivers the following information to the Global Array Manager Transition Tool Client:

- Monitors the controller(s) and disks in the server.
- Manages the controller(s) and associated disk subsystems in the server.

The automatic installation procedure for the Windows 2000/2003/XP Global Array Manager Transition Tool Server loads the GAM TT Server component as a “service.” This service loads automatically at system startup. No special procedure is required to run the GAM TT for Windows 2000/2003/XP on the Server.

To verify that this service has started, go to **Start->Settings->Control Panel->Administrative Tools->Services**, then check under Name File, GAM TT Server, and Status to see if it has started.

### 3.2.4 Troubleshooting Server Software Installation

**Problem:** The message “Error in connecting selected server” is displayed or an error is encountered when trying to connect to a server.

Check: Is the Ethernet connection good?

Check: Are the various port numbers set correctly?

Check: Is the IP address of the Server correct?

Check: Is TCP/IP set up correctly? Try Ping to find the server.

**Problem:** Global Array Manager Transition Tool Server does not load.

Check: Did all of the server files load to the destination directories? Do you have sufficient disk space for the installation?

[Chapter 1, “Introduction,”](#) has a list of files needed for operation. If necessary, reinstall the software.

---

## 3.3 DMI CI Manual Configuration for Windows

DMI CI files (also known as DMI files) are available for the Mylex Disk Array Controller running under Windows 2000/2003/XP. The DMI CI acts as a general monitor to locate events such as hard disk status, driver identification, etc. Mylex DMI CI is a component of GAM TT Server and is DMI 2.0 conformant. For information about the DMI standard, see the DMI 2.0 specification on <http://www.dmtf.org>.

DMI CI files must be manually configured after they are copied into the server directory by the GAM TT Server installation. See [Section 3.3.3, “DMI CI Manual Configuration,”](#) page 3-14, for details.

### 3.3.1 DMI Service Provider

The DMI CI relies on the DMI Service Provider to report DMI information about Mylex RAID devices. Therefore, you must install and launch the appropriate DMI Service Provider before you use Mylex DMI CI.

Mylex DMI CI requires a compatible DMI Service Provider to the service provider of SmartDMI™ Secure Service Provider SDK v1.0.30.2 for Win32 from Smart Technology Enablers, Inc. You can use the SmartDMI™ SP from Smart Technology Enablers, Inc. For more information, visit the web site <http://www.enablers.com>. you can also use the DMI 2.0 Service Provider of Intel ISC or Intel LanDesk.

### 3.3.2 DMI CI Files

There are three DMI CI files:

- MDAC.MIF
- MDACCI.EXE
- SRVCCFG.EXE

These files are copied into the appropriate directory path during the GAM TT Server installation process:

- %SystemRoot%\system32\gamserv\mdac.mif
- %SystemRoot%\system32\gamserv\mdacci.exe
- %SystemRoot%\system32\gamserv\srvcfg.exe

If the GAM TT Server installation detects the system environment variable (**%win32dmipath%**) created by Intel®'s LANDesk® Server Manager, these files are also copied into the following locations:

- %win32dmipath%\mifs\mdac.mif
- %win32dmipath%\bin\mdacci.exe

Note: If you are using the Intel LANDesk Service Manager, you do not need to manually configure mdacci.exe. The Intel application takes care of this.

### 3.3.3 DMI CI Manual Configuration

DMI is selected in the sub-component dialog box during the Global Array Manager Transition Tool Server installation if the DMI application such as Intel LDCM was installed. The DMI subcomponent can also be installed by itself via the server installation utility.

Note: When installation is complete, see [Section 3.3.6, “Optional DMI CI Parameters,” page 3-15](#).

Use the SRVCCFG.EXE utility to configure the DMI files.

1. Run the following command line from the GAMSERV directory to install the mdacci service manually:

```
srvccfg MLXDMISRV MYLEXDMI %SystemRoot%\system32\
GAMSERV\mdacci.exe
```

At this point, you have registered the CI as a service. Now, you need to modify the dependencies of the DMI CI service to make sure the GAM TT driver and Windows DMI Service Provider can be launched before the DMI CI service at system boot time.

2. Entering the following command line:

```
srvccfg depend MLXDMISRV gamscm;Win32sl
```

Note: “gamscm” is the service name of the GAM TT Server/Driver. “Win32sl” is the service name of the Windows DMI Service Provider. If your system has a different service name for the DMI SP, replace it as needed.

3. If DMI SP is installed prior to GAM TT Server, you will see a DMI check box during GAM TT Server installation. If you select the check box, the installation copies mdac.mif to the DMI SP MIF directory, and you do not need to manually copy it. Otherwise, continue below.

Copy mdac.mif to the DMI SP MIF directory, and enter the following command line.

```
copy mdac.mif %WIN32DMIPATH%\mifs
```

If you use Intel ISC, LanDesk, or SmartDMI SP, the installation creates a system environment variable, WIN32DMIPATH, on your system. The DMI SP MIF directory is usually “%WIN32DMIPATH%\mifs”.

4. Reboot your system OR start the “MYLEXDMI” service through Windows Services Control to start the DMI CI.

### 3.3.4 Mylex RAID Component

When the DMI CI starts, it checks to determine if the MIF database of the DMI SP contains the corresponding component. If the component is not there, MDACCI imports the component information from MDAC.MIF and create a component, called “Mylex RAID,” in the MIF database.

**Note:** Be sure that mdacci.exe and the “Mylex RAID” component are consistent in the MIF database. Otherwise, you may get wrong DMI information.

If you have previously launched MDACCI on your system, the “Mylex RAID” component may be in the MIF database. However, when you upgrade GAM TT Server, the “Mylex RAID” component is not upgraded. Therefore, always remove this component from the MIF database before you upgrade the DMI CI or GAM TT Server. You can remove the “Mylex RAID” component through a DMI browser.

### 3.3.5 Mylex DMI CI Management Information

The MDAC.MIF file describes Mylex DMI CI management information. This file defines 13 information groups. Groups with ID two through ten define Mylex RAID management information. You can browse this information with a DMI browser or DMI management application.

Mylex DMI CI sends DMI indication when it detects any GAM TT events. The indication from DMI CI should be consistent with events from the GAM TT Event Forwarding utility (gamevent.exe) or the event logs from the GAM TT Event Logging utility (gamevlog.exe).

### 3.3.6 Optional DMI CI Parameters

After the installation of the DMI CI subcomponent, you have the option to specify additional parameters, known as the GAM IPC Port and the Update Time Interval.

The default IPC port number for the GAM TT Server driver and Mylex CI port is 43162; however, this number may be modified. The update time interval specifies the interval in seconds for the DMI CI to update the

controller status, e.g. inserted or removed, to provide timely information. This is useful on a hot-plug or hot-swap enabled system. If not specified, the default value of 60 seconds is used.

**Note:** The IPC Port number for the GAM TT Server driver and the Mylex CI port number must match for proper communication. Therefore, if either the GAM TT Server driver port number or the Mylex CI port number changes, be sure to change the other port number to match.

**Note:** The value of update time interval can affect DMI CI performance.

If the time interval is too small, the CI would occupy much of the system's resources by updating the status too frequently. If the time interval is too big, the CI may not be able to report controller changes in time.

### 3.3.6.1 How to Specify the Parameter

You can specify the parameters in the system registry. After the installation of Mylex CI onto a WIN32 system, see the registry key as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\  
MLXDMISRV
```

Follow these easy steps to specify the Mylex CI parameter:

1. Access the System Registry, locate the key "MLXDMISRV" according to the above path.
2. Add a key, "Parameters," under "MLXDMISRV".
3. Add a key, "ExtraParameters," under "Parameters."
4. To specify the GAM IPC Port parameter, add a DWORD value, "GamDriverPort," under "ExtraParameters", so you can specify the IPC port number by which the DMI CI component communicates with GAM TT driver, as done for -p in the NetWare command line in [Section 2.3.4, "Optional DMI CI Parameters," page 2-6](#).

**Note:** If "GamIpcPort" is not specified, the default port number is used.

5. To specify update time interval parameter, add a DWORD value, "Update TimeInterval," under "ExtraParameters", then you can specify the value of the time interval, as done for the -t option in the NetWare DMI CI command line in [Section 2.3.4, "Optional DMI CI Parameters," page 2-6](#).





# Chapter 4

## UnixWare

---

### 4.1 Overview

This chapter describes information about the following installation, verification, and startup of the Global Array Manager Transition Tool (GAM TT) Server software for UnixWare 7.1. The software is provided by downloading the files from <http://www.lsillogic.com/GAMTT>.

Note: This chapter assumes that the network administrator for this site will perform these installation procedures.

---

### 4.2 Global Array Manager Transition Tool Server Software for UnixWare 7.1

Before installing the GAM TT Server for UnixWare, a diskette must be created according to the instructions in [Section C.1.1, “When to Create a GAM TT Server Installation Diskette,”](#) page C-1.

This diskette is used in the next section wherever instructed to insert the “GAM TT Server diskette for UnixWare.”

Note: After creating this diskette, DOS is not able to read it.

#### 4.2.1 Installing Global Array Manager Transition Tool Server Software

Use *pkgadd* to install the Global Array Manager Transition Tool Server software for UnixWare. Complete the following procedure.

Note: These instructions assume the installation diskette is in disk drive 1. If a different source is used, substitute that location for “diskette1” in [step 3](#).

1. Log in as root.

2. Insert the GAM TT Server diskette for UnixWare in the file server's diskette drive.
3. Type the following (match case exactly as shown):

```
pkgadd -d diskette1 GAM ↵
```

4. You are prompted to insert the diskette and confirm installation as shown:

```
Insert diskette into Floppy Drive 1.  
Type [go] when ready.  
or [q] to quit: (default: go)
```

To begin installation, type:

```
go ↵
```

The files are copied and the Kernel is rebuilt.

5. Installation is complete.

Modify the GAMEVENT and GAMEVLOG lines manually. To do this edit the S99GAM file found in the directory /etc/rc2.d, changing the GAMEVENT line to include (after each -h parameter) the IP addresses of the client systems you will use with this server. Modify the pathname and filename in the \$EVENTLOGFILE command line if you wish to. For more information, refer to [Appendix B, "GAMEVENT."](#)

Note: If you are using SNMP features, you must enable /usr/bin/gamagent. For more information, see [Section A.5, "SNMP Installation for UnixWare,"](#) page A-7.

6. Be sure to remove comment markers (such as the character #) from any command line which you intend to enable.
7. Save the modified S99GAM and exit.
8. Create a user account called `gamroot` and assign Root access privileges to that user account.
9. Reboot the system using the following command from the root directory (match case exactly as shown):

```
shutdown -y -i6 -g0 ↵
```

## 4.2.2 Running Global Array Manager Transition Tool Server

The Global Array Manager Transition Tool Server runs on the server and delivers the following information to the Global Array Manager Transition Tool Client:

- Monitors the controller(s) and disks in the server.
- Manages the controller(s) and associated disk subsystems in the server.

The installation of Global Array Manager Transition Tool Server for UnixWare causes the appropriate drivers to load automatically at system startup. No additional actions are required to start GAM TT Server beyond a system boot.

## 4.2.3 Manually Starting and Stopping GAM TT Server

In some instances, you may find it necessary to start or stop GAM TT Server manually. Follow the instructions below to do so.

To manually start GAM TT Server:

From the /etc/rc2.d directory, run the command `./S99GAM start`

To manually stop GAM TT Server:

From the /etc/rc2.d directory, run the command `./S99GAM stop`

## 4.2.4 Troubleshooting Server Software Installation

**Problem:** An error is encountered when trying to connect to a server.

Check: Is the IP address of the Server correct?

Check: Is the installation complete? Was the software successfully loaded on the server?

Check: Is the Ethernet connection good?

Check: Is TCP/IP installed?

Check: Is TCP/IP set up correctly? Try Ping to find the server.

**Problem: Global Array Manager Transition Tool Server does not load.**

Check: Do you have login rights to the root?

Check: Did all of the server files load to the destination directory? Do you have sufficient disk space for the installation? If necessary, reinstall the software.

## **4.2.5 Uninstalling the Server Software**

To remove the Global Array Manager Transition Tool Server software, complete the following procedures:

1. Type the following command (match case exactly as shown):

```
pkgrm GAM ↵
```

2. You are prompted for confirmation as shown:

```
Do you want to remove this package [yes,no,?,quit]
```

At the prompt, type:

```
y ↵
```

The files are removed. The Kernel is rebuilt.

3. When you see the following message, removal is complete.

```
Removal of <GAM> was successful.
```

4. Reboot the system using the following command from the root directory (match case exactly as shown):

```
shutdown -y -i6 -g0 ↵
```

# Chapter 5

## Linux

---

### 5.1 Overview

This chapter describes installation, startup, and troubleshooting of the Global Array Manager Transition Tool Server software for the Linux operating system with the following distributions:

- Red Hat 7.2, 7.3 (external products support only 7.1)
- SuSE 7.3

The software is provided by downloading the files from <http://www.lsillogic.com/GAMTT>.

**Note:** This chapter assumes that the network administrator for this site will perform these installation procedures.

Go to the following web site to download the appropriate Disk Array Controller Drivers for External Controllers:

[http://www.q1c.com/bbs-html/csg\\_web/adapter\\_pages/driver\\_pages/21xx/21linux.html](http://www.q1c.com/bbs-html/csg_web/adapter_pages/driver_pages/21xx/21linux.html)

For instructions on how to install the disk array controller drivers, see the appropriate instructions on each web site and refer to the appropriate Linux OS distribution reference manual.

---

### 5.2 Global Array Manager Transition Tool Server Software for Linux

#### 5.2.1 Installation Overview

This section covers the following for the Global Array Manager Transition Tool (GAM TT) Server software:

- [Section 5.2.2, “Installing Global Array Manager Transition Tool Server Software”](#)
- [Section 5.2.4, “Running Global Array Manager Transition Tool Server”](#)
- [Section 5.2.5, “Troubleshooting Server Software Installation”](#)
- [Section 5.2.6, “Uninstalling the Server Software”](#)

This process assumes that the network administrator for this site will perform this installation procedure.

## 5.2.2 Installing Global Array Manager Transition Tool Server Software

Global Array Manager Transition Tool Server software can be downloaded from <http://www.lsiillogic.com/GAMTT>. Once you download and unzip the GAM TT Server, use the following procedure for installation.

1. Log in as root.

Before Installing the GAM TT Server Software, you need to determine if there is already a version installed (Step 3) and then remove it (Step 4). If you are certain that no other version is installed, skip to Step 5.

2. To query the RPM database for GAM TT, type:

```
rpm -qa | grep gam
```

3. If GAM TT is listed, remove it, by typing:

```
rpm -ev <gam release name> (such as .rpm file name)
```

4. To install the GAM TT Server Software, type:

```
rpm -iv <path where you saved download files>
gam-server.x.00xx.i386.rpm
```

**Note:** To query RPM about the contents of the GAM TT file, type:

```
rpm -qpi <gam release name>
```

The GAM TT Server installation is complete.

## 5.2.3 Editing GAMEVENT and GAMEVLOG

The \$EVENTLOGFILE and GAMEVENT files must be edited so that they will hold the correct host or IP address to direct the events to the desired client(s).

1. Access the GAM TT file for GAMEVENT, type:

```
vi /etc/rc.d/init.d/gam
```

2. Edit gam (replace [-h host1] with an actual—your user—address)

```
gamevent -h host1 &
```

For example (remove the # symbol to enable the command line):

```
gamevent -h 192.168.0.148 &
```

By default, the Linux client and server are configured to communicate correctly when using the root login. See the note on [page B-2](#) for details about root and non-root users and proper port numbers for event logging.

3. Access the \$EVENTLOGFILE file and remove the # symbol to enable the command line.

```
gamevlog -f $EVENTLOGFILE &
```

## 5.2.4 Running Global Array Manager Transition Tool Server

The Global Array Manager Transition Tool Server runs on the server and delivers the following information to the Global Array Manager Transition Tool Client:

- Monitors the controller(s) and disks in the server.
- Manages the controller(s) and associated disk subsystems in the server.

**Note:** The device driver (e.g., DAC960 or qla2x00) must be loaded prior to starting Global Array Manager Transition Tool Server software.

To run the GAM TT Server software, follow these steps:

1. Log in as root.
2. Stop the GAM TT Serve by typing:

```
/etc/rc.d/init.d/gam stop
```

3. Verify that all GAM TT Server components are gone:

```
ps -A | grep gam
```

4. If you see several process IDs left behind, remove them by typing:

```
kill -g gamdrvd
```

If necessary, you can also remove process IDs individually by typing:

```
kill -9 <process ID #>
```

Note: It is *not* necessary to reboot in order to enable GAM TT when using Software Kit 5.x or higher. However, if you need to reboot for any other reason, go to step 5.

5. To restart the GAM TT Server, type:

```
/etc/rc.d/init.d/gam start
```

## 5.2.5 Troubleshooting Server Software Installation

**Problem: An error is encountered when trying to connect to a server.**

Check: Is the HBA device driver loaded?

If the device driver is not loaded manually (via `insmod qla2100`) or at boot time, the server connection is not established since “gamdrvd” was started before the HBA device driver was loaded.

Check: Is the IP address of the Server correct?

Check: Is the installation complete? Was the software successfully loaded on the server?

Check: Is the Ethernet connection good?

Check: Is TCP/IP installed?

Check: Is TCP/IP set up correctly? Try Ping to find the server.

**Problem: Client won't detect controller, but events appear on client event log viewer.**

Check: Is `inetd` running?

Note: When Red Hat 6.2 is installed on a workstation, `inetd` is not installed. The `inetd` may be installed as an rpm, as an upgrade, or as part of a custom installation.



**Problem: Global Array Manager Transition Tool Server does not load.**

Check: Do you have login rights to the root?

Check: Did all of the server files load to the destination directory? Do you have sufficient disk space for the installation? If necessary, reinstall the software.

## **5.2.6 Uninstalling the Server Software**

1. To query the rpm database for GAM TT, type:

```
rpm -qa | grep gam
```

2. Locate the GAM TT file name within the list. Type the following to remove GAM TT:

```
rpm -ev <gam file name>
```



# Appendix A

## SNMP Installation, Operation, and Definition

---

### A.1 Introduction

The Global Array Manager Transition Tool Server includes a Simple Network Management Protocol (SNMP) subagent for the MegaRAID or Mylex RAID controller and connected storage devices. An SNMP-based management application (also known as an SNMP manager) can monitor and manage devices through SNMP subagents. An example of an SNMP management application is Hewlett-Packard's Open View. The SNMP subagent can be used to augment the GAM TT/SAM Client, for the purpose of monitoring, if you are already running an SNMP management application at your site.

The SNMP subagent reports the information about the RAID controller, logical drives, physical devices, enclosures, etc. per SNMP request. The SNMP subagent also sends out SNMP traps when it detects any GAM TT events, such as controller found, enclosure fan failed, etc.

The Management Information Base (MIB) file, `mlxraid.mib`, defines the SNMP subagent provided management information, see [Section A.8](#), "MYLEXRAIDMIB Object Definitions," [page A-16](#), for more information.

---

### A.2 SNMP Installation Overview

The SNMP subagent is installed in several phases:

- Installing and enabling SMNMP main agent of the Operating System
- Installing the agent software on the server
- Placing a copy of the management information base (MIB) in a directory which is accessible to the management application
- Compiling the MIB description file with the management application

---

## A.3 SNMP Installation for NetWare

During installation of the Global Array Manager Transition Tool Server, the SNMP files were copied to their appropriate directory, as shown in [Table A.1](#). The files can also be copied to the server directory from a workstation's floppy disk drive (with the appropriate NetWare access rights to the server directory).

**Table A.1 NetWare SNMP File**

Operating system	Agent filename	Server directory
NetWare	GAMAGENT.NLM	SYS:SYSTEM
NetWare	MLXRAID.MIB	SYS:SYSTEM

Depending upon the SNMP management application used, the MIB (an ASCII text file named MLXRAID.MIB) must be placed in a specific directory on the network management station running the management application. The MLXRAID.MIB file must be manually copied to this directory. For example:

**Table A.2 Location for MIB**

SNMP Application	MIB location
OpenView	\OV\MIBS
NetWare NMS	\NMS\SNMPMIBS\CURRENT

Note: Your management application may have a different target directory. Consult the management application's user guide for the correct location.

### A.3.1 Using the TRAPTARG.CFG File

TRAPTARG.CFG is an SNMP file that specifies all managers that are to receive SNMP trap messages generated by the SNMP agent (SNMP.NLM).

You must copy and edit TRAPTARG.CFG to direct the events to be logged into the etc/ directory. (See the traptarg.cfg file for more information.) Follow the steps below:

1. Copy TRAPTARG.CFG to this path: etc/traptarg.cfg
2. Edit the TRAPTARG.CFG file by adding either the logical (host) name, IP, or IPX address, which is directly below Protocol UDP or Protocol IPX.

Note: Leave white space preceding the address name.  
Each address destination must be on a separate line.

For example:

Protocol UDP (logical (host) name or IP address)

Server $N$  ( $N$  = name or IP address of server to receive trap data)

In this section, you can put SNMP managers that want to receive traps from the local node over UDP. Use either IP address or logical name. (If you use a logical name, be sure the name and its corresponding IP address appear in the sys:etc/hosts file.)

Protocol IPX (IPX address)

In this section you can put SNMP managers that want to receive traps from the local node over IPX. Managers can be identified by NetWare service name (a NetWare file server name, for example) or by an IPX address. To specify by IPX address, use the following format:

IPX Network Number : MAC Address

c9990111 : 00001B555555

### A.3.2 Starting the NetWare Agent

To start the agent, enter the appropriate command from the system console:

```
LOAD GAMAGENT ↵
```

### A.3.2.1 About the NetWare SNMP Main Agent

The GAMAGENT NLM assumes that SNMP main agent for NetWare servers (SNMP.NLM) is already installed on the server.

The GAMAGENT NLM attempts to autoload the SNMP.NLM. If the SNMP.NLM file is not present, the agent does not load.

The command to load the agent can be incorporated into the AUTOEXEC.NCF or other operating system startup files as well.

### A.3.3 Optional SNMP Parameters for NetWare

After the installation of the DMI CI subcomponent, you have the option to specify additional parameters, known as the GAM IPC Port and the Update Time Interval.

The default IPC port number for the GAM TT Server driver and Mylex CI port is 43162; however, this number may be modified. The update time interval specifies the interval in seconds for the DMI CI to update the controller status, e.g. inserted or removed, to provide timely information. This is useful on a hot-plug or hot-swap enabled system. If not specified, the default value of 60 seconds is used.

The IPC Port number for the GAM TT Server driver and the Mylex CI port number must match for proper communication. Therefore, if either the GAM TT Server driver port number or the Mylex CI port number is changed, be sure to change the other port number to match.

You can specify this parameter through the command line. The full command line format of Mylex CI is:

```
mdacci [-p <GAM IPC port>] [-t <update time interval>]
```

-p specifies the IPC port number by which the DMI CI component communicates with the GAM TT Driver.

**Note:** If "GamIpcPort" is not specified, the default port number is used.

**Note:** The value of the update time interval can affect DMI CI performance. If the time interval is too small, the CI component uses much of the system's resources by updating the sta-

tus too frequently. If the time interval is too big, the CI may not be able to report controller changes in time.

Therefore, be careful when changing this parameter.

---

## A.4 SNMP Installation for Windows 2000/2003, and XP

The SNMP subagent is available on Windows 2000/2003/XP. The SNMP subagent files are:

- GAMAGENT.DLL
- MLXRAID.MIB

During GAM TT Server installation, these files are copied to the same folder as the GAM TT Server. See [Section 3.2.2, “Installing Global Array Manager Transition Tool Server Software,” page 3-1](#).

### A.4.1 Install the SNMP Subagent

Before installing the SNMP subagent, install and configure the Windows TCP/IP and SNMP service. The Windows SNMP service works as the SNMP main agent.

You can select to install the SNMP subagent during the GAM TT Server installation. The installation creates registry values for the SNMP subagent:

1. Under the registry key  
“HKEY\_LOCAL\_MACHINE\system\CurrentControlSet\Services\SNMP\Parameters\ExtensionAgents”, to add the string value “MLX\_GAM”, whose value is in the following format:  
“SOFTWARE\Mylex\Global Array Manager Transition Tool Server\<Version Number>”
2. Under the registry key  
“HKEY\_LOCAL\_MACHINE\SOFTWARE\Mylex\Global Array Manager\<Version Number>”, add an expand string value of “Pathname”, whose value is the file path to GAMAGENT.DLL

## A.4.2 Enable/Disable the SNMP Subagent for Windows

After installing the SNMP subagent, you can enable it by enabling the SNMP service through Windows Service Control. When you install the SNMP Service, by default, it is enabled and it is auto-loaded after system boot.

To disable the SNMP subagent, you can disable the Windows SNMP service through the Windows Service Control. However, in this way, you also disable other SNMP subagents.

To disable the SNMP subagent without affecting other SNMP subagents, you can manually delete the “MLX\_GAM” under the registry key “HKEY\_LOCAL\_MACHINE\system\CurrentControlSet\Services\SNMP\Parameters\ExtensionAgents”. If later you want to re-enable the SNMP subagent, you can manually add the “MLX\_GAM” value in the registry.

## A.4.3 Optional SNMP Parameters for Windows 2000, 2003, and XP

After the installation of the SNMP subcomponent, you have the option to specify additional parameters, known as the GAM IPC Port and the Update Time Interval.

See [Section 3.3.6, “Optional DMI CI Parameters,” page 3-15](#), for details.

### A.4.3.1 How to Specify the Parameter

You can specify the parameters in the system registry. A registry value, MLX\_GAM, is created and can be found under the path shown below. After the successful installation of the SNMP agent onto a Windows 2000/2003/XP system, you will see the registry key as follows:

```
"HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\  
Services\SNMP\Parameters\ExtensionAgents"
```

Follow these easy steps to specify the SNMP agent parameter:

1. Access the system registry and locate MLX\_GAM; for example, the value may be:

```
"SOFTWARE\Mylex\Global Array Manager\<CurrentVersion>"
```

2. Find the actual file path to the gamagent under the value of “Pathname” in the following path:



"HKEY\_LOCAL\_MACHINE\SOFTWARE\Mylex\Global Array  
Manager\<CurrentVersion>\Pathname"

3. To specify the AM IPC Port parameter, add a DWORD value, "GamIpcPort" under the <CurrentVersion> key. Then, you can specify the GAM TT driver ipc port number. (See -p in the NetWare command line, as in [Section A.3.3, "Optional SNMP Parameters for NetWare," page A-4.](#))
4. To add the Update Time Interval parameter, add a DWORD value, "UpdateTimeInterval" under the <CurrentVersion> key. Then you can specify the value of the update time interval.

---

## A.5 SNMP Installation for UnixWare

The SNMP subagent is available for UnixWare 7.1.1.

### A.5.1 Install the SNMP Subagent

On UnixWARE, the SNMP subagent is installed by default during the installation of GAM TT Server.

The SNMP subagent files are:

- gamagent
- gamagent.defs
- mlxraid.mib

During the installation of GAM TT Server, gamagent is copied to the folder of /usr/bin; gamagent.defs and mlxraid.mib are copied to the folder of /etc/netmgt. For information on how to install GAM TT Server, see [Section 4.2, "Global Array Manager Transition Tool Server Software for UnixWare 7.1," page 4-1.](#)

The installation also modifies the configuration file of the UnixWare SNMP peer agent. The configuration file is /etc/netmgt/snmpd.peers. If this file does not exist, the installation creates one for your system. And it adds one line to the configuration file:

"gamagent" 1.3.6.1.4.1.1608 "nopassword"

This ensures the proper communication between the SNMP subagent and the UnixWare SNMP peer agent.

## A.5.2 Enable/Disable SNMP Subagent

To enable the SNMP subagent, you can uncomment the command line of “gamagent” in S99GAM in the folder of /etc/rc2.d/S99GAM. S99GAM is the script file, to auto-load GAM TT Server components during boot time, which is copied to your UnixWare system during GAM TT Server installation. By default, gamagent is disabled in S99GAM.

To disable the SNMP subagent, you can simply comment the command line of “gamagent” in the S99GAM file.

## A.5.3 Optional SNMP Parameters for UnixWare

After you install the DMI CI subcomponent, you can optionally specify the additional parameters GAM IPC Port and Update Time Interval.

The default IPC port number for the GAM TT driver and the SNMP subagent is 43162; however, this number may be modified. The update time interval specifies the interval in seconds for the DMI CI to update the controller status, e.g. inserted or removed, to provide timely information. This is useful on a hot-plug or hot-swap enabled system. If not specified, the default value of 60 seconds is used.

The IPC Port number for the GAM TT driver and the SNMP subagent must match for proper communication. Therefore, if either the GAM TT driver port number or the SNMP subagent is changed, be sure to change the other port number to match.

### A.5.3.1 How to Specify the Parameter

The parameter can be specified through the “gamagent” command line in the S99GAM script file, which is used to start and stop the GAM TT Server components. For example, in S99GAM file, the user can type:

```
gamagent[-p <GAM IPC Port>] [-t <Update Time  
Interval>]&
```

**Note:** If “GamIpcPort” is not specified, the default port number (43162) is used.

**Note:** The value of update time interval can affect the performance of the SNMP subagent. If the time interval is too small, the subagent uses much of the system's resources by updating the status too frequently. If the time interval is too big, the subagent may not be able to report controller changes in time.

Therefore, be careful when changing this parameter.

---

## A.6 SNMP Installation for Linux

The SNMP Subagent for LINUX kernel 2.2 and 2.4 works with the UC-Davis SNMP agent when compiled in the SMUX mode.

Information for UC Davis SNMP is available at

<http://net-snmp.sourceforge.net>.

### A.6.1 Install UC Davis SNMP Agent

The UC Davis SNMP agent is available by clicking the Download button then clicking `ucd-snmp-4.2.2.tar.gz` on the above UC Davis web site. After you download this file, copy it to your Linux system.

1. Extract the files from the tar.gz file with the command:

```
tar -xvzf ucd-snmp-4.2.2.tar.gz
```

The file is extracted into a sub-directory called "ucd-snmp-4.2.2".

2. Configure and build the UC Davis SNMP Agent with the command:

```
cd ucd-snmp-4.2.2
./configure --with-mib-modules=smux;
make
```

3. Login as root and install the UC Davis SNMP Agent with the command:

```
unmask 022 // zero-two-two
make install
```

For more details about how to install the UCD SNMP Agent, see the README inside the UCD SNMP Agent package.

## A.6.2 Example of /etc/rc.d/init.d/snmpd File

The following is an example of the /etc/rc.d/init.d/snmpd file from Red Hat Linux which has been modified to use the above configuration:

```
#!/bin/bash

# ucd-snmp init file for snmpd
#
# chkconfig: - 50 50
# description: Simple Network Management Protocol (SNMP)
#              Daemon
#
# processname: /usr/sbin/snmpd
# config: /etc/snmp/snmpd.conf
# config: /usr/share/snmp/snmpd.conf
# pidfile: /var/run/snmpd

# source function library
#this is for the function of killproc etc.
. /etc/init.d/functions
#This library may fail to load on some of the Linux flavors.
#If the failure happens, comment the above line,
#and change the killproc lines in stop() to
# pids=`$PS | grep snmpd | grep -v grep | awk '{ print $1}'`
# [ "$pids" ] $$ kill $pids
# pids=`$PS | grep snmptrapd | grep -v grep | awk '{ print
$1}'`

OPTIONS="-s -l /dev/null -P /var/run/snmpd -a"
RETVAL=0
Prog="snmpd"

start() {
    echo -n "Starting $prog: "
    /usr/local/sbin/snmpd -c /usr/share/snmp/snmpd.conf -C
        $OPTIONS
    /usr/local/sbin/snmptrapd -o /var/log/snmptrapd.log
    RETVAL=$?
    ECHO
    touch /var/lock/subsys/snmpd
    return $RETVAL
}

stop() {
    echo -n "Shutting $prog: "
    killproc /usr/local/sbin/snmpd
    killproc /usr/local/sbin/snmptrapd
}
```

```

        RETVAL=$?
        echo
        rm -f /var/lock/subsys/snmp
        return $RETVAL
    }
    reload () {
        start
        stop
    }
    restart () {
        start
        stop
    }
    condrestart () {
        [ -e /var/lock/subsys/snmpd ] && restart
        return 0
    }
    case "$1" in
        start)
            start
            ;;
        stop)
            stop
            ;;
        restart)
            restart
            ;;
        reload)
            reload
            ;;
        condrestart)
            condrestart
            ;;
        status)
            status snmpd
            RETVAL=$?
            ;;
        *)
            echo $"Usage: $0
                {start|stop|status|restart|condrestart|reload}"
            RETVAL=1
    esac

    exit $RETVAL

```

Use the following commands to create some symbolic links:

```
ln -s /etc/rc.d/init.d/snmpd /etc/rc.d/rc3.d/S90snmpd
```

```
ln -s /etc/rc.d/init.d/snmpd /etc/rc.d/rc5.d/S90snmpd
```

S90snmpd must precede S99gamagent lexically in /etc/rc.d/rc3.d and /etc/rc.d/rc5.d so S90snmpd (UCD SNMP Agent) is run before S99gamagent (SNMP Subagent) at boot time.

Note: This install procedure may change due to installing GAM TT driver/server in the same rpm package

### A.6.3 Installing the SNMP Subagent Files

Before installing the SNMP Subagent (gamagent) files, install the GAM TT Server/Driver. GAMagent communicates with the GAM TT driver to retrieve information about MegaRAID or Mylex RAID products.

To install gamagent files, change to whatever directory (or media) contains gamagent.rpm and enter the command (verify the version number on the media before typing the command):

```
rpm -i gam-agent-5.15-07.i386.rpm
```

gamagent.rpm installs the following files:

- /usr/local/sbin/gamagent (SNMP subagent)
- /etc/rc.d/init.d/gamagent (system start/stop init file)
- /usr/share/snmp/gamagent.efs (definition file)
- /usr/share/snmp/snmpd.conf (snmpd configuration file)
- /usr/share/snmp/mlxraid.mib (MIB file)

gamagent.rpm creates the following symbolic links:

- /usr/local/share/snmp/mlxraid.mib ==> /usr/share/snmp/mlxraid.mib
- /usr/local/share/snmp/gamagent.efs ==> /usr/share/snmp/gamagent.efs
- /usr/local/share/snmpd.conf ==> /usr/share/snmp/snmpd.conf
- /etc/rc.d/rc2.d/S99gamagent ==> /etc/rc.d/init.d/gamagent
- /etc/rc.d/rc3.d/S99gamagent ==> /etc/rc.d/init.d/gamagent
- /etc/rc.d/rc4.d/S99gamagent ==> /etc/rc.d/init.d/gamagent
- /etc/rc.d/rc5.d/S99gamagent ==> /etc/rc.d/init.d/gamagent

The S99gamagent files ensure that gamagent runs after snmpd and that gamdrvd starts at boot.

The /usr/share/snmp/snmpd.conf configuration file *must* be edited for the local system environment.

The file contains SNMP security options (man snmpd.conf) which are set to 'public' but may be changed. Change the sysLocation and sysContact parameters. Change the trapsink, trap2sink, and informsink IP addresses to the IP address of where SNMP traps are to be sent. Do NOT change the smuxpeer line.

For further details on how to configure the snmpd.conf, type the command:

```
man snmpd.conf
```

The gamagent SNMP subagent calls the gamdrvd driver. The gam-server-5.00-15.i386.rpm *must* be installed before gamagent is run.

#### **A.6.4 Starting gamdrvd, snmpd, and gamagent**

To start gamdrvd, snmpd, and gamagent you may either reboot the system or execute:

```
#/etc/rc.d/init.d/gam start  
#/etc/rc.d/init.d/gamagent start
```

The trap client program (IP addresses in snmpd.conf) should be running on the client system before rebooting the snmpd system, as snmpd and gamagent send traps to the client after starting. To determine if gamdrvd, snmpd, and gamagent are running, enter the command

```
ps -e
```

and check for gamdrvd, snmpd, and two gamagents.

To start or stop gamagent, as root enter the command:

```
/etc/rc.d/init.d/gamagent start|stop|restart
```

#### **A.6.5 Uninstalling gamagent Files**

To remove the files installed from gamagent.rpm, do the following:

Enter the command

```
rpm -qa | grep gamagent
```

to list gamagent's full name for the next command.

Enter the command

```
rpm -e <package name of the SNMP subagent  
from above>
```

The main gamagent files are removed. If snmpd is still to be used, the /usr/share/snmp/snmpd.conf file must be recreated. The snmpd.conf is backed up in /usr/share/snmp before gamagent was removed for such an occasion. If it is necessary to modify snmpd.conf, see [Section A.6.3, "Installing the SNMP Subagent Files," page A-12.](#)

## A.6.6 Optional SNMP Parameters for Linux

After the installation of the SNMP subagent, you have the option to specify additional parameters, known as the GAM IPC Port and the Update Time Interval.

The default IPC port number for the GAM TT driver and the SNMP subagent port is 43162; however, this number may be modified. The update time interval specifies the interval in seconds for the SNMP subagent to update the controller status, e.g. inserted or removed, to provide timely information. This is useful on a hot-plug or hot-swap enabled system. If not specified, the default value of 60 seconds is used.

The IPC Port number for the GAM TT driver and the SNMP subagent port must match for proper communication. Therefore, if either the GAM TT Server driver port number or the SNMP subagent port number is changed, be sure to change the other port number to match.

You can specify this parameter through the command line of gamagent inside the script file /etc/rc.d/init.d/gamagent. The full command line format of gamagent is:

```
gamagent [-p <GAM IPC port>] [-t <update time  
interval>]
```

**Note:** If "GamIpcPort" is not specified, the default port number is used.



Note: The value of update time interval can affect the performance of the SNMP subagent.

If the time interval is too small, the subagent uses much of the system's resources by updating the status too frequently. If the time interval is too big, the subagent may not be able to report controller changes in time.

Therefore, be careful when changing this parameter.

---

## A.7 MIB Compilation and Definition File Creation

The next step in the installation involves the integration of the MIB into the management application's database of events and status indicator codes. This process is known as *compiling* the MIB into the application. This process is highly vendor-specific and should be well-covered in the User's Guide of your SNMP application. Ensure that the compilation process successfully integrates the contents of the `mlxraid.mib` file (known as the `mlxraid_mib` object when viewed from within the SNMP application) into the traps database.

---

## A.8 MYLEXRAIDMIB Object Definitions

### A.8.1 Traps

All traps are defined under this object according to [Table A.3](#):

**Table A.3 Traps and Trap Numbers**

Trap	Trap Number
<b>Traps 1-127 are physical device traps</b>	
physdevOnline	1
physdevHotspare	2
physdevHardError	3
physdevPfa	4
physdevAutoRebuildStart	5
physdevManualRebuildStarted	6
physdevRebuildDone	7
physdevRebuildCanceled	8
physdevRebuildError	9
physdevRebuildNewdevFailed	10
physdevRebuildSysdevFailed	11
physdevDead	12
physdevFound	13
physdevGone	14
physdevUnconfigured	15
physdevExpandcapacityStart	16
physdevExpandcapacityDone	17
physdevExpandcapacityError	18
(Sheet 1 of 12)	

**Table A.3     Traps and Trap Numbers (Cont.)**

Trap	Trap Number
physdevCommandTimeout	19
physdevCommandAbort	20
physdevCommandRetried	21
physdevParityError	22
physdevSoftError	23
physdevMiscError	24
physdevReset	25
physdevActivespare	26
physdevWarmspare	27
physdevReqsense	28
physdevInitStarted	29
physdevInitDone	30
physdevInitFailed	31
physdevInitCanceled	32
physdevWriterecDead	33
physdevResetDead	34
physdevDbfccDead	35
physdevRemovedDead	36
physdevGrosserrDead	37
physdevBadtagDead	38
physdevScsitmoDead	39
physdevSysresetDead	40
physdevBsyparDead	41
physdevBycmdDead	42
(Sheet 2 of 12)	

**Table A.3     Traps and Trap Numbers (Cont.)**

Trap	Trap Number
physdevSeltmoDead	43
physdevSeqerrDead	44
physdevUnknownstsDead	45
physdevNotrdyDead	46
physdevMissingDead	47
physdevCodwrfailDead	48
physdevBdtwrfailDead	49
physdevOffline	50
physdevStandby	51
physdevRebuild	52
physdevIdMismatch	53
physdevFailedStart	54
physdevOffsetSet	55
physdevSetBusWidth	56
physdevMissingOnstartup	57
physdevvRebuildStartFailed	58
physdevMovingToOtherChn	59
physdevOfflineDeviceMadeOnline	60
physdevStandbyRebuildStart	61
physdevHotSpareSmaller	62
ppiloLogiclaDiskOnline	63
ppilotLogiclaDiskOffline	64
ppilotLogicalDiskPathFailover	65
ppilotLogicalDiskPathFailback	66
(Sheet 3 of 12)	

**Table A.3     Traps and Trap Numbers (Cont.)**

Trap	Trap Number
physdevNonRedundantAccess	67
physdevTypeInvalid	68
physdevSoftId	69
physdevPortFailed	70
ctldevMirrorRaceEntryFailed	71
ctldevCtrlParamsChecksumFailed	72
firmwareUpgradeStarted	73
firmwareUpgradeComplete	74
firmwarUpgradeFailed	75
[RESERVED]	76-95
fibredevLoopidSoftaddrOccurred	96
[RESERVED]	97-127
<b>Traps 128-255 are logical drive (system device) traps</b>	
sysdevCheckStart	128
sysdevCheckDone	129
sysdevCheckCanceled	130
sysdevCheckError	131
sysdevCheckSysdevFailed	132
sysdevCheckPhysdevFailed	133
sysdevOffline	134
sysdevCritical	135
sysdevOnline	136
sysdevAutoRebuildStart	137
sysdevManualRebuildStart	138
(Sheet 4 of 12)	

**Table A.3     Traps and Trap Numbers (Cont.)**

Trap	Trap Number
sysdevRebuildDone	139
sysdevRebuildCanceled	140
sysdevRebuildError	141
sysdevRebuildNewdevFailed	142
sysdevRebuildSysdevFailed	143
sysdevInitStarted	144
sysdevInitDone	145
sysdevInitCanceled	146
sysdevInitFailed	147
sysdevFound	148
sysdevGone	149
sysdevExpandcapacityStart	150
sysdevExpandcapacityDone	151
sysdevExpandcapacityError	152
sysdevBadblock	153
sysdevSizechanged	154
sysdevTypechanged	155
sysdevBaddatablock	156
sysdevWrLunMap	157
sysdevDatareadfromBlockinBdt	158
sysdevDataForBlockLost	159
sysdevOfflineDeviceMadeAvailableWithDataLoss	160
sysdevOfflineDeviceMadeAvailable	161
sysdevStandbyRebuildStart	162
(Sheet 5 of 12)	

**Table A.3     Traps and Trap Numbers (Cont.)**

Trap	Trap Number
[RESERVED]	163-175
skysdevBgInitStarted	176
sysdevBgInitStopped	177
sysdevBgInitPaused	178
sysdevBgInitRestarted	179
sysdevBgInitFailed	180
sysdevBgInitCompleted	181
sysdevDataLossLowBbuCharge	182
[RESERVED]	183-255
<b>Traps 256-271 are FMT fan traps</b>	
fmtFanFailed	256
fmtfanOk	257
aemiFanFailed	258
fmtFanNotPresent	259
[RESERVED]	260-271
<b>Traps 272-287 are FMT power traps</b>	
fmtpowerFailed	272
fmtpowerOK	273
aemiPwrSupplyFailed	274
fmtpowerNotpresent	275
[RESERVED]	276-287
<b>Traps 288-303 are FMT temperature traps</b>	
fmtheatBad	288
fmtheatCritical	289
(Sheet 6 of 12)	

**Table A.3     Traps and Trap Numbers (Cont.)**

Trap	Trap Number
fmtheatOK	290
aemiOverTemperature	291
fmtheatNotPresent	292
[RESERVED]	293-303
<b>Traps 304-306 are StorageWorks traps</b>	
fmtstwkFailed	304
fmtstwkCritical	305
fmtstwkOK	306
<b>Traps 307-383 are FMT enclosure traps</b>	
fmtUpsDisabled	307
fmtUpsAcFail	308
fmtUpsBatLow	309
fmtUpsFailed	310
fmtUpsOk	311
[RESERVED]	312-319
enclfanFailed	320
enclfanOK	321
enclfanNotpresent	322
enclpowerFailed	323
enclpowerOK	324
enclpowerNotPresent	325
enclheapBad	326
enclheatCritical	327
enclheatOk	328
(Sheet 7 of 12)	



**Table A.3     Traps and Trap Numbers (Cont.)**

Trap	Trap Number
enclheatNotpresent	329
enclaccessCritical	330
enclaccessOK	331
enclaccessOffline	332
enclsesSoftaddrOccurred	333
enclaccessReady	333
enclheatUnknown	335
enlcpowerUnknown	336
enclfanUnknown	337
enclosureShutdown	338
enclcoldWarn	339
enclcoldFail	340
[RESERVED]	341-383
<b>Traps 384-511 are miscellaneous traps</b>	
systemStarted	384
ctldevWritebackError	385
ctldevStateTableFull	386
[NOT USED]	387
ctldevDead	388
ctldevReset	389
ctldevFound	390
ctldevGone	391
ctldevBbuFound	392
ctldevBbuPowerLow	393
(Sheet 8 of 12)	

**Table A.3     Traps and Trap Numbers (Cont.)**

Trap	Trap Number
ctldevBbuPowerOK	394
ctldevPowerOff	395
ctldevPowerOn	396
ctldevOnline	397
ctldevOffline	398
ctldevCritical	399
ctldevBbuRecondStart	400
ctldevBbuRecondDone	401
ctldevBbuRecondAbort	402
ctldevInstallationAborted	403
ctldevFirmwareMismatch	404
ctldevBbuNoresponse	405
ctldevWarmBootError	406
ctldevBbuCalibrateStart	407
ctldevBbuCalibrateSone	408
ctldevBbuCalibrateAbort	409
ctldevBbuNoBattery	410
ctldevConserveCacheMode	411
ctldevNormalCachMode	412
ctldevDevstartCmp	413
ctldevSoftEccCorrected	414
ctldevHardEccCorrected	415
ctldevBbuRecondNeeded]	416
ctldevRemovedPtrnr	417
(Sheet 9 of 12)	

**Table A.3     Traps and Trap Numbers (Cont.)**

Trap	Trap Number
ctldevBbuOutOfService	418
ctldevUpdatePtnrStatus	419
ctldevRelinquishPtnr	420
ctldevInsertedPtnr	421
ctldevDualEnabled	422
ctldevKillPtnr	423
ctldevNexus	424
ctldevBadBootromImage	425
ctldevBadMacAddress	426
ctldevMirrorRaceRecovery	427
ctldevMirrorCriticalDrive	428
ctldevInCluster	429
ctldevNotInCluster	430
ctldevDataLossImproperShutdown	431
ctldevAutomaticFlashStarted	432
ctldevNegotiationFailedJumpers	433
ctldevNegotiationSameId	434
ctldevNegotiationBoardType	435
ctldevNegotiationDiskChannels	436
ctldevNegotiationHostChannels	437
ctldevNegotiationMemorySize	438
ctldevNegotiationCacheSize	439
ctldevMirrorRaceTableError	440
ctldevStopRejected	441
(Sheet 10 of 12)	

**Table A.3     Traps and Trap Numbers (Cont.)**

Trap	Trap Number
[RESERVED]	442-511
<b>Traps 512-640 are system traps</b>	
systemStartedNew	512
systemSizeTableFull	513
systemUserLoggedIn	514
systemUserLoggedOut	515
systemAlive	516
systemDead	517
autobootChanged	518
ctldevBbuBattTestStart	519
ctldevBbuBattTestComplete	520
ctldevBbuBattTestCaceled	521
ctldevBbuBatttestFailed	522
[RESERVED]	523-639
<b>Traps 640-944 are miscellaneous traps</b>	
channelFailed	640
channelOk	641
channelScsiBusDead	642
channelScsiBusAlive	643
channelFiberDead	644
channelFiberAlive	645
[RESERVED]	646-699
logEmpty	700
logOutSync	702
(Sheet 11 of 12)	

**Table A.3     Traps and Trap Numbers (Cont.)**

Trap	Trap Number
logrequestSense	703
[RESERVED]	
cfgNew	800
cfgClear	801
cfgInvalid	802
cfgCodAccessError	803
cfgCodConverted	804
cfgCodImportFailed	805
debugDumpGenerated	806
[RESERVED]	807-808
debugDumpGeneratedPartner	809
[RESERVED]	810-895
fatalHang	896
fatalBrkp	897
[RESERVED]	898-911
i960HwErr	912
[RESERVED]	913-927
sarmHwErr	928
[RESERVED]	929-943
scsiHwErr	944
Reserved Traps	945-(16 <sup>7</sup> )
(Sheet 12 of 12)	

## A.8.2 Controller Information Group

This object is used to find information about any or all of the controllers present in the system.

**Table A.4 Controller Information Group**

Table Object	Data Type	Description	
a2ControllerNumber 1.3.6.1.4.1.1608.1.1.1.2.1.1	Integer	References a particular controller by its controller number	
a2OperationalState 1.3.6.1.4.1.1608.1.1.1.2.1.2	Integer	Operational state of the controller:	
		Value	Meaning
		1	Functional
		2	Non-Functional
		128	Not Present
a2FirmwareRevision 1.3.6.1.4.1.1608.1.1.1.2.1.3	Display String	A displayable ASCII string containing the firmware version of the controller	
a2ConfiguredChannels 1.3.6.1.4.1.1608.1.1.1.2.1.4	Integer	The maximum number of SCSI channels that can be configured on the controller	
a2ActualChannels 1.3.6.1.4.1.1608.1.1.1.2.1.5	Integer	Actual number of SCSI channels present	
a2MaximumLogicalDrives 1.3.6.1.4.1.1608.1.1.1.2.1.6	Integer	Maximum number of logical drives supported by the controller	
a2MaximumTargetsPerChannel 1.3.6.1.4.1.1608.1.1.1.2.1.7	Integer	The maximum number of targets (SCSI IDs) supported per channel	
a2MaximumTaggedRequests 1.3.6.1.4.1.1608.1.1.1.2.1.8	Integer	The maximum number of tagged requests per target	
a2MaximumDataTransferSizePerIoRequestInK 1.3.6.1.4.1.1608.1.1.1.2.1.9	Integer	The maximum data transfer size supported (in Kbytes)	
a2MaximumConcurrentCommands 1.3.6.1.4.1.1608.1.1.1.2.1.10	Integer	The maximum number of concurrent commands that are supported	
a2RebuildRate 1.3.6.1.4.1.1608.1.1.1.2.1.11	Integer	The priority of rebuild versus system I/Os; Value is 0 to 50; 0 = lowest rebuild priority, 50 = highest rebuild priority	
(Sheet 1 of 8)			

**Table A.4     Controller Information Group (Cont.)**

Table Object	Data Type	Description	
a2LogicalSectorSizeInBytes 1.3.6.1.4.1.1608.1.1.1.2.1.12	Integer	The logical sector (block) size in bytes (Default: 512 bytes) (obsolete)	
a2PhysicalSectorSizeInBytes 1.3.6.1.4.1.1608.1.1.1.2.1.13	Integer	The physical sector (block) size in bytes (Default: 512 bytes) (obsolete)	
a2CacheLineSizeInBytes 1.3.6.1.4.1.1608.1.1.1.2.1.14	Integer	The cache line size in bytes	
a2CacheSizeInMb 1.3.6.1.4.1.1608.1.1.1.2.1.15	Integer	The memory size of the controller cache in Mbytes	
a2CacheMemoryType 1.3.6.1.4.1.1608.1.1.1.2.1.16	Integer	Numerical identification of the controller cache memory type:	
		Value	Meaning
		1	DRAM
		2	EDRAM
		3	EDO
		4	SDRAM
		65	DRAM with parity protection
		66	EDRAM with parity protection
		67	EDO with parity protection
		68	SDRAM with parity protection
		129	DRAM with ECC protection
		130	EDRAM with ECC protection
		131	EDO with ECC protection
		132	SDRAM with ECC protection
255	Unknown		
a2EpromSizeInKb 1.3.6.1.4.1.1608.1.1.1.2.1.17	Integer	The flash EPROM size in Kbytes	
(Sheet 2 of 8)			

**Table A.4     Controller Information Group (Cont.)**

Table Object	Data Type	Description	
a2BusType 1.3.6.1.4.1.1608.1.1.1.2.1.18	Integer	Numerical identification of controller's bus type:	
		Value	Meaning
		1	EISA
		2	MCA
		3	PCI
		4	VESA
		5	ISA
		255	Unknown
a2ControllerClass 1.3.6.1.4.1.1608.1.1.1.2.1.19	Integer	The class of the controller:	
		Value	Meaning
		1	RAID controller
		96	SCSI-SCSI
		128	HBA controller
		255	Unknown
a2ControllerModel 1.3.6.1.4.1.1608.1.1.1.2.1.20	Integer	Numerical identification of controller model:	
		Value	Meaning
		1	DAC960E
		8	DAC960M
		16	DAC960PD
		17	DAC960PL
		18	DAC960PDU
		19	DAC960PE
		20	DAC960PG
		21	DAC960PJ
		22	DAC960PTL0
		23	DAC960PR
		24	DAC960PRL

(Sheet 3 of 8)



**Table A.4     Controller Information Group (Cont.)**

Table Object	Data Type	Description	
(a2ControllerModel)	(Integer)	25	DAC960PT
		26	DAC1164P
		27	DAC960PTL1
		28	EXR2000P
		29	EXR3000P
		30	AR352
		31	AR170
		32	AR160
		33	EXR2000EB
		34	EXR3000EB
		35	EXR4000
		36	EXR5000
		37	AR400
		38	AR500
		39	AR600
		40	SR100
		41	SR500
		42	SB500
		96	DAC960S
		97	DAC960SU
		98	DAC960SX
		99	DAC960SF
		100	DAC960SS
		101	DAC960FL
		102	DAC960LL
		103	DAC960FF
		104	FC ARRAY
(Sheet 4 of 8)			

**Table A.4     Controller Information Group (Cont.)**

Table Object	Data Type	Description	
(a2ControllerModel)	(Integer)	105	DAC960MFL
		106	DAC960MFF
		107	DAC960FFX
		108	DAC960FFX2
		109	DACFFX2
		255	Unknown
a2SystemBusNumber 1.3.6.1.4.1.1608.1.1.1.2.1.21	Integer	The system bus number for the controller. This value is supplied by the Operating System and may not be defined for all operating systems.	
a2SlotNumber 1.3.6.1.4.1.1608.1.1.1.2.1.22	Integer	The slot number where the controller resides, defined for EISA and MCA controller only	
a2InterruptVectorNumber 1.3.6.1.4.1.1608.1.1.1.2.1.23	Integer	The interrupt vector number being used by the controller. This value is a mapped IRQ supplied by the Operating System and may not be same as the actual Interrupt Vector	
a2InterruptMode 1.3.6.1.4.1.1608.1.1.1.2.1.24	Integer	Numerical identification of the interrupt mode (edge/level):	
		Value	Meaning
		0	EDGE
		1	LEVEL
		255	Unknown
a2NumberOfPhysicalDevices 1.3.6.1.4.1.1608.1.1.1.2.1.25	Integer	The number of SCSI devices detected	
a2NumberOfPhysicalDevicesOffline 1.3.6.1.4.1.1608.1.1.1.2.1.26	Integer	The number of SCSI devices with an operational state of DEAD	
a2NumberOfLogicalDevices 1.3.6.1.4.1.1608.1.1.1.2.1.27	Integer	The number of logical devices currently configured	
a2NumberOfLogicalDevicesCritical 1.3.6.1.4.1.1608.1.1.1.2.1.28	Integer	The number of logical devices in a “critical” state	
a2NumberOfLogicalDevicesOffline 1.3.6.1.4.1.1608.1.1.1.2.1.29	Integer	The number of OFFLINE logical devices	
(Sheet 5 of 8)			

**Table A.4     Controller Information Group (Cont.)**

Table Object	Data Type	Description	
a2FaultManagementType 1.3.6.1.4.1.1608.1.1.1.2.1.30	Integer	The controller's fault management type:	
		Value	Meaning
		1	AEMI
		2	OEM1
		4	OEM2
		8	OEM3
		16	CONNER
		32	SAFTE
		64	SES
0	Not Present		
a2ArrayInformation 1.3.6.1.4.1.1608.1.1.1.2.1.31	Display String	A displayable ASCII string containing the array information. The information is of the form: A(ch-targ ch-targ) B(ch-targ), where A,B = Array List, ch = channel number, targ = SCSI target number.	
a2LogicalDriveReadRequests 1.3.6.1.4.1.1608.1.1.1.2.1.32	Integer	The total number of read requests to all logical drives	
a2DataReadFromLogicalDrivesInMb 1.3.6.1.4.1.1608.1.1.1.2.1.33	Integer	The amount of data that was read from all logical drives in Mbytes	
a2LogicalDriveWriteRequests 1.3.6.1.4.1.1608.1.1.1.2.1.34	Integer	The total number of write requests to all logical drives	
a2DataWrittenToLogicalDrivesInMb 1.3.6.1.4.1.1608.1.1.1.2.1.35	Integer	The amount of data that was written to all logical drives in Mbytes	
a2LogicalDrivesReadCacheHit Percentage 1.3.6.1.4.1.1608.1.1.1.2.1.36	Integer	The percentage rate of read cache hits for all logical drives	
a2PhysicalDriveReadRequests 1.3.6.1.4.1.1608.1.1.1.2.1.37	Integer	The total number of read requests to all physical drives	
a2DataReadFromPhysicalDrivesInMb 1.3.6.1.4.1.1608.1.1.1.2.1.38	Integer	The amount of data that was read from all physical drives in Mbytes	
a2PhysicalDriveWriteRequests 1.3.6.1.4.1.1608.1.1.1.2.1.39	Integer	The total number of write requests to all physical drives	
(Sheet 6 of 8)			

**Table A.4     Controller Information Group (Cont.)**

Table Object	Data Type	Description	
a2DataWrittenToPhysicalDrivesInMb 1.3.6.1.4.1.1608.1.1.1.2.1.40	Integer	The amount of data that was written to all physical drives in Mbytes	
a2StorageWorksCabinetStatusOnChannel0 1.3.6.1.4.1.1608.1.1.1.2.1.41	Integer	StorageWorks cabinet status on channel 0 (obsolete)	
		Value	Meaning
		1	Ok
		2	Not Ok
		3	Not Present
a2StorageWorksCabinetStatusOnChannel1 1.3.6.1.4.1.1608.1.1.1.2.1.42	Integer	StorageWorks cabinet status on channel 1 (obsolete)	
		Value	Meaning
		1	Ok
		2	Not Ok
		3	Not Present
a2StorageWorksCabinetStatusOnChannel2 1.3.6.1.4.1.1608.1.1.1.2.1.43	Integer	StorageWorks cabinet status on channel 2 (obsolete)	
		Value	Meaning
		1	Ok
		2	Not Ok
		3	Not Present
a2BatteryBackupUnitStatus 1.3.6.1.4.1.1608.1.1.1.2.1.44	Integer	BBU status	
		Value	Meaning
		0	Not Present
		1	Present
a2PartnerControllerNumber 1.3.6.1.4.1.1608.1.1.1.2.1.45	Integer	Dual Active Partner Controller Number	
a2WwName 1.3.6.1.4.1.1608.1.1.1.2.1.46	Display String	Controller World-Wide Name	
a2HostControllerNumber 1.3.6.1.4.1.1608.1.1.1.2.1.47	Integer	Host Controller Number	
(Sheet 7 of 8)			

**Table A.4     Controller Information Group (Cont.)**

Table Object	Data Type	Description
a2HostChannelNumber 1.3.6.1.4.1.1608.1.1.1.2.1.48	Integer	Host Channel Number
a2HostTargetId 1.3.6.1.4.1.1608.1.1.1.2.1.49	Integer	Host Target ID
(Sheet 8 of 8)		

**Notes:**

- `a2ControllerNumber` is the index for any search operations against this object.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object whose MIB ID is in the query.
- A GETNEXT operation returns the object's information which is next to the MIB ID given in the query.
- Controller numbers start at 0.

## A.8.3 Logical Drive Information Group

This object is used to determine information about any or all the logical drives present in the system.

**Table A.5 Logical Drive Information Group**

Table Object	Data Type	Description	
a3ControllerNumber 1.3.6.1.4.1.1608.1.1.1.3.1.1	Integer	References a particular controller by its controller number	
a3LogicalDriveNumber 1.3.6.1.4.1.1608.1.1.1.3.1.2	Integer	The logical drive number	
a3OperationalState 1.3.6.1.4.1.1608.1.1.1.3.1.3	Integer	Numerical identification of the logical drive state:	
		Value	Meaning
		3	ONLINE
		4	CRITICAL
		255	OFFLINE
		128	Not Present
a3RaidLevel 1.3.6.1.4.1.1608.1.1.1.3.1.4	Integer	RAID level selected for the logical drive	
		Value	Meaning
		0	RAID0
		1	RAID1
		3	RAID3
		5	RAID5
		6	RAID0+1
		7	JBOD
a3WritePolicy 1.3.6.1.4.1.1608.1.1.1.3.1.5	Integer	Numerical identification of the write policy setting for the logical drive:	
		Value	Meaning
		0	WRITE THRU
		128	WRITE BACK

**Table A.5 Logical Drive Information Group (Cont.)**

Table Object	Data Type	Description
a3SizeInMb 1.3.6.1.4.1.1608.1.1.1.3.1.6	Integer	The logical drive capacity in Mbytes
a3PhysicalSizeInMb 1.3.6.1.4.1.1608.1.1.1.3.1.7	Integer	The total physical capacity used by this logical drive in Mbytes
a3StripeSizeInBytes 1.3.6.1.4.1.1608.1.1.1.3.1.8	Integer	The value of the stripe size in bytes, valid only for RAID levels 0, 5, and 6
a3PhysicalDriveMap 1.3.6.1.4.1.1608.1.1.1.3.1.9	Display String	A displayable ASCII string containing the list of all physical drives that make up the logical drive. This information is provided in Channel Target combination form. For example, (0-1, 0-2, 1-3, 1-11).
a3ArrayList 1.3.6.1.4.1.1608.1.1.1.3.1.10	Display String	The list of arrays across which this logical drive spans. For example, A, B, etc.
a3RaidLevelString 1.3.6.1.4.1.1608.1.1.1.3.1.11	Display String	RAID Level associated with Logical Drive

**Notes:**

- a3ControllerNumber and a3LogicalDriveNumber compose the Index for a search operation.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object at the address (a3ControllerNumber/a3LogicalDriveNumber) specified in the argument.
- A GETNEXT operation returns information about the next object at the smallest address greater than the address specified in the argument.
- The lowest address of a drive (a3ControllerNumber/a3LogicalDriveNumber) is defined as 0/0, followed by 0/1... 1/0, 1/1, and so on.
- Controller numbers start at 0. Logical drive numbers start at 0.

## A.8.4 Physical Device Information Group

This object is used to find information about any or all of the physical devices present in the system.

**Table A.6 Physical Device Information Group**

Table Object	Data Type	Description	
a4ControllerNumber 1.3.6.1.4.1.1608.1.1.1.4.1.1	Integer	References a particular controller by its controller number	
a4ChannelNumber 1.3.6.1.4.1.1608.1.1.1.4.1.2	Integer	SCSI channel number	
a4TargetId 1.3.6.1.4.1.1608.1.1.1.4.1.3	Integer	SCSI target number	
a4Lun 1.3.6.1.4.1.1608.1.1.1.4.1.4	Integer	SCSI logical unit number (LUN) of the SCSI device	
a4OperationalState 1.3.6.1.4.1.1608.1.1.1.4.1.5	Integer	Numerical identification of the physical device state:	
		Value	Meaning
		0	DEAD
		2	REBUILDING
		3	ONLINE
		4	INSTALLATION ABORT
		5	PRESENT
		6	NOT PRESENT
		16	HOT SPARE
		24	KILLED or REBUILD CANCELLED
		97	DEDICATED HOT SPARE
130	REBUILD CANCELLED		
a4VendorId 1.3.6.1.4.1.1608.1.1.1.4.1.6	Display String	The SCSI device vendor ID. This is the vendor ID from the SCSI INQUIRY data.	
(Sheet 1 of 3)			



**Table A.6 Physical Device Information Group (Cont.)**

Table Object	Data Type	Description	
a4ProductId 1.3.6.1.4.1.1608.1.1.1.4.1.7	Display String	The SCSI device product ID. This is the product ID from the SCSI INQUIRY data.	
a4ProductRevisionLevel 1.3.6.1.4.1.1608.1.1.1.4.1.8	Display String	The SCSI device product revision level. This is the revision level from the SCSI INQUIRY data.	
a4SizeInMb 1.3.6.1.4.1.1608.1.1.1.4.1.9	Integer	The physical device capacity in Mbytes	
a4DeviceType 1.3.6.1.4.1.1608.1.1.1.4.1.10	Integer	Numerical identification of the SCSI device type. The value matches the device type value of the SCSI INQUIRY data:	
		Value	Meaning
		0	FIXED DISK
		1	TAPE
		2	PRINTER
		3	PROCESSOR
		4	WORM
		5	CDROM
		6	SCANNER
		7	MO
		8	CHANGER
		9	COMMUNICATION DEVICE
		10	GRAPHICS-0
		11	GRAPHICS-1
		12-30	Reserved
		31	Unknown
199	SCSI HOST		
204	Ctrl Channel		
a4SoftErrors 1.3.6.1.4.1.1608.1.1.1.4.1.11	Integer	The number of soft errors that occurred	
a4HardErrors 1.3.6.1.4.1.1608.1.1.1.4.1.12	Integer	The number of hard errors that occurred	
(Sheet 2 of 3)			

**Table A.6 Physical Device Information Group (Cont.)**

Table Object	Data Type	Description
a4ParityErrors 1.3.6.1.4.1.1608.1.1.1.4.1.13	Integer	The number of parity errors that occurred
a4MiscErrors 1.3.6.1.4.1.1608.1.1.1.4.1.14	Integer	The number of miscellaneous errors that occurred
a4ArrayList 1.3.6.1.4.1.1608.1.1.1.4.1.15	Display String	The list of arrays to which this physical drive belongs. For example, A, B, etc.
a4LogicalDriveList 1.3.6.1.4.1.1608.1.1.1.4.1.16	Integer	The list of logical drives that depend on this physical drive. For example, 0, 1, etc.
a4BusSpeed 1.3.6.1.4.1.1608.1.1.1.4.1.17	Display String	Bus transfer speed
a4BusWidth 1.3.6.1.4.1.1608.1.1.1.4.1.18	Display String	Bus width
a4CommandQueuing 1.3.6.1.4.1.1608.1.1.1.4.1.19	Integer	Command tag queuing enabled
a4PfaErrors 1.3.6.1.4.1.1608.1.1.1.4.1.20	Integer	Smart PFA error count, valid for physical drive only
(Sheet 3 of 3)		

**Notes:**

- *a4ControllerNumber*, *a4ChannelNumber*, *a4TargetId* and *a4Lun* comprise the Index for the search operation.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object at the address (*a4ControllerNumber/a4ScsiBusId/a4ScsiTargetId*) specified in the argument.
- A GETNEXT operation returns information about the next object at the smallest address greater than the address specified in the argument.
- The lowest address of a device (*a4ControllerNumber/a4ScsiBusId/a4ScsiTargetId*) is defined as 0/0/0/0, followed by 0/0/0/1... 0/0/1/0, 0/0/1/1... 1/0/0/0, 1/0/0/1, and so on.
- Controller numbers start at 0. Channel numbers start at 0. Target IDs start at 0.

## A.8.5 RAID Management Software Group

This object contains the build date and version number for the Global Array Manager driver, Disk Array Controller device driver, and SNMP agent.

**Table A.7 RAID Management Software Group**

Table Object	Data Type	Description
a5ManagementSoftwareRevision 1.3.6.1.4.1.1608.1.1.1.5.1.1	Display String	A displayable string that shows the revision level of the SNMP agent
a5ManagementSoftwareBuildDate 1.3.6.1.4.1.1608.1.1.1.5.1.2	Display String	A displayable string that shows the build date for the SNMP agent
a5MylexDacDeviceDriverRevision 1.3.6.1.4.1.1608.1.1.1.5.1.3	Display String	A displayable string that shows the revision level of the controller device driver
a5MylexDacDeviceDriverBuildDate 1.3.6.1.4.1.1608.1.1.1.5.1.4	Display String	A displayable string that shows the build date for the controller device driver
a5GamDriverRevision 1.3.6.1.4.1.1608.1.1.1.5.1.5	Display String	A displayable string that shows the revision level of the Global Array Manager (GAM TT) driver
a5GamDriverBuildDate 1.3.6.1.4.1.1608.1.1.1.5.1.6	Display String	A displayable string that shows the build date for the Global Array Manager (GAM TT) driver

### Notes:

- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object at the address specified in the argument.
- A GETNEXT operation returns information about the next object at the smallest address greater than the address specified in the argument.

## A.8.6 Logical Drive Statistics Group

This object is used to determine statistics about all logical drives configured on a controller.

**Table A.8 Logical Drive Statistics Group**

Table Object	Data Type	Description
a6ControllerNumber 1.3.6.1.4.1.1608.1.1.1.6.1.1	Integer	References a particular controller by its controller number
a6LogicalDriveNumber 1.3.6.1.4.1.1608.1.1.1.6.1.2	Integer	The logical drive number
a6ReadRequests 1.3.6.1.4.1.1608.1.1.1.6.1.3	Integer	The total number of read requests
a6DataReadInMb 1.3.6.1.4.1.1608.1.1.1.6.1.4	Integer	The total amount of data that was read in Mbytes
a6WriteRequests 1.3.6.1.4.1.1608.1.1.1.6.1.5	Integer	The total number of write requests
a6DataWrittenInMb 1.3.6.1.4.1.1608.1.1.1.6.1.6	Integer	The total amount of data that was written in Mbytes
a6ReadCacheHitPercentage 1.3.6.1.4.1.1608.1.1.1.6.1.7	Integer	The percentage rate of read cache hits

### Notes:

- *a6ControllerNumber* and *a6LogicalDriveNumber* compose the Index for a search operation.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object at the address (a6ControllerNumber/a6LogicalDriveNumber) specified in the argument.
- A GETNEXT operation returns information about the next object at the smallest address greater than the address specified in the argument.
- The lowest address of a drive (a6ControllerNumber/a6LogicalDriveNumber) is defined as 0/0, followed by 0/1... 1/0, 1/1, and so on.
- Controller numbers start at 0. Logical drive numbers start at 0.

## A.8.7 Physical Drive Statistics Group

This object is used to determine statistics about all physical drives configured on a controller.

**Table A.9 Physical Drive Statistics Group**

Table Object	Data Type	Description
a7ControllerNumber 1.3.6.1.4.1.1608.1.1.1.7.1.1	Integer	References a particular controller by its controller number
a7ChannelNumber 1.3.6.1.4.1.1608.1.1.1.7.1.2	Integer	SCSI channel number
a7TargetId 1.3.6.1.4.1.1608.1.1.1.7.1.3	Integer	SCSI target number
a7Lun 1.3.6.1.4.1.1608.1.1.1.7.1.4	Integer	SCSI logical unit number (LUN) of the SCSI device
a7ReadRequests 1.3.6.1.4.1.1608.1.1.1.7.1.5	Integer	The total number of read requests
a7DataReadInMb 1.3.6.1.4.1.1608.1.1.1.7.1.6	Integer	The total amount of data that was read in Mbytes
a7WriteRequestst 1.3.6.1.4.1.1608.1.1.1.7.1.7	Integer	The total number of write requests
a7DataWrittenInMb 1.3.6.1.4.1.1608.1.1.1.7.1.8	Integer	The total amount of data that was written in Mbytes

### Notes:

- *a7ControllerNumber*, *a7ChannelNumber*, *a7TargetId*, and *a7Lun* comprise the Index for the search operation.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object at the address (*a7ControllerNumber/a7ScsiBusId/a7ScsiTargetId*) specified in the argument.
- A GETNEXT operation returns information about the next object at the smallest address greater than the address specified in the argument.

- The lowest address of a device (a7ControllerNumber/a7ScsiBusId/a7ScsiTargetId) is defined as 0/0/0/0, followed by 0/0/0/1... 0/0/1/0, 0/0/1/1... 1/0/0/0, 1/0/0/1, and so on.
- Controller numbers start at 0. Channel numbers start at 0. Target IDs start at 0.

## A.8.8 Fault Management Cabinet Information Group

This object is used to obtain information about the fault management cabinet that is in use.

**Table A.10 Fault Management Cabinet Information Group**

Table Object	Data Type	Description
a8ControllerNumber 1.3.6.1.4.1.1608.1.1.1.8.1.1	Integer	References a particular controller by its controller number
a8ChannelNumber 1.3.6.1.4.1.1608.1.1.1.8.1.2	Integer	SCSI channel number
a8CabinetNumber 1.3.6.1.4.1.1608.1.1.1.8.1.3	Integer	Cabinet number
a8TargetId 1.3.6.1.4.1.1608.1.1.1.8.1.4	Integer	SCSI target number
a8Lun 1.3.6.1.4.1.1608.1.1.1.8.1.5	Integer	SCSI logical unit number (LUN) of the SCSI device
a8CabinetType 1.3.6.1.4.1.1608.1.1.1.8.1.6	Integer	Fault management cabinet type:
		<b>Value</b> <b>Meaning</b>
		1      CONNER CR6
		2      CONNER Smart Cabinet
		3      SAFTE
		32      SAFTE
		64      SES
		255      Unknown
a8NumberOfFans 1.3.6.1.4.1.1608.1.1.1.8.1.7	Integer	The number of fans housed in the cabinet
a8NumberOfPowerSupplyUnits 1.3.6.1.4.1.1608.1.1.1.8.1.8	Integer	Number of power supply units installed

**Table A.10 Fault Management Cabinet Information Group (Cont.)**

Table Object	Data Type	Description
a8NumberOfHeatSensors 1.3.6.1.4.1.1608.1.1.1.8.1.9	Integer	Number of heat sensors
a8NumberOfDriveSlots 1.3.6.1.4.1.1608.1.1.1.8.1.10	Integer	Number of drive slots
a8NumberOfDoorLocks 1.3.6.1.4.1.1608.1.1.1.8.1.11	Integer	Number of door locks
a8NumberOfSpeakers 1.3.6.1.4.1.1608.1.1.1.8.1.12	Integer	Number of speakers
a8NumberOfFansCritical 1.3.6.1.4.1.1608.1.1.1.8.1.13	Integer	Number of fans in a “critical” state
a8NumberOfPowerSupplyUnitsCritical 1.3.6.1.4.1.1608.1.1.1.8.1.14	Integer	Number of power supply units in a “critical” state
a8NumberOfHeatSensorsCritical 1.3.6.1.4.1.1608.1.1.1.8.1.15	Integer	Number of heat sensors in a “critical” state
a8NumberOfFansFailed 1.3.6.1.4.1.1608.1.1.1.8.1.16	Integer	Number of fans in the “failed” state
a8NumberOfPowerSupplyUnitsFailed 1.3.6.1.4.1.1608.1.1.1.8.1.17	Integer	Number of power supply units in the “failed” state
a8NumberOfHeatSensorsFailed 1.3.6.1.4.1.1608.1.1.1.8.1.18	Integer	Number of heat sensors in the “failed” state

**Notes:**

- *a8ControllerNumber*, *a8ScsiBusId*, and *a8CabinetNumber* comprise the Index for the search operation.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object at the address (*a8ControllerNumber/a8ScsiBusId/a8ScsiTargetId*) specified in the argument.
- A GETNEXT operation returns information about the next object at the smallest address greater than the address specified in the argument.
- The lowest address of a device (*a8ControllerNumber/a8ScsiBusId/a8CabinetNumber*) is defined as 0/0/0, followed by 0/0/1... 0/1/0, 0/1/1... 1/0/0, 1/0/1, and so on.

- Controller numbers start at 0. Channel numbers start at 0. Target IDs start at 0.

## A.8.9 RAID Event Information Group

This object is used to obtain information on events that occur for any or all of the controllers. This group's information is used to send SNMP traps to the SNMP Manager workstation.

**Table A.11 RAID Event Information Group**

Table Object	Data Type	Description
a9EventTableIndex 1.3.6.1.4.1.1608.1.1.1.9.1.1	Integer	The index to the Event Table
a9EventCode 1.3.6.1.4.1.1608.1.1.1.9.1.2	Integer	Numerical identification of the event codes for events. (For event codes, see "Traps" beginning on page A-6.)
a9EventTimeStamp 1.3.6.1.4.1.1608.1.1.1.9.1.3	Integer	The time associated with the event. This is provided as the number of seconds since midnight, January 1, 1970.
a9ControllerNumber 1.3.6.1.4.1.1608.1.1.1.9.1.4	Integer	References a particular controller by its controller number
a9ChannelNumber 1.3.6.1.4.1.1608.1.1.1.9.1.5	Integer	SCSI channel number; valid for physical drive events and fault management events
a9TargetId 1.3.6.1.4.1.1608.1.1.1.9.1.6	Integer	SCSI target ID; valid for physical drive events
a9Lun 1.3.6.1.4.1.1608.1.1.1.9.1.7	Integer	SCSI logical unit number (LUN) of the physical device; valid for physical drive events
a9LogicalDriveNumber 1.3.6.1.4.1.1608.1.1.1.9.1.8	Integer	The logical drive number; valid for logical drive events
a9FmtCabinetNumber 1.3.6.1.4.1.1608.1.1.1.9.1.9	Integer	The fault management cabinet number; valid for fault management events
a9FanUnitNumber 1.3.6.1.4.1.1608.1.1.1.9.1.10	Integer	The fan unit number in the fault management cabinet; valid for fault management events
a9PowerSupplyUnitNumber 1.3.6.1.4.1.1608.1.1.1.9.1.11	Integer	The power supply unit number in the fault management cabinet; valid for fault management events
a9HeatSensorUnitNumber 1.3.6.1.4.1.1608.1.1.1.9.1.12	Integer	The heat sensor unit number
a9EnclosureUnitNumber 1.3.6.1.4.1.1608.1.1.1.9.1.13	Integer	The enclosure unit number

### Notes:



- The value -1 in any of the object fields signifies that the field is not valid for the event being considered.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object whose MIB ID is in the query.
- A GETNEXT operation returns the object's information which is next to the MIB ID given in the query.

## A.8.10 Battery Backup Unit Information Group

This object is used to obtain information about the Battery Backup Unit (BBU).

**Table A.12 Battery Backup Unit Information Group**

Table Object	Data Type	Description	
a10ControllerNumber 1.3.6.1.4.1.1608.1.1.1.10.1.1	Integer	References a particular controller by its controller number	
a10OperationalState 1.3.6.1.4.1.1608.1.1.1.10.1.2	Integer	Operational state of the Battery Backup Unit (BBU)	
		Value	Meaning
		1	No recondition since power on
		2	Recondition needed
		4	First warning on low battery charge
		8	Last warning on low battery charge
		16	Reconditioning active
		32	Discharging
		64	Fast charging
		128	Low power alarm
		255	No battery backup present

**Table A.12 Battery Backup Unit Information Group**

Table Object	Data Type	Description	
a10BatteryType 1.3.6.1.4.1.1608.1.1.1.10.1.3	Integer	Battery type	
		<b>Value</b>	<b>Meaning</b>
		0	Unknown
		1	Nickel Cadmium
		2	NiMh
		3	Lithium Ion
		254	No battery backup present
a10CurrentPowerInHours 1.3.6.1.4.1.1608.1.1.1.10.1.4	Integer	Current battery power in hours	
a10MaximumPowerInHours 1.3.6.1.4.1.1608.1.1.1.10.1.5	Integer	Maximum battery power in hours	
a10ThresholdValueInHours 1.3.6.1.4.1.1608.1.1.1.10.1.6	Integer	Battery threshold value in hours	
a10ChargeLevelInPercentage 1.3.6.1.4.1.1608.1.1.1.10.1.7	Integer	Current charge level of the battery (%)	
a10Version 1.3.6.1.4.1.1608.1.1.1.10.1.8	Integer	The battery hardware version	
a10OperationalStateString 1.3.6.1.4.1.1608.1.1.1.10.1.9	Display String	Operational State of Battery Backup Unit	

**Notes:**

- *a10ControllerNumber* is the index for any search operations against this object.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object whose MIB ID is in the query.
- A GETNEXT operation returns the object's information which is next to the MIB ID given in the query.
- Controller numbers start at 0.

# Appendix B

## GAMEVENT

---

### B.1 Introduction

GAMEVENT refers to the concept of “Event Notification” in Global Array Manager. Event Notification involves the following:

1. The Global Array Manager Transition Tool Server (GAM TT Server) runs on the server computer to which the MegaRAID or Mylex controllers and third-party disk drives or enclosures are installed. When an informational event or error occurs, GAM TT Server generates an “event.” When an informational event, status change, or error occurs, that is deemed significant enough to inform the user, the controller generates a GAM TT event. That GAM TT event is then retrieved by the GAM TT Server.
2. These events can be sent to client workstations running GAM TT/SAM Client for display in GAM TT/SAM Client’s Log Information Viewer when the particular server is accessed.

In order to do this, a command line in the GAM TT Server configuration file must be modified to enable event logging to clients, AND to identify the client workstations by IP address or name.

3. Events generated by GAM TT Server can also be saved to a log file (GAMEVLOG.LOG, by default), which is stored on the system running GAM TT Server and can be viewed or printed later.

In order to do this, another command line in the GAM TT Server configuration file must be enabled to generate the event log file. The name of the log file or its path can also be changed if desired.

4. In order to access valid parameters and default settings, run gamevent on the DOS command line.

This appendix discusses how GAMEVENT works for various operating systems.

**Note:** The server and the client must have matching port numbers to generate inpro event logging activity. By default, the Linux client and server are configured to communicate correctly when using the root login. If you would like to use any login other than root for the GAM TT WINE Client, then you must modify the server and client event port numbers. This is due to a requirement by non-root users to use a port number above 1000.

For example, -i 158 is the default for a root user and -i 1158 needs to be entered for a non-root user.

If necessary, edit the GAM TT file to change these port number values.

---

## B.2 NetWare

### B.2.1 Enabling Event Notification

To enable event notification to GAM TT Clients, both local and remote, edit the LOAD GAMEVENT command line in the AUTOEXEC.NCF file.

1. Open the AUTOEXEC.NCF configuration file in a text editor.
2. Navigate to the command line of the configuration file called #LOAD GAMEVENT.

```
#LOAD GAMEVENT -h <enter client ip address>
```

3. Replace <enter client ip address> with a desired system name or IP address. For example:

```
#LOAD GAMEVENT -h 10.97.49.189 -h fabd_test
```

**where:** -h <address> sets address as a receiver of events. Address may be an IP address or a network system name.

Some systems may already be identified in the LOAD GAMEVENT command line, either because they were previously identified in your existing AUTOEXEC.NCF file, or because they were automatically registered when you entered IP addresses or system names during GAM TT Server installation.

4. Additional entries require that you extend the command line. Type -h, then an IP address or system name, separated by one space, for

each additional entry you need. Additional entries are read by the system as a continuous string of addresses. Correct spacing is important to avoid confusion of the server names.

**Note:** The argument list is limited to 1028 bytes, allowing a practical maximum of about 50 event notification addresses and provides space for additional addresses.

5. Delete the comment marker “#” from the command line to enable event notification:

```
LOAD GAMEVENT -h 10.97.49.189 -h fabd_test
```

## B.2.2 Enabling a GAM TT Event Log File

1. Navigate to the section of the AUTOEXEC.NCF file called #LOAD GAMEVLOG.

```
#LOAD GAMEVLOG -f sys:\public\gamevlog.log
```

2. If necessary, delete the comment marker “#” from the command line to enable event logging to a file:

```
LOAD GAMEVLOG -f sys:\public\gamevlog.log
```

3. The file shown (gamevlog.log) is the default file name for the GAM TT event log. If you want to change this file name, replace “gamevlog” with your desired log file name.
4. The file path shown (sys:\public\) is the default file path for the GAM TT event log. If you want to change this path, replace “sys:\public\” with your desired file path name.

The log file is saved to the appropriate directory.

## B.2.3 Saving and Restarting

1. Save the .NCF file in your text editor.
2. Restart your system to start the GAM TT Server service and activate event notification to the specified IP addresses or system names.

**Note:** To start the event notification and/or logging without restarting the system, type the command with the parameters at the command prompt.

---

## B.3 Windows 2000, 2003, and XP

### B.3.1 Enabling Event Notification

To modify or add event notification to GAM TT Clients, both local and remote, edit the GAMEVENT command line in the GAMSCM.INI file.

1. Open the GAMSCM.INI configuration file in a text editor.
2. Navigate to the section of the configuration file called GAMEVENT.

```
gamevent.exe -h host1 -h host2
```

3. Replace host1 and host2 with a desired IP address or system name.

For example:

```
gamevent.exe -h 192.9.11.246 -h host1
```

**where:** -h <address> sets address as a receiver of events. Address may be an IP address or a network system name.

Some systems may already be identified in the GAMEVENT command line, either because they were previously identified in your existing GAMSCM.INI file, or because they were automatically registered when you entered IP addresses or system names during GAM TT Server installation.

4. Additional entries require that you extend the command line. Type -h then an IP address or system name, separated by one space, for each additional entry you need. Additional entries are read by the system as a continuous string of addresses. Correct spacing is important to avoid confusion of the server names.

Note: The argument list is limited to 1028 bytes, allowing a practical maximum of about 50 event notification addresses and provides space for additional addresses.

5. Delete the comment marker “#” from the command line to enable event notification:

```
gamevent.exe -h 192.9.11.246 -h host1
```

### B.3.2 Enabling a GAM TT Event Log File

1. Navigate to the section of the GAMSCM.INI file called GAMEVENT LOG.

```
#gamevlog.exe -f .\gamserv\gamevlog.log -s 0
```

2. If necessary, delete the comment marker “#” from the command line to enable event logging to a file:

```
gamevlog.exe -f .\gamserv\gamevlog.log -s 0
```

3. The file shown (gamevlog.log) is the default file name for the GAM TT event log. If you want to change this file name, replace “gamevlog” with your desired log file name.
4. The file path shown (. \gamserv\ ) is the default file path for the GAM TT event log. If you want to change this path, replace “. \gamserv\” with your desired file path name.

The log file is saved to the appropriate directory.

### B.3.3 Saving and Restarting

1. Save the .INI file in your text editor.
2. Restart your system to start the GAM TT Server service and activate event notification to the specified IP addresses or system names.

## B.3.4 GAMEVENT LOG Options

The server sends event activity (EVENT LOG) to other hosts computers, which can be another server or a client system. Events can be written to a file and/or to your local terminal screen. There are two options associated with the GAMEVENT LOG, -f and -s.

### Usage:

-f        File        : :        Sets the event log file name

Note:    The event log file is created in the following directory:

%SystemRoot%\system32\gamserv

Note:    Option -s is valid for only Windows 2000. This setting sends the events to the 2000 Windows Event Viewer Application Log.

-s        Value        : :        Sets the Severity Level to report.  
          0 = Critical  
          1 = Serious  
          2 = Error  
          3 = Warning  
          4 = Information

Note:    If a parameter is not specified, no information is reported.

gamevlog.exe -f .\gamserv\gamevlog.log -s

---

## B.4 UnixWare

### B.4.1 Enabling Event Notification

To enable event notification to GAM TT Clients, both local and remote, edit the GAMEVENT command line in the S99GAM file.

1. Open the S99GAM configuration file in a text editor.
2. Navigate to the section of the configuration file called GAMEVENT.

#gameevent -h host1 -h host2 -h host3 &



3. Replace `host1`, `host2`, and `host3` with a desired system name or IP address. For example:

```
#gamevent -h 10.97.49.189 -h 10.97.49.190  
-h fabd_test
```

**where:** `-h <address>` sets address as a receiver of events. Address may be an IP address or a network system name.

4. Additional entries require that you extend the command line. Type `-h` then an IP address or system name, separated by one space, for each additional entry you need. The system reads additional entries as a continuous string of addresses. Correct spacing is important to avoid confusion of the server names.

Note: The argument list is limited to 1028 bytes, allowing a practical maximum of about 50 event notification addresses and provides space for additional addresses.

5. Delete the comment marker “#” from the command line to enable event notification:

```
gamevent -h 10.97.49.189 -h 10.97.49.190  
-h fabd_test
```

## B.4.2 Enabling a GAM TT Event Log File

1. Navigate to the section of the S99GAM file called GAMEVENT LOG.

```
#gamevlog -f $EVENTLOGFILE &
```

2. If necessary, delete the comment marker “#” from the command line to enable event logging to a file:

```
gamevlog -f $EVENTLOGFILE &
```

## B.4.3 Saving and Restarting

1. Save the modified S99GAM file and exit.
2. Reboot the system using the following command from the root directory (match case exactly as shown):

```
shutdown -y -i6 -g0 ↵
```

---

## B.5 Linux

### B.5.1 Enabling Event Notification

To enable event notification to GAM TT Clients, both local and remote, edit the GAMEVENT command line in the GAM TT file to remove the initial comment marker.

To enable the Event Comment Line, follow these steps:

1. Log in as root.
2. Stop the GAM TT Server, type:  

```
/etc/rc.d/init.d/Gam stop
```
3. Using a text editor such as gnotebook+, open the GAM TT file located in the following path:  

```
/etc/rc.d/init.d/Gam
```
4. Navigate to the section of the file called GAMEVENT.
5. Near the bottom of this section you will see a command line such as the following (the command line parameters may differ, especially if IP addresses or node names were previously added):

```
#gamevent -h host1 -h host2 -h host3 &
```

6. Replace host1 and host2 with a desired IP address or DNS\_NAME.

For example:

```
#gamevent -h 10.97.49.189 -h 10.97.49.190  
-h fabd_test &
```

**where:** -h <address> sets address as a receiver of events. Address may be an IP address or a network node name.

7. Additional entries require that you extend the command line. Type -h then an IP address or node name, separated by one space, for each additional entry you need. The system reads additional entries as a continuous string of addresses. Correct spacing is important to avoid confusion of the server names.

Note: The argument list is limited to 1028 bytes, allowing a practical maximum of about 50 event notification addresses and provides space for additional addresses.

8. Save the GAM TT file in your text editor.
9. Delete the comment marker “#” from the command line to enable event notification:

```
gamevent -h 10.97.49.189 -h 10.97.49.190  
-h fabd_test &
```

### B.5.2 Enable GAM TT Event Logging

To enable event logging, follow these steps:

1. Navigate to the section of the file called GAMEVENT LOG.

```
#gamevlog -f $EVENTLOGFILE &
```

**where:** -f sets the event log file name

2. If necessary, delete the comment marker “#” from the command line to enable event logging:

```
gamevlog -f $EVENTLOGFILE &
```

### B.5.3 Saving and Restarting

1. Save the modified GAM TT file and exit.
2. Start the Global Array Manager Transition Tool Server Service and activate event logging and notification to the specified IP addresses or node names:

```
/etc/rc.d/init.d/Gam start
```



# Appendix C

## Creating a GAM TT Server Installation Diskette

---

### C.1 Introduction

The Global Array Manager Transition Tool (GAM TT) Server Software package provides RAID Management functions for your MegaRAID or Mylex Disk Array Controller. You can create your own GAM TT Server installation diskette from the RAID Management Software Installation menu under Windows. See [Table C.1](#) for information about GAM TT Server Installation Diskettes.

#### C.1.1 When to Create a GAM TT Server Installation Diskette

**Table C.1 GAM TT Server Installation Diskettes**

Operating System	GAM TT Server Diskette Required?
Netware 4.2/5.1/6	<b>NO.</b> Global Array Manager Transition Tool Server software can be downloaded from <a href="http://www.lsillogic.com/GAMTT">http://www.lsillogic.com/GAMTT</a> . See <a href="#">Chapter 2, "NetWare."</a>
Windows 2000 Windows XP (32-bits) Windows 2003 (32-bits)	<b>NO.</b> Global Array Manager Transition Tool Server software can be downloaded from <a href="http://www.lsillogic.com/GAMTT">http://www.lsillogic.com/GAMTT</a> . See <a href="#">Chapter 3, "Windows 2000, 2003 and XP,"</a> or <a href="#">Chapter 3, "Windows 2000, 2003 and XP."</a>
UnixWare 7.x,	<b>YES.</b> Follow the instructions in this appendix to create a GAM TT Server diskette.
Linux (all installations)	<b>NO.</b> Global Array Manager Transition Tool Server software can be downloaded from <a href="http://www.lsillogic.com/GAMTT">http://www.lsillogic.com/GAMTT</a> . See <a href="#">Chapter 5, "Linux."</a>

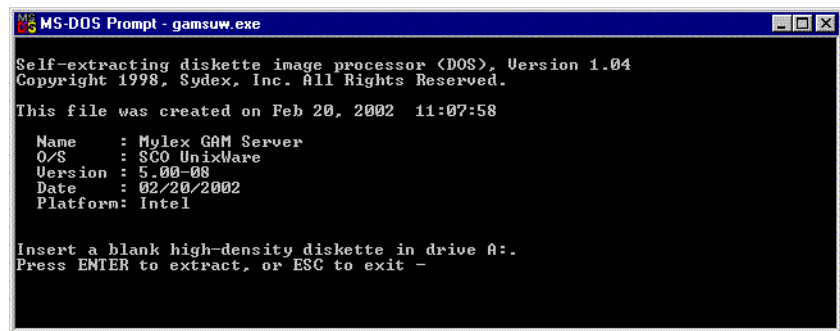
---

## C.2 Creating a GAM TT Server Software Installation Diskette

Global Array Manager Transition Tool Server software can be downloaded from <http://www.lsi logic.com/GAMTT>. Once you download and unzip the GAM TT Server onto a Windows 2000/2003/XP operating system, use the following procedure to create a GAM TT Server installation diskette:

1. Double-click **Gamsxx\_xx-x**. (where: x is the name and version number)
2. You are prompted with a DOS shell requesting that you insert a blank diskette.

**Figure C.1 DOS Shell**



3. Insert the blank diskette and press Enter to extract the image onto the diskette.

Use your newly created diskette to install your GAM TT Server. Refer to the appropriate chapter in this manual.

# Appendix D

## Installation of GAM TT Server for Failover or Failback in MSCS

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### D.1 Preparation

When preparing to use Clustering on external products, you need to install GAM TT Server to utilize the failover or failback in Microsoft Clustering Service™ (MSCS). However, you must first complete the installation of Windows 2000 Advanced Server or Datacenter, Windows 2003 (32-bits), or Windows XP 32-bit on both servers.

---

### D.2 Using Virtual Cluster IP Address

GAM Login fails when using the virtual cluster IP address. This is resolved by starting GAM as a service instead of an application. The Global Array Manager Transition Tool Server should be started as a generic service, and not a generic application. An application does not have Windows privileges to use Login call.

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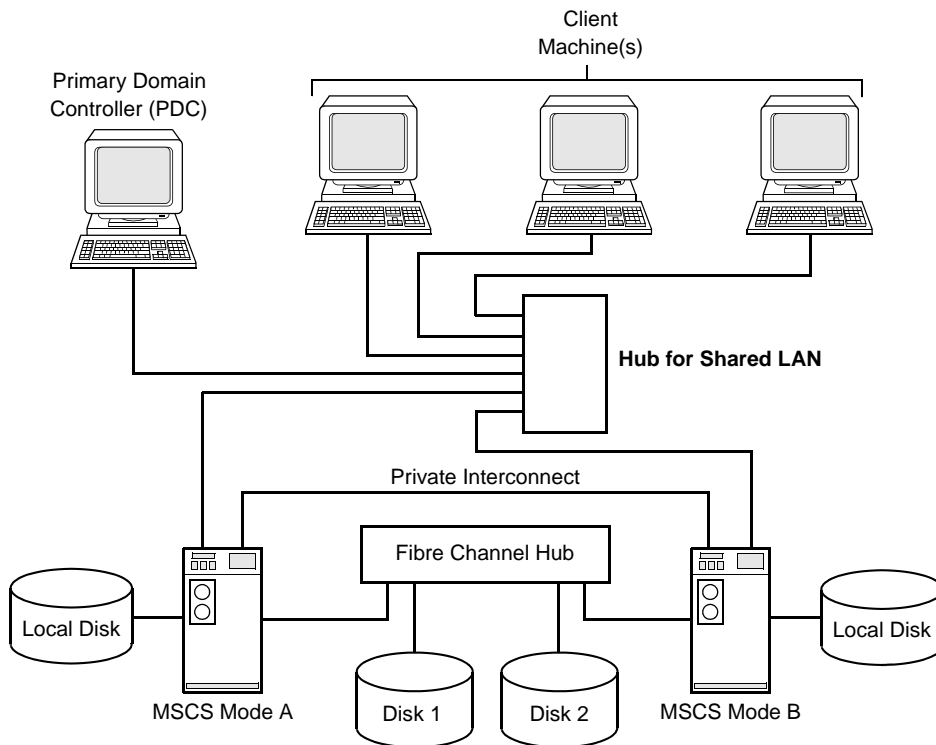
### D.3 Installing GAM TT Server for Failover or Failback in MSCS

To install GAM TT Server as a resource for failover or failback in MSCS, use the following procedure.

1. Install GAM TT Server on both nodes.
2. Disable the GAM TT Server Services on both nodes.
3. Select **Cluster Administrator** and right-click **Cluster Group**.
4. Create a new resource under Cluster Group called GAM Service with the following properties:
  - **Resource Type:** Generic Service

- **Group:** Cluster Group
  - **Possible Owners:** “Both Nodes”
  - **Resource Dependencies:** Cluster IP Address
  - **Service Name:** gamscm
  - **Startup Parameters:** Leave blank
5. Bring the GAM Service resource online.
  6. Go into GAM TT Client, and the following configuration appears on the virtual IP.

**Figure D.1 GAM Configuration**



**Note:** Disk 1 and Disk 2 are connected to an external unit not shown in this illustration.