PART NUMBER
96231

REVISION
A

L1400M

INTERFACE CONTROL MODULE

USER GUIDE

PRODUCT TYPE
HARDWARE

L1400M Interface Control Module

User Guide

We welcome your feedback. Please contact the Global Learning Solutions Feedback System at:

GLSFS@Stortek.com
or
Global Learning Solutions
Sun Microsystems Inc.
One StorageTek Drive
Louisville, CO 80028-3256
USA

Summary of Changes

EC	Date	Revision	Description
129944	May 2006	A	Initial Release

Contents

Summary of Changes 7

Contents 9

List of Figures 15

List of Tables 19

Preface 21
- Organization 21
- Alert Messages 22
- Mensajes de alerta 23
- Conventions 24
- Referenced Publications 25
- Additional Information 25
  - Sun/StorageTek's External Web Site 25
  - Customer Resource Center 25
  - Partners Site 25
  - Global Services Support Tools 26
  - Hardcopy Publications 26

Personal Safety 27
- Fiber-optic Safety 27
  - Laser Product Label 27
- Seguridad de fibras ópticas 28
  - Etiqueta del producto láser 29

Product Precautions 31
- Electrostatic Discharge Damage Prevention 31

Notices 33
- United States FCC Compliance Statement 33
- CISPR 22 and EN55022 Warning 33
- Japanese Compliance Statement 34
- Taiwan Warning Label Statement 34
- Internal Code License Statement 35

1: Introduction 39
External Features 39
Operation Indicators 40
Control Module Features 42
Fibre Channel Features 42
Management Features 42
Control Module Specifications 42
Operating Environment 42
Non-operating Environment 42

2: Interfaces and Connections 43
Fibre Channel Connections 44
SCSI Connection 46
Ethernet Connection 49
Serial Port Connection 50
Autobaud Feature 51
Setting Up Serial Port Communications 51

3: Configuration Procedures 53
Quick Setup from the Visual Manager Interface 53
Quick Setup from Serial/Telnet Interface 54

4: Addressing and Device Management 57
Addressing on SCSI Buses 57
FC Port Configuration 57
FC Arbitrated Loop Addressing 58
Soft Addressing 58
Hard Addressing 58
FC Switched Fabric Addressing 58
Discovery 59
Host Device Configuration 59
Advanced Features 60
Slot Licensing 60
Library Partitioning 60
Library Aggregation 60
Logical Unit Management 61

5: L1400M Interface Control Module Management 63
Configuration Methods 63
Serial 64
Ethernet 64
Telnet 65
Visual Manager 65

SNMP 66
Inband SCSI-3 Commands 66

6: Using L1400M Visual Manager 67
Accessing Visual Manager 67
Making Changes via Visual Manager 68
Main Menu 71
Main Menu > System 71
Main Menu > System > Serial 72
Main Menu > System > Network 73
Main Menu > System > SNMP 75
Main Menu > System > Active Fabric 78
Main Menu > System > User 79
Main Menu > System > Real-Time Clock 80
Main Menu > Reset Menu > Factory Settings Reset 81
Main Menu > Ports 82
Main Menu > Ports Menu > FC Port 0 83
Main Menu > Ports Menu > SCSI Bus 0, SCSI Bus 1 89
Main Menu > Discovery 93
Main Menu > Mapping 94
Main Menu > Slot Balancing 98
Main Menu > Partitioning 101
Main Menu > Statistics 108
Main Menu > Utilities 109
Main Menu > Utilities > FTP Utility 110
Main Menu > Utilities > Trace Settings 112
Main Menu > Utilities > Current Traces, Previous Traces, or Last Assert Traces . 114
Main Menu > Utilities > Clear Current Trace 115
Main Menu > Utilities > Clear Assert Traces 116
Main Menu > Utilities > Event Log Settings 117
Main Menu > Utilities > Event Log 118
Main Menu > Utilities > Clear Event Log 119
Main Menu > Features 120
Slot Licenses 121
Library Partitioning 122
Slot Balancing 122
Library Aggregation 122
Main Menu > Report 124
Main Menu > Reboot 125

7: Using the Serial/Telnet Interface 127

Power Up Messages 128
Perform Configuration 130
Baud Rate Configuration 130
Ethernet and SNMP Configuration 131
SNMP Configuration 133
Trap Configuration 135
Fibre Channel Configuration 136
Parallel SCSI Configuration 141
SCSI Initiator Menu 143
Device Mapping 144
Trace and Event Settings Configuration 155
Trace Configuration 156
Event Configuration 157
Real-Time Clock Configuration 157
Active Fabric Configuration 158
Save Configuration 159
Restore Last Saved Configuration 159
Reset and Save Configuration to Factory Defaults 159
System Utilities 160
System Statistics 161
Event Log 167
Diagnostics Mode 167
Display Trace and Assertion History 169
Get a Copy of Trace Buffer 170
Reboot 170
Download a New Revision of the Firmware 171

8: Using the FTP Interface. 173
Backup/Restore Configuration Settings 173
Configuration Backup Procedure 173
Configuration Restore Procedure 174
Get a Copy of Trace Buffer 175
Update Firmware 176

9: Troubleshooting. 177
Indicators 178
Basic Verification 180
Serial Port Problems 180
Login Problems 180
Verify SCSI Bus Configuration 180
Verify Fibre Channel Connection 181
Verify SCSI Devices in Windows NT 181

Verify Configuration 182
Verify Mapping 182
Verify Devices 182
Verify Host Configuration 182
PRLI Data 183
Verify HBA Device Driver Information 183
Running Diagnostics 183
Customer Support 184

A: Pin Assignments 185
RJ-11 to DB-9 Serial Pin Assignments 185
RJ-45 Ethernet Pin Assignments 186

B: Inband SCSI-3 Commands 187
General Commands **188**
Report LUNs Command 188
Inquiry Command 189
EVPD Page 0x80 190
Device Identification Page 0x83 191

C: Addressing, Structures, and Operation. 193
Auto Assigned Addressing Option 195
Indexed Addressing Option 195
SCC Addressing Option 196

D: Vendor-Unique Commands. 199

E: Management Information Bases 201
Fibre Alliance Management Information Base 201
Setting Unit Name, Info, Contact, and Location Information 202
Setting Port Name Information 202
Setting Trap IP Addresses 202
Viewing the Event Log 203
Fibre Alliance MIB 2.2 Table 204
Crossroads Enterprise MIB 209
Crossroads Enterprise MIB Table 209

F: Enabling DHCP on the L1400M Interface Control Module 219
Setting up DHCP over Control Module Interfaces 220
Serial and Telnet Interfaces 221
Special Note Regarding Ethernet IP, Subnet Mask, and Gateway Addresses 224
Visual Manager 225
Tips for Manipulating DHCP within Visual Manager 225

General Troubleshooting 226
What happens if the DHCP Server Cannot Be Contacted? 226

Glossary. 227

Index. 233

List of Figures

Figure 1. Control Module Faceplate 39
Figure 2. Control Module LEDs 40
Figure 3. Port Locations 43
Figure 4. WWN/MAC ID Label 44
Figure 5. Configuration With Tape Library in FC-AL 44
Figure 6. Fibre Channel Port 45
Figure 7. Removal of SFF Protectors 46
Figure 8. Very High Density SCSI Cable 47
Figure 9. Control Module SCSI Connections 48
Figure 10. Ethernet Port 49
Figure 11. Serial Port 50
Figure 12. Visual Manager Home Page 69
Figure 13. Navigation Bar 70
Figure 14. System Page 71
Figure 15. Serial Configuration Page 72
Figure 16. Network Configuration Page 73
Figure 17. Overrides Settings Screen 74
Figure 18. SNMP Configuration Page 75
Figure 19. Active Fabric Configuration Screen 78
Figure 20. User Configuration Page 79
Figure 21. Real Time Clock Configuration Page 80
Figure 22. Factory Settings Reset Page 81
Figure 23. Ports Page 82
Figure 24. FC Port Configuration Page 83
Figure 25. AL_PA Settings Screen 85
Figure 26. Override Settings Screen 87
Figure 27. SCSI Bus 0 Configuration Page 89
Figure 28. Overrides Settings Screen 90
Figure 29. Target ID Icons 91
Figure 30. SCSI Device Override Screen 91
Figure 31. Discovery Page 93
Figure 32. Mapping Page 94
Figure 33. Select Host for FC Port 95
Figure 34. Select Map for FC Port 96
Figure 35. Slot Balancing Page 98

Figure 36. Slot Balancing Page with Unsaved Changes 99
Figure 37. Main Partitioning Page Before Creating Partitions 101
Figure 38. Main Partitioning Page Showing Six Partitions 102
Figure 39. Library Partitions 104
Figure 40. Storage Slot Partition Assignments 105
Figure 41. Tape Drive Partition Assignments 106
Figure 42. CAP Partition Assignments 107
Figure 43. Statistics Page 108
Figure 44. Utilities Page 109
Figure 45. FTP Utility Page 110
Figure 46. Trace Settings Screen 112
Figure 47. Current Traces Screen 114
Figure 48. Clear Current Trace Buffer Page 115
Figure 49. Clear Assertion Trace Buffer Page 116
Figure 50. Event Log Settings Page 117
Figure 51. Display Event Log Page 118
Figure 52. Clear Event Log Page 119
Figure 53. Features Page 120
Figure 54. Report Page 124
Figure 55. Reboot Page 125
Figure 56. Power up Messages 128
Figure 57. Main Menu 128
Figure 58. Configuration Menu 130
Figure 59. Baud Rate Configuration Menu 130
Figure 60. Ethernet Configuration Menu 131
Figure 61. SNMP Configuration Menu 133
Figure 62. SNMP Configuration Menu With Traps Enabled 134
Figure 63. Trap IP Address Configuration Menu 135
Figure 64. Fibre Channel Configuration Menu 136
Figure 65. Fibre Channel Override Configuration Menu 139
Figure 66. Alternate Target Reset Menu 140
Figure 67. Parallel SCSI Configuration Menu 141
Figure 68. Selecting Primary and Alternate SCSI IDs 143
Figure 69. Device Mapping Main Menu 144
Figure 70. Select Current Map 145
Figure 71. Current FC Port Map Display 146
Figure 72. Create New Current Map 146
Figure 73. Delete Current Map 146
Figure 74. Map Edit Menu 147
Figure 75. Edit Map Name 147
Figure 76. Edit Map Entries 148
Figure 77. Adding an FCP Port Entry 148

Figure 78. Device List for FCP Port 149
Figure 79. Creating an Entry for FCP Port Map 150
Figure 80. Deleting an Entry 150
Figure 81. Deleting Multiple LUNs 150
Figure 82. Clear All Entries From Current Map 151
Figure 83. Clone Current Map 151
Figure 84. Host List for FCP Hosts 152
Figure 85. Adding a FCP Host 152
Figure 86. Deleting a Host 153
Figure 87. Editing Host List for FCP Port 153
Figure 88. Entire Device List 154
Figure 89. Utility Settings 155
Figure 90. Special Events Log Settings 155
Figure 91. Trace Settings 156
Figure 92. Trace Settings, Next Page 156
Figure 93. Event Settings 157
Figure 94. System Clock Setup Menu 157
Figure 95. Active Fabric Configuration Menu 158
Figure 96. System Utility Menu 160
Figure 97. SCSI Command Tracking Menu 160
Figure 98. Display Active Initiator Menu 161
Figure 99. System Status/Statistics Menu 161
Figure 100. System Status Menu 161
Figure 101. Fibre Channel Status Menu 162
Figure 102. Fibre Channel Status and Statistics 162
Figure 103. Fibre Channel Device Display 164
Figure 104. FC Resource Status 165
Figure 105. FC Driver Resource Status 165
Figure 106. Parallel SCSI Protocol Status Menu 165
Figure 107. SCSI Device Display Menu 166
Figure 108. SCSI Resource Display 166
Figure 109. Event Log Menu 167
Figure 110. System Diagnostics Mode 167
Figure 111. Trace Dump Menu 169
Figure 112. Downloading Firmware Over Serial Connection 172
Figure 113. Control Module LEDs 178
Figure 114. RJ-11 Pin Assignments 185
Figure 115. Corresponding Pin Outs of DB-9 Connector 186
Figure 116. RJ- 45 Pin Assignments 186
Figure 117. Main Menu 221
Figure 118. Configuration Menu 221
Figure 119. Ethernet Configuration Menu 222

Figure 120. Ethernet Configuration Menu 224

List of Tables

Table 1. Control Module PRLI Response Data 183
Table 2. Format of Report LUNs Command 188
Table 3. Report LUNs Parameter List 189
Table 4. Format of LUN Inquiry Command 189
Table 5. Format of EVPD Page 0x80 190
Table 6. Control Module LUN Inquiry Data 191
Table 7. SCC Addressing Structure 193
Table 8. Address Method Definitions 193
Table 9. SCC Logical Unit Addressing 194
Table 10. Peripheral Device Addressing 194
Table 11. Arbitrated Loop Node Number to AL_PA Lookup Table 194
Table 12. Indexed Addressing Table 196
Table 13. Vendor Unique Commands 199
Table 14. Fibre Alliance MIB 2.2 Elements 204
Table 15. Crossroads Enterprise MIB Elements 209

Preface

This guide describes how to operate the L1400M Interface Control Module (control module) in the L1400M1 Tape Library.

This guide is intended primarily for data center operators. System programmers and computer system administrators might also find the information useful.

Organization

This guide has nine chapters and five appendixes:

Chapter 1 "Introduction" describes the control module features and specifications.

Chapter 2 "Interfaces and Connections" describes the types of interfaces and connections on the control module.

Chapter 3 "Configuration Procedures" describes how to configure the control module.

Chapter 4 "Addressing and Device Management" describes fibre channel networking and SCSI bus addressing.

Chapter 5 "L1400M Interface Control Module Management" describes the various methods of managing the control module.

Chapter 6 "Using L1400M Visual Manager" describes major screens of the StorageTek Visual Manager.

Chapter 7 "Using the Serial/Telnet Interface" describes configuration options available using the serial/Telnet interfaces.

Chapter 8 "Using the FTP Interface" describes configuration options available using the FTP interface.

Chapter 9 "Troubleshooting" provides some basic methods of identifying faults in the setup and configuration of the control module.

Appendix A "Pin Assignments" describes pin assignments for the serial and Ethernet ports on the control module.

Appendix B "Inband SCSI-3 Commands" describes the logical unit number (LUN) commands used with the control module.

Appendix C "Addressing, Structures, and Operation" describes the different methods of addressing for Fibre Channel and SCSI devises.

Appendix D "Vendor-Unique Commands" describes the vendor-unique commands supported by the control module.

Appendix E "Management Information Bases" describes the two MIBs supported by the control module.

Appendix F "Enabling DHCP on the L1400M Interface Control Module" describes how to enable DHCP for the control module.

Glossary "Glossary"

Index "Index"

Alert Messages

Alert messages call your attention to information that is especially important or that has a unique relationship to the main text or graphic.

Note: A note provides additional information that is of special interest. A note might point out exceptions to rules or procedures. A note usually, but not always, follows the information to which it pertains.

CAUTION: A caution informs the reader of conditions that might result in damage to hardware, corruption of data, or corruption of application software. A caution always precedes the information to which it pertains.

WARNING: A warning alerts the reader to conditions that might result in long-term health problems, injury or death. A warning always precedes the information to which it pertains.

Mensajes de alerta

Los mensajes de alerta llaman la atención hacia información de especial importancia o que tiene una relación específica con el texto principal o los gráficos.

Note: Una nota expone información adicional que es de interés especial. Una nota puede señalar excepciones a las normas o procedimientos. Por lo general, aunque no siempre, las notas van después de la información a la que hacen referencia.

PRECAUCIÓN:

Una precaución informa sobre situaciones que podrían conllevar daños del hardware, de los datos o del software de aplicación. Las precauciones van siempre antes de la información a la que hacen referencia.

ADVERTENCIA:

Una advertencia llama la atención sobre condiciones que podrían conllevar problemas de salud crónicos, lesiones o muerte. Las advertencias van siempre antes de la información a la que hacen referencia.

Conventions

Typographical conventions highlight special words, phrases, and actions in this publication.

Item	Example	Description of Convention
Buttons	MENU	Text and capitalization follow label on product
Commands	Mode Select	Initial cap
Document titles	*System Assurance Guide*	Italic font
Emphasis	*not* or *must*	Italic font
File names	`fsc.txt`	Monospace font
Hypertext links	Figure 2-1 on page 2-5	Blue (prints black in hardcopy publications)
Indicators	*Open*	Text and capitalization follow label on product
Jumper names	TERMPWR	All uppercase
Keyboard keys	<Y> <Enter> or <Ctrl+Alt+Delete>	Text and capitalization follow label on product; enclosed within angle brackets
Menu names	Configuration Menu	Capitalization follows label on product
Parameters and variables	Device = *xx*	Italic font
Path names	`c:/mydirectory`	Monospace font
Port or connector names	SER1	Text and capitalization follow label on product; otherwise, all uppercase
Positions for circuit breakers, jumpers, and switches	ON	Text and capitalization follow label on product; otherwise, all uppercase
Screen text (including screen captures, screen messages, and user input)	`downloading`	Monospace font
Switch names	Power	Text and capitalization follow label on product
URLs	http://www.storagetek.com	Blue (prints black in hardcopy publications)

Referenced Publications

Library Documentation	Part Number
L180/L700x/L1400x Ordering and Configuration Guide	MT9112
L700x/L1400x Tape Libraries and Pass-thru Port Operator's Guide	95845

Additional Information

Sun Microsystems offers several methods for you to obtain additional information. Please use one of these methods when you want to obtain the latest edition of this or any other Sun/StorageTek customer publication.

Sun/StorageTek's External Web Site

Sun/StorageTek's external Web site provides marketing, product, event, corporate, and service information. In addition, the external Web site serves as an entry point to the Customer Resource Center (CRC) and to the e-Partners site. The external Web site is accessible to anyone with a Web browser and an Internet connection.

The URL for the Sun/StorageTek external Web site is:

http://www.storagetek.com

Customer Resource Center

Sun/StorageTek's CRC is a Web site that enables members to resolve technical issues by searching code fixes and technical documentation. CRC membership entitles you to other proactive services, such as HIPER subscriptions, technical tips, answers to frequently asked questions, addenda to product documentation books, and online product support contact information. Customers who have a current warranty or a current maintenance service agreement may apply for membership by clicking on the Request Password button on the CRC home page.

The URL for the CRC is http://www.support.storagetek.com

Partners Site

Sun/StorageTek's Partners site is a Web site that provides information about products, services, customer support, upcoming events, training programs, and sales tools to support Sun/StorageTek's Partners. Access to this site, beyond the Partners Login page, is restricted. On the Partners Login page, Sun/StorageTek employees and current partners who do not have access can request a login ID and password and prospective partners can apply to become Sun/StorageTek resellers.

The URL for the e-Partners site is http://members.storagetek.com

Global Services Support Tools

Sun/StorageTek's Global Services Support Tools site provides tools that aid in the sales and support of Sun/StorageTek's products and services. This is an internal Web site for Sun/StorageTek employees.

The URL for the Global Services Support Tools is http://wwssto.stortek.com

Hardcopy Publications

Contact a Sun/StorageTek sales or marketing representative to order additional paper copies of this publication or to order other Sun/StorageTek customer publications in paper format.

Personal Safety

Fiber-optic Safety

WARNING: ***Eye hazard*. Never look directly into a fiber-optic cable, a fiber-optic connector, or a laser transceiver module. Hazardous conditions might exist from laser power levels that are capable of causing injury to your eyes.**

Be especially careful when you use optical instruments with this equipment. Such instruments might increase the likelihood of injury to your eyes.

***Radiation exposure.* Use of controls or adjustment or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

The laser transceivers in fiber-optic equipment can pose dangers to personal safety. Ensure that anyone who works with this Sun/StorageTek equipment understands these dangers and follows safety procedures. Ensure that the optical ports of every laser transceiver module are terminated with an optical connector, a dust plug, or a cover.

Each fiber-optic interface in this Sun/StorageTek Fibre Channel equipment contains a laser transceiver that is a Class 1 Laser Product. Each laser transceiver has an output of less than 70 µW. Sun/StorageTek's Class 1 Laser Products comply with EN60825-1:1994+A1+A2 and with sections 21 CFR 1040.10 and 1040.11 of the Food and Drug Administration (FDA) regulations.

The following translations are for users in Finland and Sweden who wish to identify laser safety and classification:

CLASS 1 LASER
LUOKAN 1 LASERLAITE
KLASSE 1 LASER APPARAT

Laser Product Label

In accordance with safety regulations, a label on each Sun/StorageTek Fibre Channel product identifies the laser class of the product and the place and date of the manufacturer. The label appears on top of a Fibre Channel tape drive and near the Fibre Channel connectors on a Fibre Channel tape library. A copy of the label is shown here:

CLASS 1 LASER PRODUCT
LASER KLASSE 1
APPAREIL A LASER DE CLASSE 1
COMPLIES WITH 21 CFR 1040.10 AND 1040.11

Seguridad de fibras ópticas

ADVERTENCIA: ***Riesgo para la vista*. Nunca mire directamente el interior de un cable de fibra óptica, un conector de fibra óptica o un módulo transceptor de láser. Los niveles de potencia del láser pueden conllevar situaciones de riesgo, susceptibles de lesionar la vista.**

Tenga especial cuidado al utilizar instrumentos ópticos con estos equipos. Dichos instrumentos pueden incrementar las probabilidades de lesiones oculares.

***Exposición a radiaciones.* El uso de mandos, ajustes o procedimientos distintos de los aquí especificados puede conllevar un riesgo de exposición a radiaciones.**

Los transceptores de láser de los equipos de fibra óptica pueden suponer un peligro para la seguridad física. Asegúrese de que toda persona que trabaje con estos equipos de Sun/StorageTek entienda los peligros y siga los procedimientos de seguridad. Asegúrese de que todos los puertos ópticos de los módulos transceptores de láser estén terminados con un conector óptico, una cubierta o un tapón de protección contra el polvo.

Todas las interfaces de fibra óptica de estos equipos de canal de fibra de Sun/StorageTek contienen un transceptor de láser, categorizado como Producto láser de Clase 1. Todos los transceptores de láser tienen una potencia de salida inferior a 70 µW. Los productos láser Clase 1 de Sun/StorageTek cumplen lo dispuesto por la norma EN60825-1:1994+A1+A2, así como con las secciones 21 CFR 1040.10 y 1040.11 de la Food and Drug Administration (FDA) de EE.UU.

Las siguientes traducciones están dirigidas a usuarios de Finlandia y Suecia que deseen identificar la categoría y clasificación de seguridad de los dispositivos láser:

LÁSER DE CLASE 1
LUOKAN 1 LASERLAITE
KLASSE 1 LASER APPARAT

Etiqueta del producto láser

De conformidad con las normas de seguridad, cada producto de canal de fibra de Sun/StorageTek lleva una etiqueta que identifica la clase de láser del producto, y el lugar y fecha de fabricación. Esta etiqueta aparece sobre la unidad de cinta de canal de fibra, así como en las proximidades de los conectores de las bibliotecas de cintas de canal de fibra. A continuación puede verse una copia de dicha etiqueta:

PRODUCTO LÁSER CLASE 1
LASER KLASSE 1
APPAREIL A LASER DE CLASSE 1
COMPATIBLE CON LAS SECCIONES 21 CFR 1040.10 Y 1040.11

Product Precautions

Electrostatic Discharge Damage Prevention

Before you touch any internal components in the library, including drives, you must take precautions against electrostatic discharge (ESD).

CAUTION: *Components are sensitive to static electricity:* Even a small electrostatic discharge can damage an electrical component that is inside the library. A damaged component might not fail immediately, but over time, it will become worse and might eventually cause an “intermittent” problem. Be sure that you touch an *unpainted* metal surface of the library before you reach inside the library or touch the drives or optional interface equipment.

Before you touch any internal components:

1. With your finger, touch an *unpainted* metal surface of the library. In some libraries, you can touch the library’s frame. In other libraries, you might have to touch a bolt on the wall or on the door frame.
2. Keep your body movement to a minimum as you touch the drives or the library components.

Note: Antistatic wrist straps that have clip-on ends are commercially available.

Notices

Please read the following compliance and warning statements for this product.

CAUTION: *Potential equipment damage:* Cables that connect peripherals must be shielded and grounded; refer to cable descriptions in the instruction manuals. Operation of this equipment with cables that are not shielded and not correctly grounded might result in interference to radio and TV reception.

Changes or modifications to this equipment that are not expressly approved in advance by Sun/StorageTek will void the warranty. In addition, changes or modifications to this equipment might cause it to create harmful interference.

United States FCC Compliance Statement

The following compliance statement pertains to Federal Communications Commission Rules 47 CFR 15.105:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

CISPR 22 and EN55022 Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Japanese Compliance Statement

The following compliance statement in Japanese pertains to VCCI EMI regulations:

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

English translation: This is a Class A product based on the Technical Requirement of the Voluntary Control Council for Interference by Information Technology (VCCI). In a domestic environment, this product may cause radio interference, in which case the user may be required to take corrective actions.

Taiwan Warning Label Statement

The following warning label statement pertains to BSMI regulations in Taiwan, R.O.C.:

警告使用者: 這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

English translation: This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.

Internal Code License Statement

The following is the Internal Code License Agreement from StorageTek:

NOTICE

INTERNAL CODE LICENSE

PLEASE READ THIS NOTICE CAREFULLY BEFORE INSTALLING AND OPERATING THIS EQUIPMENT. THIS NOTICE IS A LEGAL AGREEMENT BETWEEN YOU (EITHER AN INDIVIDUAL OR ENTITY), THE END USER, AND STORAGE TECHNOLOGY CORPORATION (“STORAGETEK”), THE MANUFACTURER OF THE EQUIPMENT. BY OPENING THE PACKAGE AND ACCEPTING AND USING ANY UNIT OF EQUIPMENT DESCRIBED IN THIS DOCUMENT, YOU AGREE TO BECOME BOUND BY THE TERMS OF THIS AGREEMENT. IF YOU DO NOT AGREE WITH THE TERMS OF THIS AGREEMENT, DO **NOT** OPEN THE PACKAGE AND USE THE EQUIPMENT. IF YOU DO NOT HAVE THE AUTHORITY TO BIND YOUR COMPANY, DO **NOT** OPEN THE PACKAGE AND USE THE EQUIPMENT. IF YOU HAVE ANY QUESTIONS, CONTACT THE AUTHORIZED STORAGETEK DISTRIBUTOR OR RESELLER FROM WHOM YOU ACQUIRED THIS EQUIPMENT. IF THE EQUIPMENT WAS OBTAINED BY YOU DIRECTLY FROM STORAGETEK, CONTACT YOUR STORAGETEK REPRESENTATIVE.

1. **Definitions:** The following terms are defined as followed:

   a. “Derivative works” are defined as works based upon one or more preexisting works, such as a translation or a musical arrangement, or any other form in which a work may be recast, transformed, or adapted. A work consisting of editorial revision, annotations, elaboration, or other modifications which, as a whole, represent an original work of authorship, is a Derivative work.

   b. “Internal Code” is Microcode that (i) is an integral part of Equipment, (ii) is required by such Equipment to perform its data storage and retrieval functions, and (iii) executes below the user interface of such Equipment. Internal code does not include other Microcode or software, including data files, which may reside or execute in or be used by or in connection with such Equipment, including, without limitation, Maintenance Code.

   c. “Maintenance Code” is defined as Microcode and other software, including data files, which may reside or execute in or be used by or in connection with Equipment, and which detects, records, displays, and/or analyzes malfunctions in the Equipment.

   d. “Microcode” is defined as a set of instructions (software) that is either imbedded into or is to be loaded into the Equipment and executes below the external user interface of such Equipment. Microcode includes both Internal Code and Maintenance Code, and may be in magnetic or other storage media, integrated circuitry, or other media.

2. The Equipment you have acquired by purchase or lease is manufactured by or for StorageTek and contains Microcode. By accepting and operating this Equipment, you acknowledge that StorageTek or its licensor(s) retain(s) ownership of all Microcode, as well as all copies thereof, that may execute in or be used in the operation or servicing of the Equipment and that such Microcode is copyrighted by StorageTek or its licensor(s).

3. StorageTek hereby grants you, the end user of the Equipment, a personal, nontransferable (except as permitted in the transfer terms below), nonexclusive license to use each copy of the Internal Code (or any replacement provided by StorageTek or your authorized StorageTek distributor or reseller) which license authorizes you, the end user, to execute the Internal Code solely to enable the specific unit of Equipment for which the copy of Internal Code is provided to perform its data storage and retrieval functions in accordance with StorageTek's (or its licensor's) official published specifications.

4. Your license is limited to the use of the Internal Code as set forth above. You may not use the Internal Code for any other purpose. You may not, for example, do any of the following:

   (i) access, copy, display, print, adapt, alter, modify, patch, prepare Derivative works of, transfer, or distribute (electronically or otherwise) or otherwise use the Internal Code;

   (ii) reverse assemble, decode, translate, decompile, or otherwise reverse engineer the Internal Code (except as decompilation may be expressly permitted under applicable European law solely for the purpose of gaining information that will allow interoperability when such information is not otherwise readily available); or

   (iii) sublicense, assign, or lease the Internal Code or permit another person to use such Internal Code, or any copy of it.

   If you need a backup or archival copy of the Internal Code, StorageTek, or your authorized StorageTek distributor or reseller, will make one available to you, it being acknowledged and agreed that you have no right to make such a copy.

5. Nothing in the license set forth above or in this entire Notice shall convey, in any manner, to you any license to or title to or other right to use any Maintenance code, or any copy of such Maintenance Code. Maintenance Code and StorageTek's service tools and manuals may be kept at your premises, or they may be supplied with a unit of Equipment sent to you and/or included on the same media as Internal Code, but they are to be used only by StorageTek's customer service personnel or those of an entity licensed by StorageTek, all rights in and to such Maintenance Code, service tools and manuals being reserved by StorageTek or its licensors. You agree that you shall not use or attempt to use the Maintenance Code or permit any other third party to use and access such Maintenance Code.

6. You, the end user, agree to take all appropriate steps to ensure that all of your obligations set forth in this Notice are extended to any third party having access to the Equipment.

7. You may transfer possession of the Internal Code to another party only with the transfer of the Equipment on which its use is authorized, and your license to use the Internal Code is discontinued when you are no longer an owner or a rightful possessor of the Equipment. You must give such transferee all copies of the Internal Code for the transferred Equipment that are in your possession, along with a copy of all provisions of this Notice.

Any such transfer by you is automatically (without further action on the part of either party) expressly subject to all the terms and conditions of this Notice passing in full to the party to whom such Equipment is transferred, and such transferee accepts the provisions of this license by initial use of the Internal Code. You cannot pass to the transferee of the Equipment any greater rights than granted under this Notice, and shall hold StorageTek harmless from any claim to the contrary by your transferee or its successors or assigns. In addition, the terms and conditions of this Notice apply to any copies of Internal Code now in your possession or use or which you hereafter acquire from either StorageTek or another party.

8. You acknowledge that copies of both Internal Code and Maintenance Code may be installed on the Equipment before shipment or included with the Equipment and other material shipped to you, all for the convenience of StorageTek's service personnel or service providers licensed by StorageTek, and that during the warranty period, if any, associated with the Equipment, and during periods in which the Equipment is covered under a maintenance contract with StorageTek or service providers licensed by StorageTek, both Internal Code and Maintenance Code may reside and be executed in or used in connection with such Equipment, and you agree that no rights to Maintenance Code are conferred upon you by such facts. StorageTek or the licensed service provider may keep Maintenance Code and service tools and manuals on your premises but they are to be used only by StorageTek's customer service personnel or those of service providers licensed by StorageTek. You further agree that upon (i) any termination of such warranty period or maintenance contract period; or (ii) transfer of possession of the Equipment to another party, StorageTek and its authorized service providers shall have the right with respect to the affected Equipment to remove all service tools and manuals and to remove or disable all Maintenance Code and/or replace Microcode which includes both Internal Code and Maintenance Code with Microcode that consists only of Internal Code.

Introduction

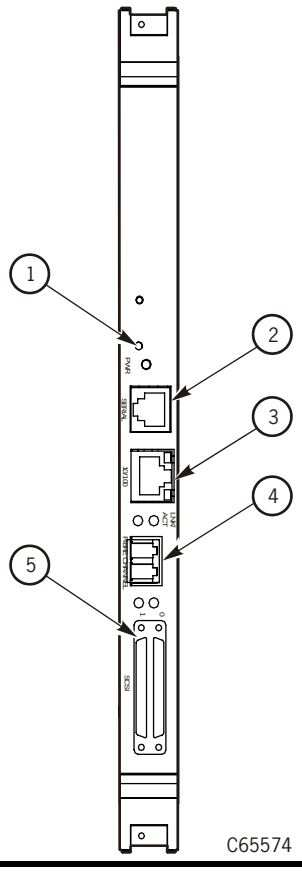
1

The L1400M Inteface Control Module (control module) provides bi-directional connectivity between a Fibre Channel Switched Fabric (FC-SW) or Fibre Channel Arbitrated Loop (FC-AL), and two Narrow/Wide Fast/Ultra-3 SCSI buses. The control module supports Fibre Channel host Initiator Devices.

External Features

Figure 1 shows the control module faceplate.

Figure 1. Control Module Faceplate



1. Reset Button
2. Serial port
3. Ethernet port
4. Fibre Channel port (external Host/SAN)
5. SCSI buses (library use only)

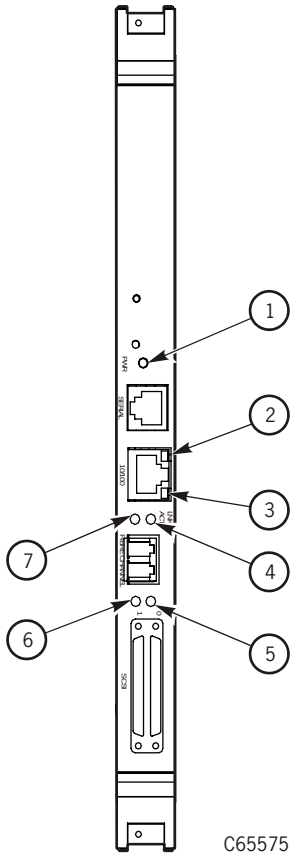
Controls, indicators, and interfaces on the control module faceplate include:

- A reset button that manually forces a reboot of the control module. For proper operation of the control module, cable connections should remain securely in place.
- The Ethernet and Serial interfaces allow for configuring and managing the unit.
- The SCSI interface provides internal library communications.
- The Fibre Channel interface provides connectivity to a SAN or Host.
- The LEDs (operation indicators) provide basic status information.

Operation Indicators

The control module uses LEDs (Figure 2) to monitoring overall unit status.

Figure 2. Control Module LEDs



1. Power Indicator
2. Ethernet Link Status
3. Ethernet Activity
4. Fibre Channel Link Status
5. SCSI Activity for Library Bus 0
6. SCSI Activity for Library Bus 1
7. Fibre Channel Activity

- **PWR** (Power and Fault) (1)
  - Green: power is currently active. Lack of power indication suggests that:
    - the unit is off
    - there is a problem with the power supply to the module
    - an internal problem exists
  - Amber: a fault condition exists. Faults can occur as a result of Power On Self Test (POST) failure or operational failures. This indicator normally flashes when the unit is powering up or reset. If the fault indicator stays on, contact your product support representative.
- **LNK/ACT** (Fibre Channel)
  - Upper (LNK) indicator (4): On (green) signifies a good Fibre Channel link on the port.
  - Lower (ACT) indicator (7): On (green) signifies Fibre Channel port activity.
  - If the LNK indicator remains off, or if the ACT indicator stays continually on without corresponding SCSI bus activity, there may be a problem with the Fibre Channel configuration. Verify the Fibre Channel configuration.
- **0**, **1** (SCSI Bus 0 and SCSI Bus 1) (5 and 6)
  - Flickering green: signifies SCSI activity on the bus corresponding to the number of the indicator.
  - Activity should be occur briefly during power up or configuration, and relatively often when the unit is transferring data. If an Activity indicator stays continually lit without corresponding target device activity, there may be a problem with the SCSI bus configuration. Verify the SCSI bus configuration.
- **10/100** (Ethernet)
  - The status indicator (2) stays on continuously to show Ethernet link established.
  - The Ethernet activity indicator (3) flickers to show Ethernet activity.
  - If these indicators fail to operate properly, there may be a problem with the network connection or configuration. Verify the network connection and configuration. The port must connect to a 10/100BaseT Ethernet network to function properly.

Control Module Features

Fibre Channel Features

- Single 2.125 Gbps FC port
- Fibre Channel Arbitrated Loop (FC-AL) [including Point-to-Point configurations in arbitrated loop topology only] and Switched Fabric (FC-SW) topologies.
- Private Loop Direct Attach (PLDA) profile compliant
- Class 3 operation with SCSI-FCP protocol
- Supports FCP-2 error recovery protocol as specified in FCP-2 rev. 04 and 05 for use with streaming devices (such as tape)
- Optical SFF support (Shortwave)

Management Features

- Out-of-band Ethernet TCP/IP Management Access
- SNMP with FA MIB 2.2 and private MIB support (for control module only)
- DHCP for easier network administration
- Serial RJ-11 connector for terminal access
- Ethernet RJ-45 connector for FTP, Telnet and Web browser access
- Field-upgradeable firmware
- SCC (FC only), Indexed, and Auto Assigned addressing modes
- LUN mapping and masking functionality

Control Module Specifications

Operating Environment

- 0 to 50°C
- 5 to 80% Relative Humidity (non-condensing)

Non-operating Environment

- -40 to +55°C
- 0 to 92% Relative Humidity (non-condensing)

Interfaces and Connections

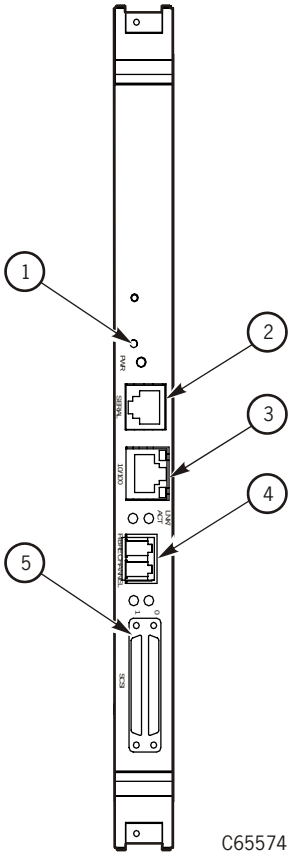
2

There are four types of data interfaces on the L1400M Interface Control Module (control module):

- RS-232 (RJ-11 Serial port)
- Ethernet
- Fibre Channel
- SCSI (library use only)

The RS-232 and Ethernet ports (Figure 3) are used primarily for control module configuration and management.

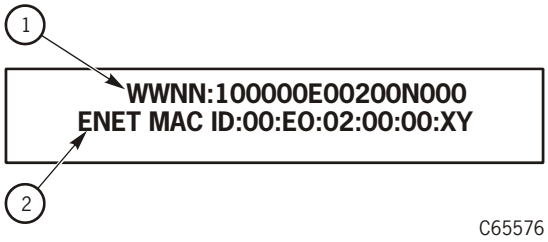
Figure 3. Port Locations



1. Reset button
2. RS-232 (RJ-11) Serial port
3. Ethernet port
4. Fibre channel port
5. SCSI ports (library use only)

Note: For convenience in configuring ports, key information is shown on a label (Figure 4) located on the control module.

Figure 4. WWN/MAC ID Label



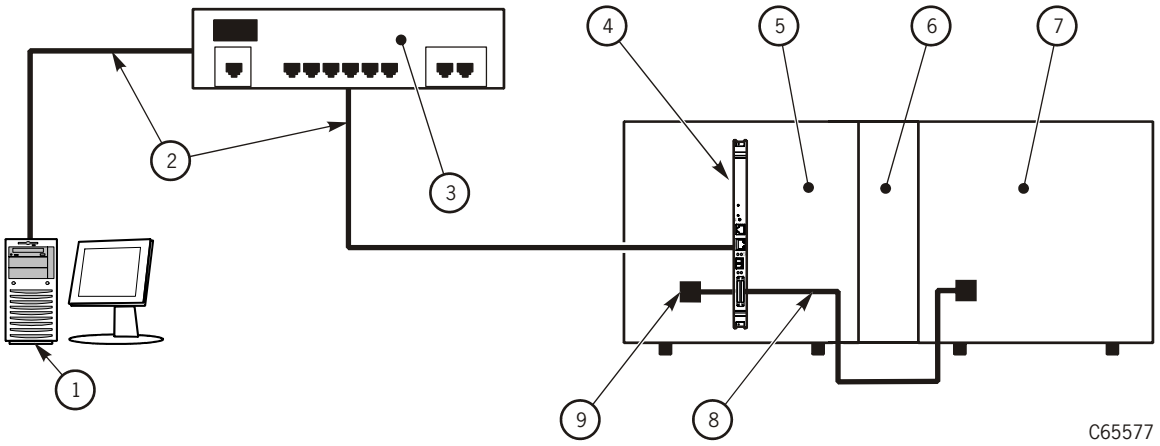
1. WWN Name
2. Ethernet MAC ID (Physical Address)

Fibre Channel Connections

Before connecting the control module to other Fibre Channel devices, it is important to understand the configuration requirements of the environment to which it will be connected. Failure to correctly configure a Fibre Channel device may impair the operation of the Storage Area Network to which it is attached.

Typical installations will have the control module connected to either Arbitrated Loop or Switched Fabric environments. For an Arbitrated Loop, the library can be directly attached to the Fibre Channel host bus adapter, in a Point-to-Point fashion. Arbitrated Loops also allow the use of Fibre Channel hubs, to which the unit can be directly attached. In Fibre Channel switched environments, the switch is also directly attached to the control module (Figure 5).

Figure 5. Configuration With Tape Library in FC-AL



1. Host FC HBA
2. Fiber optic cables (max 10km distance)
3. Fibre Channel hub
4. Control module
5. L1400M1 Library
6. Pass-thru port
7. L1400P1 library
8. SCSI cable to L1400P1 library (SCSI Port 1)
9. SCSI cable to L1400M0/L1400M1 library (SCSI Port 0)

Both FC switches and hubs may allow for individual ports to be configured for different media types. The control module must be connected to the hub or switch port with the appropriate FC cabling for the media type in use on both the control module and the port to which it is connected.

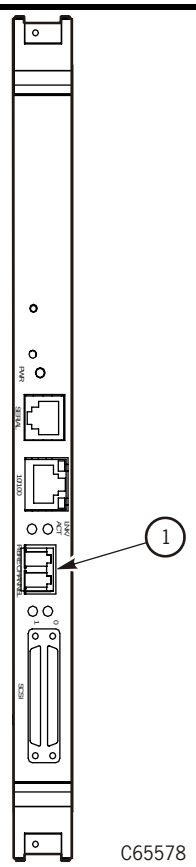
The control module supports various Fibre Channel media types through the use of external Small Formfactor Transceivers (SFFs).

Supported media type: Multi-Mode Fiber - 2.125 Gbit Dual LC connectors.

To connect the control module to the Fibre Channel Storage Area Network:

1. Locate the Fibre Channel port on the front of the control module (Figure 6).

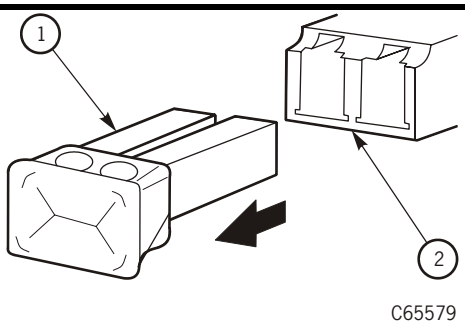
Figure 6. Fibre Channel Port



1. Fibre Channel port

2. Remove the rubber protector from the SFF, as shown in Figure 7.

Figure 7. Removal of SFF Protectors



1. SFF Protector
2. SFF

3. With the control module powered off, connect the control module into the Fibre Channel environment using the appropriate cabling. The FC optical connector on the control module is keyed to prevent improper orientation.

SCSI Connection

The control module can support Fast/Ultra-3 Narrow/Wide SCSI, depending on the specific configuration. The control module is factory configured to support two LVD/Single-Ended buses that are attached to the robot within the L1400M library. Two VHDCI 68-pin D-shell, P-type connectors allowing the control module to be attached at the end of up to two SCSI buses. The control module must always be installed at the end of SCSI buses.

The control module supplies termination power (TERMPWR) to each SCSI bus. An internal self-resetting fuse in the TERMPWR will reset after a fault is cleared.

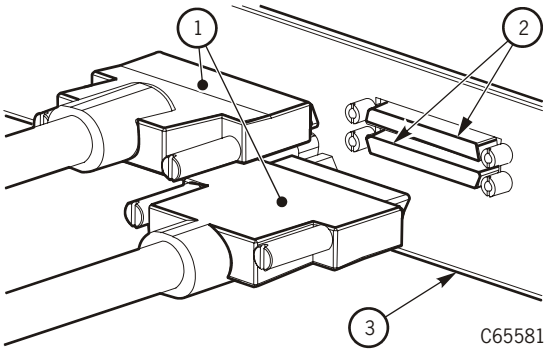
CAUTION:

During attachment of high density SCSI cables, note the orientation (Figure 8 on page 47) of the high density SCSI port connectors on the control module. Failure to maintain proper cable orientation can result in damage to the control module SCSI port connectors.

Do not connect HVD devices to an LVD/SE bus. Failure to heed this caution may result in severe damage to equipment.

SCSI ports on the control module are not hot-pluggable. Power off the control module whenever connecting/disconnecting the SCSI cables.

Figure 8. Very High Density SCSI Cable



1. SCSI cables
2. SCSI ports
3. L1400 Library Control Module

Any SCSI cables used with the control module must meet SCSI 2 standards and must be LVD rated. The cables should be rated at 24 Ohm impedance and have a *VHDCI 68pin 0.8mm D-shell/P-type to Standard 68pin SCSI D-shell* connector at the end that attaches to the control module.

CAUTION: Failure to comply with the minimum high density cable specifications can result in damage to, or operational failure of, the control module.

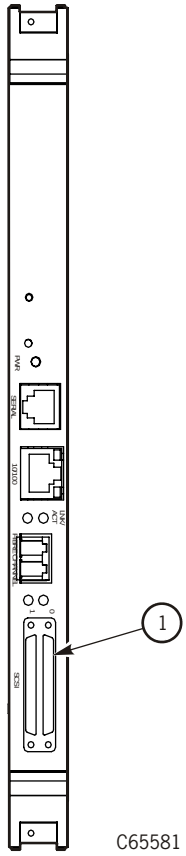
Note: SE is not supported by SCSI-2 protocols. While it is possible to mix SE and LVD devices on the same bus, doing so may result in substantially decreased performance on the bus.

To connect the control module to a SCSI bus:

1. Power off the libraries on the bus.
2. Connect a SCSI cable to one of the SCSI connectors (Figure 9) on the faceplate. Always install the control module as the last physical device on the SCSI bus; do not daisy-chain to another device.

Note: The L1400M1 (Lib 0) connects to port 0. The L1400P1 (Lib 1) connects to port 1.

Figure 9. Control Module SCSI Connections



1. SCSI ports

3. Make sure that the bus is correctly terminated. By default, the control module is automatically terminated. However, you must also terminate the device at the other end of bus.

   The following cables included with the L1400M1 have terminators as shown:

   - Lib 0 cable: 3148359xx (built-in termination)
   - L1b 1 cable: 3148360xx (in-line termination)

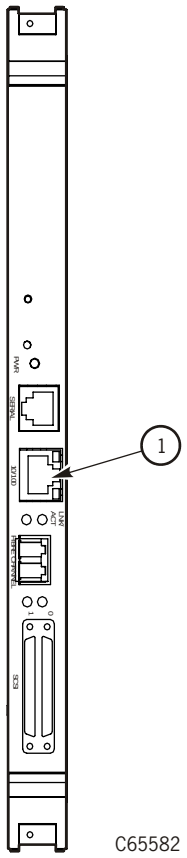
4. Power on the libraries.

5. After all the libraries have completed their individual POST (Power-On Self Test) processes, use the reset button to reboot the control module.

Ethernet Connection

10/100BaseT Ethernet connectivity provides enhanced management and configuration capabilities. The RJ-45 connector on the control module (Figure 10) can be directly connected to a standard 10/100BaseT Ethernet network.

Figure 10. Ethernet Port



1. Ethernet port

Setting the IP network address is recommended, but not required, in order to configure the control module from this port. The IP network address can be manually assigned or dynamically assigned (using DHCP). Depending on the network environment, you may be able to temporarily use the control module's default IP address of `1.1.1.1` to configure the control module.

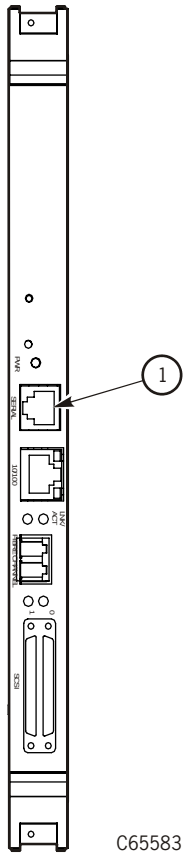
Note: The control module's default IP address of `1.1.1.1` is technically not a valid IP address. You should change the setting to a valid address. Refer to "Ethernet and SNMP Configuration" on page 131 for information on configuring the IP address.

Ethernet capabilities include Telnet, SNMP, and an HTTP interface known as Visual Manager for configuration and management. FTP is also supported for other management capabilities.

Serial Port Connection

The RJ-11 connector on the faceplate of the control module provides a serial port (Figure 11) that is compatible with RS-232 signaling levels. The control module is designed to communicate with a terminal or any operating system utilizing a terminal emulator. The baud rate, data bits, stop bits, parity, and flow control of both the control module and the host system must use the same settings. The Autobaud feature described below provides an effective method to set the baud rate of the control module and host system.

Figure 11. Serial Port



1. Serial port

Autobaud Feature

The autobaud feature automatically configures the baud rate on the control module. Once you set the baud rate in the terminal emulator, wait until the control module completes the Power-On Self Test (POST) and then the Firmware Initialization process. This can take up to 90 seconds, during which time the POST and initialization information may or may not be visible on the terminal or terminal emulator. After this process has completed, you can press the <Enter> key slowly 7 or 8 times (or just type `<shift-z>`) and the control module will automatically detect the baud rate being used by the serial port. The baud rate is then saved in the control module's configuration and is retained through future power cycles.

Note: Pressing the <Enter> key before the POST has completed is of no benefit to the Autobaud feature. Wait until both the POST and the Firmware Initialization processes have completed before pressing the <Enter> key. This may take up to 90 seconds.

The baud rate used by the terminal or terminal emulator must be 9,600, 19,200, 38,400, 57,600, or 115,200 for the autobaud feature to recognize it. The control module will not function properly at any other baud rate.

Setting Up Serial Port Communications

Leave the control module turned off until you have set up the serial port communications on your host computer, unless serial I/O was previously established and is currently running.

The control module can communicate with a terminal or any operating system utilizing a terminal emulator. For example, Windows 9x, NT 4.0, Windows 2000, and Windows NT operating systems can use Hyperterminal. Be sure the baud rate, data bits, stop bits, parity, and flow control are set correctly.

To set up serial communications with the control module:

1. Set up the serial port communications on your host terminal.
2. Plug the serial cable into one of the host computer's serial ports (COM1 or COM2), and then plug the other end of the serial cable into the control module's serial port.

Note: If you are unable to connect to the control module, press the control module RESET button.

3. Start the terminal emulator.
4. Set the terminal emulator to use the appropriate COM port.

Note: Auto Detect or VT100 are the recommended settings for Windows HyperTerminal emulation type.

5. Specify the following settings for the port:

Baud Rate:	9,600, 19,200, 38,400, 57,600, or 115,200 (Default)
	Note: Autobaud only recognizes these baud rates)
Data Bits:	8
Stop Bits:	1
Parity:	None
Flow Control:	None or XON/XOFF

Configuration Procedures

3

There are a variety of ways to configure the L1400M Interface Control Module (control module). The following are general procedures for setting up basic operational status. Not all of these exact settings will apply to every environment, but this chapter should provide guidance for some of the basic considerations when configuring the control module.

Quick Setup from the Visual Manager Interface

1. Ensure the Ethernet setting has been changed to “DHCP enabled” or that a valid IP address and IP gateway have been entered to properly configure the control module for network operation. Depending on the network environment, it may be possible to use the control module’s default IP address of `1.1.1.1` to configure the control module.

   Note: The control module’s default IP address of `1.1.1.1` is technically not a valid IP address. You should change the setting to an IP address that is valid address (via the serial interface). Refer to “Ethernet and SNMP Configuration” on page 131 for information on configuring the IP address.

2. Enter the control module IP address into the browser Address field and press the <Enter> key.

3. In the Visual Manager home page, click on the port in the GUI or select `Ports` from the `MAIN MENU` on the left.

4. When the security page appears, enter the appropriate user ID and password values and then select the `Submit` button. The default user name is `root` and the default password is `password`.

5. Select the Fibre Channel port.

6. Set the Discovery Mode to `Auto Discovery on Reboot Events`. If you are using a switch, toggle Port Mode to the `N-Port` setting. When finished, select the `Submit` button.

7. Verify that the libraries are not set to SCSI ID 7. If ID 7 is used, then set the Initiator ID to a different value. Initiator ID 7 is the default SCSI ID used on the control module. To change the Initiator ID, select the appropriate SCSI bus and then select a SCSI ID that is not in use. When finished, select the `Submit` button.

8. Reboot the control module by selecting the Reboot menu option. In about 30 seconds, the control module will once again display the Home page of the Visual Manager interface.

   Note: Some older browsers must be manually returned to the desired page after the reboot page counter has completed counting down to 0.

9. If the control module does not see Lib 0 or Lib 1, repeat steps 4-6 above, and check that the initiator ID(s) are set to a unique value for the selected bus. Again, you must submit any changes and reboot the control module. Check the libraries to make sure they have unique SCSI IDs.

You have now successfully configured the control module for what is commonly known as Initiator Mode. This procedure may not apply to all situations but does address most key issues required for initial setup.

Quick Setup from Serial/Telnet Interface

1. In the main menu of the serial interface, there are a number of menu options. Select menu option `1`, `Perform Configuration`.

2. Select option `5` to toggle the Discovery Mode until it reads `Auto Discovery on Reboot Events`.

   a. If you are using a switch, toggle option `8` to the `N-Port` setting.

   b. When finished, enter `X` to exit this menu.

3. If attaching the control module to a server via a Fibre Channel, verify that SCSI ID 7 is not in use by any devices being attached to the control module.

   a. Select option `4`, `Parallel SCSI Configuration`.

   b. From the `Parallel SCSI Configuration Menu`, press the <Enter> key to select the appropriate SCSI bus

   c. Select option `1`, `Edit Initiator Settings`. The current setting for Initiator ID is shown.

      Note: If ID 7 is used, set the Enactor ID to a value different from any SCSI IDs already in use on the SCSI bus for the devices you are attaching to the control module.

   d. To change the Initiator ID, select option `1`, `Select primary SCSI Initiator ID` and choose a SCSI ID that is not in use by any device(s) attached to the control module.

   e. When finished, enter `X` to exit this menu and then again to exit back to the Parallel SCSI Configuration Menu.

4. If attaching the control module to a server via a Fibre Channel HBA, verify that SCSI ID 7 is not in use by any devices being attached to the control module. If ID 7 is used, then set the Initiator ID to a value different from any SCSI IDs already in use on the SCSI bus of the devices you are attaching to the control module. Initiator ID 7 is the default SCSI ID used on the control module. To change the Initiator ID, select the appropriate SCSI bus and then select a SCSI ID that is not in use by any device(s) attached to the control module. When finished, enter `X` to exit this menu.
5. To enable remote management capabilities, change the Ethernet settings to `DHCP enabled` or enter a valid IP address and IP gateway so the control module is configured properly for network operation. Select option `2` from the configuration menu to access Ethernet settings. Select option `7` to toggle DHCP on or off.
6. Select option `X` to exit to the Configuration Menu.
7. Select option `A` to save your configuration changes to the control module. Once the control module saves your configuration changes, enter `X` to exit to the `MAIN MENU`.
8. Select option `4` to reboot the control module. In about 30 seconds, the control module will once again display the main menu.
9. If the control module does not see all of the devices expected, repeat steps 4-6 above, and check that the initiator ID(s) are set to a unique value for the selected bus. Again, you must save any changes and reboot the control module.
10. You have now successfully configured the control module. The control module should now be operating in what is commonly known as Initiator Mode. This procedure may not apply to all situations but does address most key issues required for initial setup.

Addressing and Device Management

4

The L1400M Interface Control Module (control module) is preconfigured for the most common L1400M environments. In most cases, changes are not required. The following guidelines are provided in case configuration modifications are necessary.

To provide connectivity between hosts and devices, it is necessary for the L1400M Interface Control Module (control module) to establish itself with an address on each connected Fibre Channel network and SCSI bus.

Addressing on SCSI Buses

The control module appears on a SCSI bus as a single initiator. Set the Initiator ID to any valid SCSI address (0-15). The robot may not use this address. Ensure that a FC host is not itself connected to the bus.

The control module provides the capability to reset SCSI buses during the control module boot cycle. This allows the robot on a given SCSI bus to be in a known state. The feature is enabled in the default configuration but should be disabled for configurations using multiple initiators, tape changers, or other devices that have long reset cycles, or are adversely affected by bus resets.

FC Port Configuration

By default, the configuration of the FC ports on the control module is set to Auto Sensing to detect whether an Arbitrated Loop or Switched Fabric is used. However, in situations where another FC device such as a switch is also using auto sensing for FC ports, it may be necessary to manually set the FC port configuration of the control module to N_Port mode. As an example, if there is a switch or other device using U-ports on a fabric, the control module may need to use N_Port mode.

For more information, see the Fibre Channel Configuration sections in Chapter 5, “L1400M Interface Control Module Management” and Chapter 6, “Using L1400M Visual Manager.”

FC Arbitrated Loop Addressing

On a Fibre Channel Arbitrated Loop, each device appears as an Arbitrated Loop Physical Address (AL_PA). To obtain an AL_PA, the control module can use two addressing methods: soft and hard addressing. Soft addressing is the default setting. For hard addressing, the user specifies the AL_PA of the control module.

Soft Addressing

When acquiring a soft address, the control module acquires the first available loop address starting from address 01 and moving up the list of available AL_PAs in the chart from 01 to EF. In this mode, the control module obtains an available address automatically and then participates on the FC loop, as long as there is at least one address available on the loop connected to the control module. Fibre Channel supports up to 126 devices on an Arbitrated Loop.

Hard Addressing

When acquiring a hard address, the control module attempts to acquire the AL_PA value specified by the user in the configuration settings. If the desired address is not available at loop initialization time, the control module comes up on the FC loop using an available soft address. This allows both the loop and the unit to continue to operate. An example of this would be when another device on the Arbitrated Loop has acquired the same address as that configured on the control module.

Hard addressing is recommended for FC Arbitrated Loop environments where it is important that the FC device addresses do not change. Device address changes can affect the mapping represented by the host operating system to the application, and have adverse effects. An example of this would be a tape library installation, where the application configuration requires fixed device identification for proper operation. Hard addressing ensures that the device identification to the application remains constant.

FC Switched Fabric Addressing

When connected to a Fibre Channel switch, the control module is identified to the switch as a unique device by the factory programmed World Wide Name (WWN).

Discovery

Discovery is a feature that makes it easy to display attached tape devices. Discovery should be set to occur after reboot events (when the control module reboots) or after link-up events (for instance, when cables are attached or a hub is rebooted). Discovery can also be turned off by setting the control module to `Manual Discovery Only` (default setting).

For specific information on Discovery settings, see the Fibre Channel Configuration and SCSI Configuration sections in Chapter 5, “L1400M Interface Control Module Management” and Chapter 6, “Using L1400M Visual Manager.”

Host Device Configuration

A host system using a Fibre Channel Host Bus Adapter (HBA) will typically map devices into the existing device mapping scheme used by that operating system. Refer to the HBA manual for the mapping table.

Mapping usually involves pairing FC AL_PAs to SCSI target addresses. The HBA will claim enough SCSI bus entries to allow for 125 FC targets to map to SCSI Bus:Target entries. This is usually done by a fixed mapping of AL_PA to Bus:Target. In such a configuration, the control module corresponds to a Bus:Target identifier, with the SCSI devices attached to the control module appearing as logical units (LUNs). Operating systems can extend the available SCSI limit of 15 targets per bus. Although this is not an issue for the operating system or most applications, there are cases where older applications can have expectations about what are valid SCSI IDs, and not correctly handle certain mappings. In particular, applications have been seen to exhibit difficulties addressing target IDs greater than 15 (e.g. 16 and up). Resolve this problem by configuring the control module to use hard addressing, and setting the AL_PA used by the unit to a value that the HBA will map to an ID with a value less than 16.

For example, depending on the FC HBA, if the hard AL_PA selection is 1, the address is 1. If the selection is 125, the AL_PA address is 0xEF. Some FC HBA’s will configure differently, so verify the AL_PA by reviewing the documentation for the HBA.

Advanced Features

Advanced features supported by the control module include:

- Slot licensing
- Library partitioning
- Library Aggregation

Slot licensing and library partitioning are optional features that are purchased from Sun Microsystems and can be enabled by the operator. Library aggregation is enabled by the Sun Service Representative when two libraries are connected with a pass-thru port. Refer to *L180/L700x/L1400x Ordering and Configuration Guide*, PN MT9112 for information regarding the purchase of additional capacity (slot licensing) and library partitioning.

Slot Licensing

The control module supports 200 slot licenses by default. You can purchase additional slot licenses from 300 to 700 slots in 100-slot increments. With Aggregation enabled, you can purchase slot licenses from 800 to 1,344 slots, in 100-slot increments. For information on management of slot licenses, refer to "Slot Licenses" on page 121.

Library Partitioning

Partitioning is an advanced feature which replaces the Slot Balancing menu with a Partitioning menu. This feature allows the combined assets of one or two libraries to be allocated into smaller virtual libraries, applying to either an individual library or an aggregated virtual library consisting of two libraries. A maximum of six partitions can be created. Beyond the management of slot licenses available from the Slot Balancing menu, Partitioning enables management of slots, drives, and caps for each partition created. For more information on management of partitions, refer to "Main Menu > Partitioning" on page 101.

Library Aggregation

When Aggregation is enabled, the Slot Balancing and Partitioning menus gain additional functionality. Aggregation consolidates the assets of two libraries into one virtual library that can be managed as a single system. When Aggregation is enabled, the system aggregates a second library with the initial library and presents the two libraries as one virtual library. The user may also distribute available slot licenses between the aggregated libraries. This adds a greater degree of flexibility for Slot Balancing and Partitioning. For more information on aggregation, refer to "Library Aggregation" on page 122.

Logical Unit Management

Because SAN resources can be shared, it is possible for multiple hosts to have access to the same devices on the SAN. To prevent conflicts, the control module provides the means to restrict access and only allow hosts to find and access selected devices. Simple LUN masking can restrict access but may leave gaps in the list of LUNs presented to a host, since devices are always associated with fixed LUNs. The control module, however, provides controlled access to devices by use of LUN management which goes beyond simple LUN masking.

LUN Management is the ability to present different hosts with different views of the physical and partitioned SCSI changer(s)[1] accessed through the control module. For example, one FC host may see three disk LUNs and a tape LUN at LUNs 0 to 3 when it performs discovery on the control module. Another FC host may only discover a tape LUN at LUN 0. Not only can the administrator control which SCSI changers a host may access but also which LUNs are used to access these devices.

LUN Management is accomplished by allowing the administrator to configure multiple maps each of which may present a different view of the devices behind the control module. You can associate each host accessing the control module with a specific map.

For a host connected to an FC port, a map is a table of LUNs where each entry in the table is either empty or contains SCSI changer address information needed to route commands to the appropriate device.

Each port on the control module, both FC and SCSI, has a set of maps which include both user defined maps and a few special predefined maps.

There are currently three special predefined maps: Indexed, Auto Assigned, and SCC maps. Until a user configures the control module otherwise, the default setting is Indexed.

- The Indexed map is initially empty but the user can modify it.
- The Auto Assigned map is built dynamically and contains all the SCSI changers found during discovery. This map will change automatically any time discovery finds a change in the devices attached to the control module. You can display the map, but not directly modify it.
- The SCC map is only available on FC ports and contains only a single entry. LUN 0 is a control module controller LUN and access to devices behind the control module is handled by using SCC logical unit addressing.

1. “SCSI Changer” refers to the library robot.

When a host sends a command to the control module, the control module will select which map to use, based on the port receiving the command and the ID of the host sending the command. For FC ports the host ID is the World Wide Name and for SCSI buses the host ID is the initiator ID (0 - 15). When a host is unknown to the control module or is not attached to a specific map, the control module will use the default setting for mapping. You can set the default for each port to Auto-assigned, Indexed, or SCC (applies to FC ports only).

L1400M Interface Control Module Management

5

Use either of the following interfaces to manage the L1400M Interface Control Module (control module):

- Serial port via a terminal or terminal emulation utility.
- Ethernet via a Telnet utility, an HTTP-based interface called Visual Manager, or an SNMP management tool. Further, FTP support provides additional management functionality.

Before attempting to configure the control module, a basic understanding of Fibre Channel and SCSI devices is recommended.

Note: For information on SCSI standards, refer to publications from the T10 committee of InterNational Committee for Information Technology Standards (INCITS). For information on Fibre Channel standards, refer to publications from the T11 committee of INCITS. INCITS is the primary U.S. focus of standardization in the field of Information and Communications Technologies (ICT), encompassing storage, processing, transfer, display, management, organization, and retrieval of information. INCITS also serves as the ANSI (American National Standards Institute) Technical Advisory Group for ISO/IEC Joint Technical Committee 1. JTC 1 is responsible for International standardization in the field of Information Technology. To purchase approved INCITS Standards and Technical Reports, visit INCITS Online at http://www.techstreet.com/incitsgate.tmpl or call INCITS at 202.737.8888.

Configuration Methods

You can configure the control module over the serial port via a terminal or terminal emulation utility, or over Ethernet via a Telnet utility, Visual Manager, or SNMP management tool. FTP is also supported on Ethernet to update firmware revisions.

Serial

The serial port allows for configuration of device characteristics from an attached terminal or terminal emulator. For instructions on use of the serial interface, refer to Chapter 7, “Using the Serial/Telnet Interface.”

Note: A Serial connection cannot be made if a Telnet session is already open. If a user attempts to open a serial connection while a Telnet session is already open, the following message appears over the serial interface:

```
System in use via Telnet. Shell restarted.
```

The serial interface will resume working when the Telnet session closes.

Ethernet

The 10/100BaseT Ethernet port must first be configured via the serial port with an appropriate IP address, subnet mask, and gateway prior to use unless the default values are to be used. The factory default values that are used by the control module are IP address 1.1.1.1, a subnet mask of 255.255.255.0, and a gateway address of 0.0.0.0. At a minimum, the IP address should be changed from the default value (see “Ethernet and SNMP Configuration” on page 131).

When setting the IP address for the control module, there are two options (both are described in “Ethernet and SNMP Configuration” on page 131):

- The first option is to enter a fixed, or permanent, IP address for the control module.
- The second option is to enable DHCP on the control module so that a DHCP server (on the Ethernet network used by the control module) can assign a dynamic IP address to the control module.

Your DHCP server may also allow you to set up a lease reservation for an IP address by providing the server with the Ethernet MAC address of the control module. This sets the DHCP server to always provide the same IP address to the control module. This setup can be useful for remote management of the control module via Telnet or Visual Manager. Because the method of setting up a lease reservation varies depending on the DHCP server being used, you should contact your Network Administrator for assistance.

Telnet

The control module is capable of holding Telnet sessions for configuration purposes. The configuration menus accessed via the serial port will be disabled when a Telnet session is connected. To open a Telnet session, the IP address of the control module and a Telnet client utility are required.

Note: Rebooting the control module will close the Telnet session. After the control module reboots and completes POST, the user will have to restart or re-open the Telnet session.

Resetting a control module to factory defaults and rebooting will render the control module unable to use a gateway until the IP address and gateway are re-configured via the serial interface. This will result in a loss of connectivity during a Telnet session.

From most Windows 9x, NT, and Windows 2000 systems, users can start a Telnet session from the DOS (or Command) prompt using the following steps:

1. From the Windows Start menu, open the DOS (or Command) prompt window.
2. At the ‘>’ prompt, enter the following command

   `TELNET <IP address>`

   where `<IP address>` is the IP address of the control module. This will start a Telnet session window for the control module.
3. Enter `root` for the default user name and `password` for the default password. You should change the user name and password as soon as possible.
4. Access configuration options in the same way used for the serial interface.
5. To exit the Telnet session, select the `Disconnect` option from your Telnet client utility. In most Telnet utilities, this option is available as a menu item.

Visual Manager

The control module allows any standard Internet Web browser to view and change the control module’s configuration with the Visual Manager interface. Information is dynamically generated in an HTML format by the control module so that Web browsers can access it.

To access Visual Manager, enter the IP address of the control module into the Address field of a Web browser. Or, you can enter a URL using a host name defined by the user—for instance, http://L1400M. But the user must define the host name on the DNS server first.

To make changes to settings, use standard keyboard and mouse controls to input information and then select the `Submit` button to send the changes to the control module.

A user name and password are required before submitting any changes. The default user name is `root` and the default password is `password`. You change the user name and password as soon as possible.

Changes will not take effect until the next time the control module reboots but you can force it to reboot by selecting the `Reboot` option.

For more information about the Visual Manager interface, refer to Chapter 6, “Using L1400M Visual Manager.”

SNMP

The control module includes SNMP management support. SNMP commands are transported via Ethernet. The control module supports FA MIB 2.2 and a private Crossroads Enterprise MIB. Both MIBs are described in Appendix E.

Inband SCSI-3 Commands

The control module supports a set of SCSI-3 commands that can be received as FCP commands over the Fibre Channel ports. When using these commands, they must be sent to a tape LUN or Controller LUN of the control module. For more information, see Appendix B, “Inband SCSI-3 Commands.”

Using L1400M Visual Manager

6

This chapter describes the StorageTek Visual Manager. The current configuration and operating status of the L1400M Interface Control Module (control module) can be accessed from any standard Web browser, after the user logs in with the appropriate username and password. Information is presented in HTML format in accordance with the W3C specification for HTML 3.2. Current W3C Recommendations and other technical documents can be found at http://www.w3.org/TR/.

Visual Manager allows access to configuration settings such as:

- Baud rate of the serial port
- Fibre Channel address
- Ethernet IP and MAC addresses
- Device Mappings
- Trace level settings

Most settings may be changed and saved to the control module.

Note: Unless otherwise indicated, configuration changes take effect when the unit next powers on or reboots.

Accessing Visual Manager

1. Connect a 10baseT or 100baseT Ethernet cable to the control module.

Notes: This procedure assumes the library, control module, and host computer are already powered up and operating. If you are powering up the library at this time, then you must reset the control module after the library becomes ready.

If you reboot the library at any time after power up, you must reset the control module after the library becomes ready.

2. Reset the control module, if necessary.

3. If the IP address for the control module is known, open the host computer's Web browser and enter the IP address into the Address field. The factory default for the IP address of the control module is `1.1.1.1`. See the Network settings for DHCP in this chapter and in Appendix E, "Management Information Bases."

Note: The control module's default IP address of `1.1.1.1` is technically not a valid IP address. Change the setting to a valid address (see "Ethernet and SNMP Configuration" on page 131).

If you do not know the IP address of the control module, connect to the control module using the serial (RS-232) connection. Current settings can be viewed and changed from the Network menu.

Note: To access Visual Manager, the control module must be assigned an IP address. The factory default setting for the IP address allows access on a local area network only. If the factory default for the IP address is already used by another device on the local network, the IP address must be changed.

For remote access from WAN or Internet locations, the IP address must be changed to a valid IP address. Valid IP addresses have the form *x.x.x.x* where each x is an integer in the range of 0 to 255.

4. You will be taken to the control module's home page, which displays a snapshot of the device's current status. The home page is accessible to anyone who knows the control module's IP address. When selecting a menu item from the navigation bar for the first time, however, the user will be prompted to log in with a user name and password. The defaults are `root` for user name and `password` for password. This information is required only once per session.

Note: You should change the user name and password from the defaults. For more information, see "Main Menu > System > User" on page 79.

5. After entering the user name and password, full access is gained to the configuration menus for as long as a session lasts. A session ends when the user exits the Web browser. Log-in will be required again the next time you open a session.

Note: To end the current session of Visual Manager, it is necessary to close the browser window. Merely navigating the browser to another URL is not sufficient to end the current session.

■ Making Changes via Visual Manager

To make changes to settings, use a standard keyboard and mouse to enter new information. Click the `Submit` button to send changes from the Web browser to the control module. Changes will not take effect until the next time the control module reboots. Select the `Reboot` option from the `MAIN MENU` to force a reboot.

Detailed instructions about all settings are provided later in this chapter.

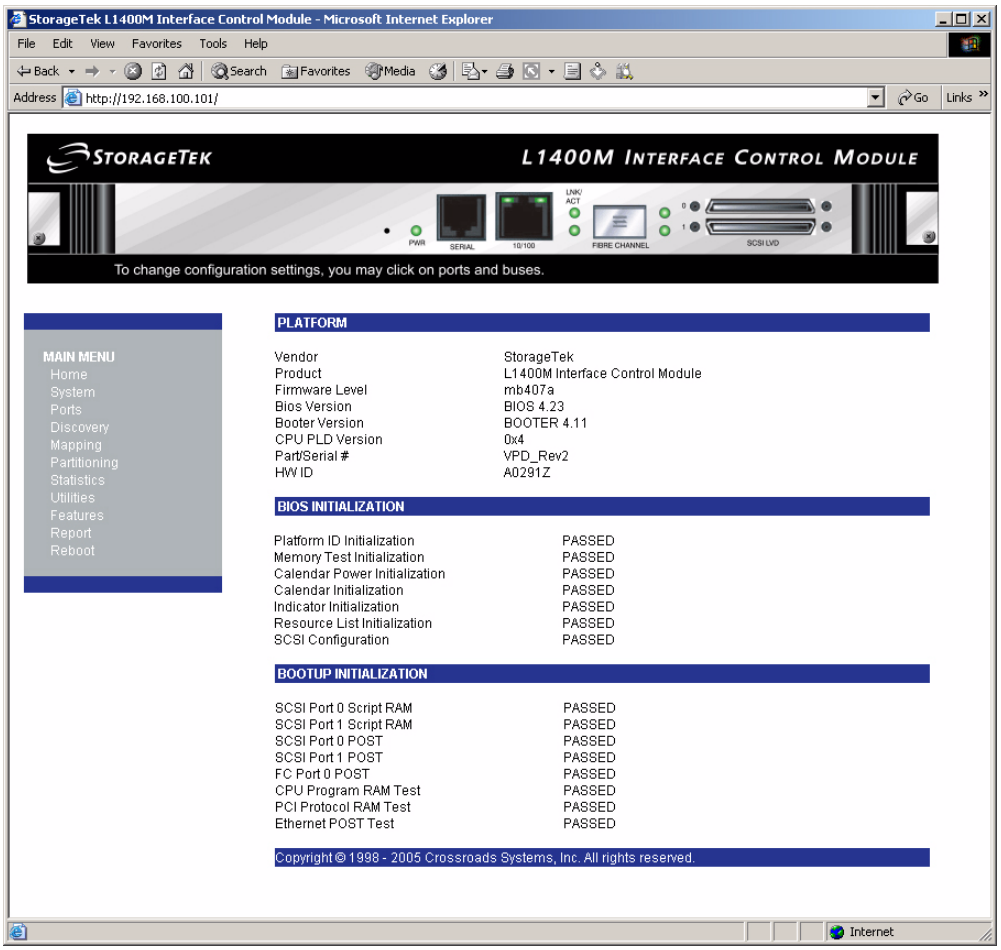
Notes: Menus are not case sensitive. You can enter uppercase and lowercase characters interchangeably.

Do not bookmark Visual Manager pages with a Web browser. Because configuration information is transmitted via URLs, it is possible that the control module could be configured with information present at the time a page was bookmarked. For similar reasons, do not to use navigation features of the Web browser (such as the Back button) to navigate Visual Manager.

Navigate only using the Web page links contained in Visual Manager itself. Depending on the Web browser used, these links often appear as highlighted text. By clicking on these links, Visual Manager can be safely navigated.

The home page (Figure 12) appears when Visual Manager is first accessed.

Figure 12. Visual Manager Home Page



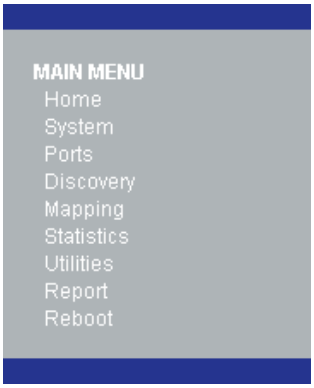
Clicking on the StorageTek logo in the upper left corner of Visual Manager opens the Sun/StorageTek company website, if access to the Internet is available.

The control module faceplate is shown on the home page. On all password protected pages of the Visual Manager interface, not including the home and report pages, the control module image is interactive, and available for most menus.

Clicking on a port opens a menu for making changes to settings for that particular port.

The navigation bar (Figure 13) on the left side of the control module home page provides a list of menu items that are links to various control module functions, information, and other menus.

Figure 13. Navigation Bar



Main Menu

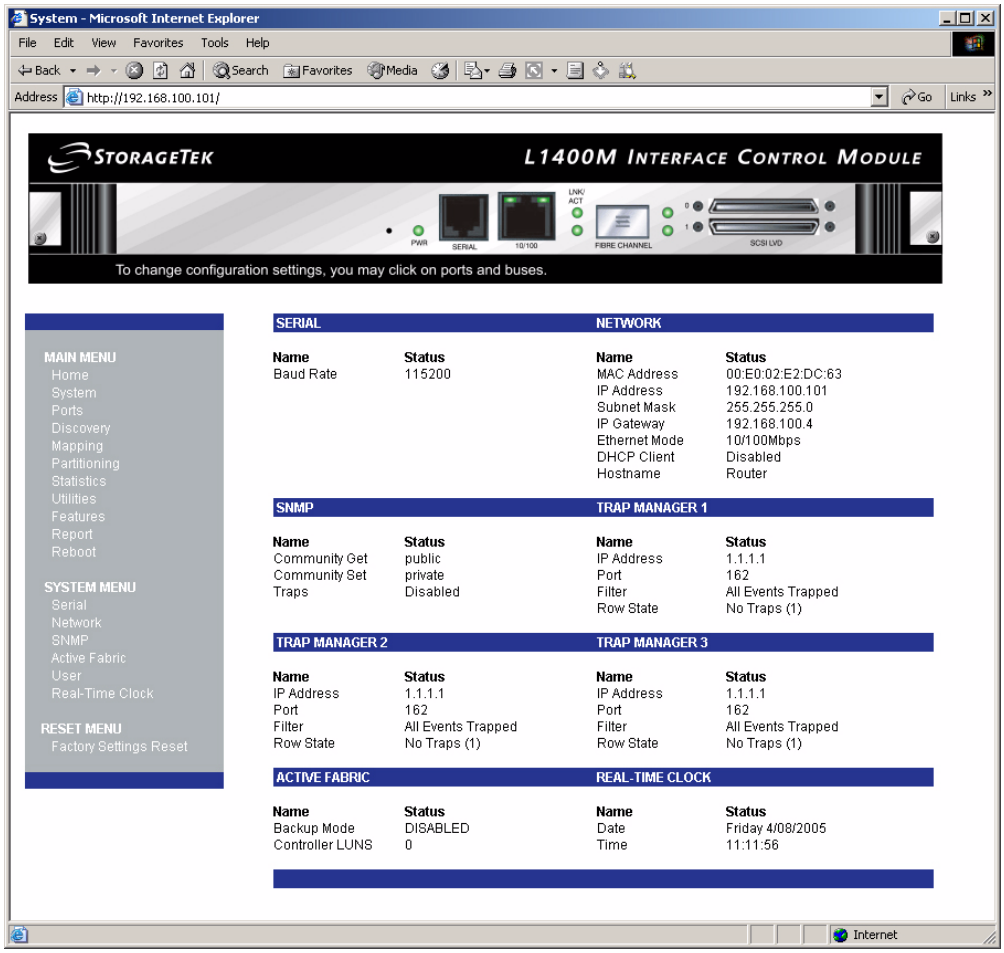
The following are descriptions of the MAIN MENU navigation bar items.

Main Menu > System

Use the system page (Figure 14) to view system status and configure standard system components.

To view status information or perform configuration on ports, use the Ports menu (see "Main Menu > Ports" on page 82).

Figure 14. System Page

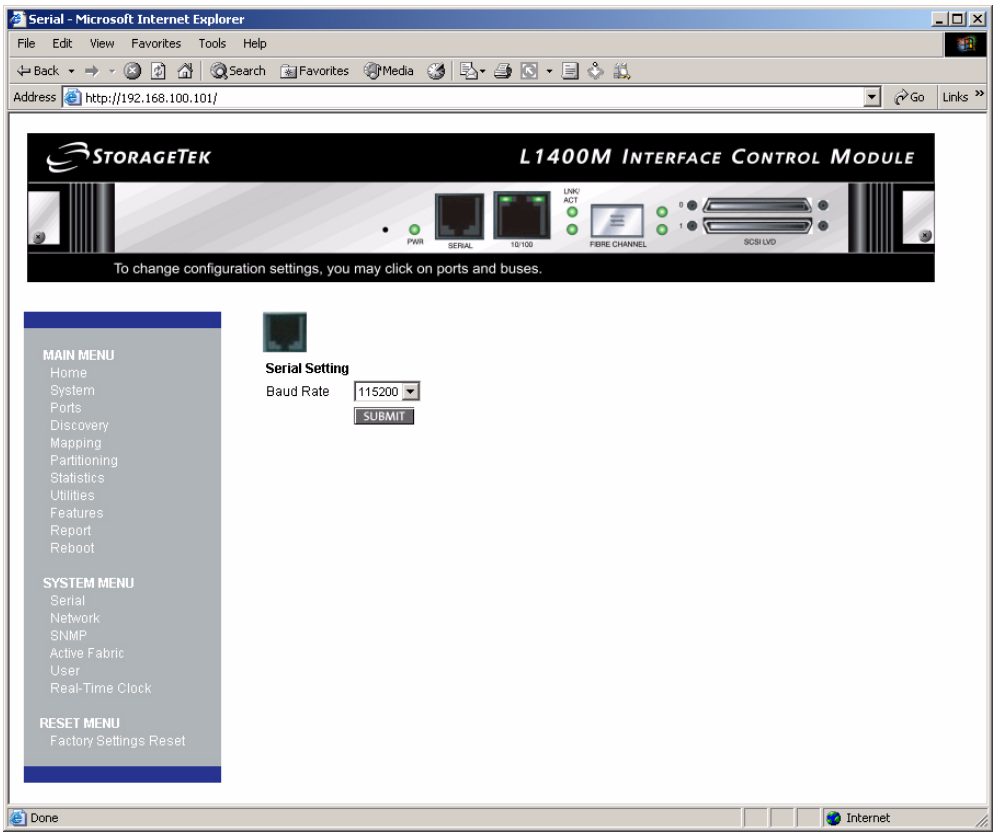


Main Menu > System > Serial

Use the serial configuration page (Figure 15) to change the serial port baud rate.

If you are using the Autobaud feature, it may not be necessary to set the baud rate. See “Autobaud Feature” on page 51 for more information.

Figure 15. Serial Configuration Page



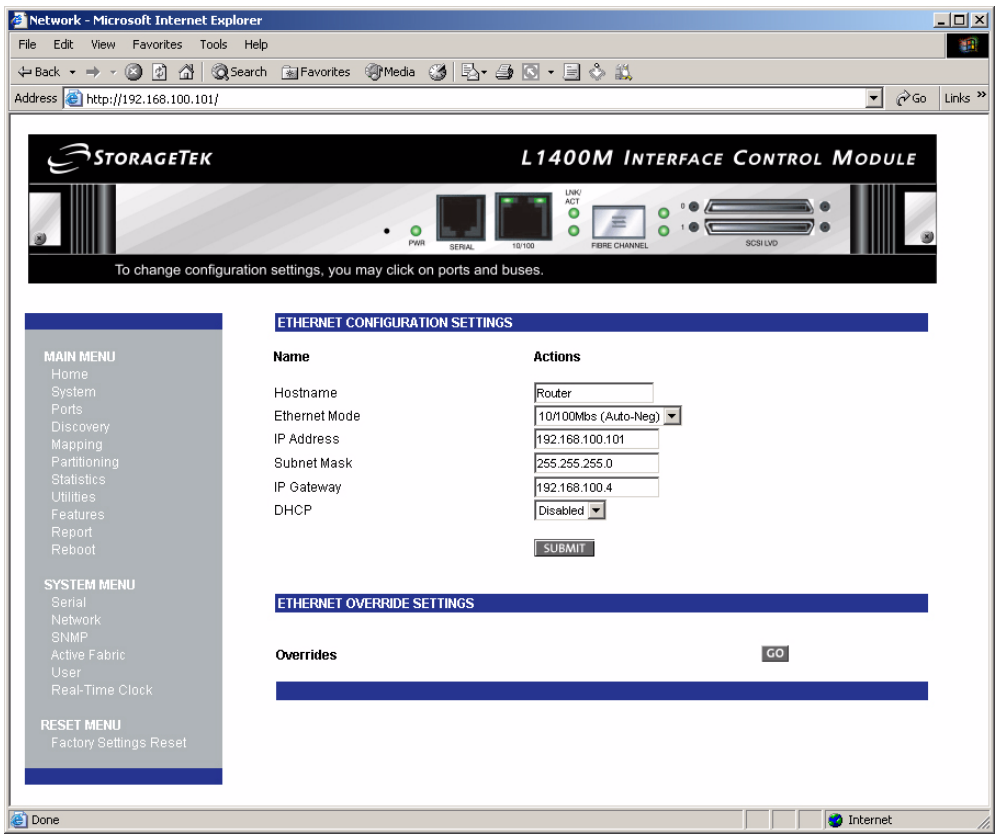
`Baud Rate` sets the serial port baud rate. The baud rate shown is the current setting. The default Baud Rate setting is `115200`.

To make any changes, modify the entry then click the `Submit` button.

Main Menu > System > Network

Use the network configuration page (Figure 16) to set network configuration.

Figure 16. Network Configuration Page



To make any changes, modify the entries as described below and then click the `Submit` button.

- `Hostname` is an alphanumeric entry of one word up to 8 characters long. To change this entry, enter a new hostname and click the `Submit` button.
- `Ethernet Mode` can be toggled among the following options:
  `10Mps Only`
  `100Mps (half duplex) Only`
  `100Mps (full duplex) Only`
  `10/100Mps (Auto-Neg.)`
- `IP address` is the IP address of the control module. The default setting is `1.1.1.1`.
- `Subnet Mask` is the IP subnet mask for the control module. The default setting is `255.255.255.0`.
- `IP Gateway` is the IP address of the gateway for the Ethernet network connected to the control module.

- `DHCP` enables/disables support for Dynamic Host Configuration Protocol (DHCP). When enabled, the control module retrieves a dynamic IP address from a DHCP server located on the Ethernet network to which the control module is connected. Once DHCP is enabled, it is necessary to reboot the control module (see "Main Menu > Reboot" on page 125) before an IP address will be requested from the DHCP server. After the control module finishes rebooting, the HTTP session will have to be restarted. The IP address will be different than the former non-DHCP IP address.

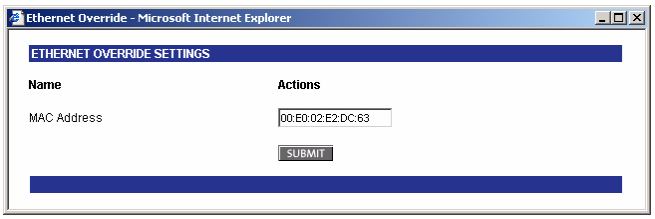
  Note: To use the DHCP feature, a DHCP server must be operational on the Ethernet network connected to the control module. If the DHCP feature is used when there is no DHCP server, the standard for DHCP requires that the control module wait three minutes for a response from a DHCP server before timing out. During this period, the control module menus and functions will not be accessible.

  A DHCP server may allow the setup of a lease reservation for an IP address if provided with the MAC address of the control module. This forces the DHCP server to always provide the same IP address to the control module. This setup is useful for remote management of the control module via Telnet or Visual Manager. Because the method of setting up a lease reservation varies depending on the DHCP server, you should contact your Network Administrator for assistance.

- `Override Settings` (Figure 17) are provided to enhance interoperability with some storage devices that require special consideration during setup of the control module configuration menus. To access the Overrides Settings, click the `Go` button.

  To finalize any changes for the override settings, click the `Submit` button beneath the override menu options.

Figure 17. Overrides Settings Screen

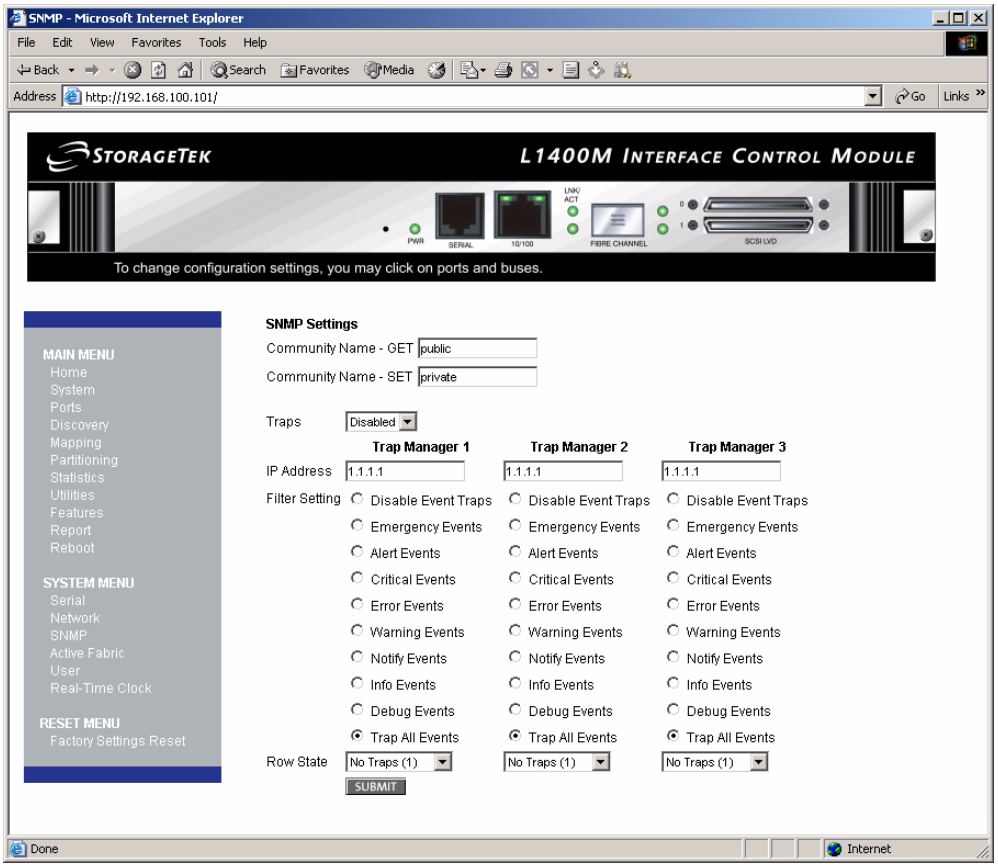


- `MAC address` is the Ethernet physical address of the control module. Ethernet physical addresses are always assigned to Ethernet adapters by the manufacturers.

Main Menu > System > SNMP

Use the SNMP configuration page (Figure 18) to configure SNMP options.

Figure 18. SNMP Configuration Page



To make any changes, modify the entries as described below and then click the `Submit` button.

The SNMP GET community name is checked for each GET request received. The community name in the SNMP packet must match the one here to complete the SNMP GET request. Set your SNMP manager to the same GET and SET community names as the control module.

- `Community Name - GET` has a default setting of `public`.
- `Community Name - SET` has a default setting of `private`. This option is only applicable for the FA MIB 2.2. See Appendix E, “Management Information Bases” for more information.
- `Traps` enable/disable SNMP traps for manager IP addresses. If Traps are disabled, no Trap events are sent. If Traps are enabled, up to three manager IP addresses can be set up for traps.

- `Trap Manager IP Address`: Enter a valid IP address for an SNMP Manager tool. Typically, this is the IP address of the machine using the network management application and/or a MIB browser.

- `Trap Manager Filter Setting` is used to set a filter on Trap event notifications going to a specific Manager tool. The level of filtering can be total blocking (`Disable Event Traps`) for this particular Manager, all the way to no blocking (`Trap All Events`). In the column for each Trap Manager are radio buttons for the SNMP-defined event filter levels.

  - To turn off event notification for a specific Trap Manager, select the `Disable Event Traps` button in that Manager's column.
  - To turn on event notification for a specific Trap Manager, select the button of the desired event filter level in that Manager's column.

  Note: Each successive level is inclusive of the defined events above it. For instance, `Critical Events` filter setting will also enable notification of alert events and emergency events.

  `Trap Manager Filter Setting`: Select the desired filter level for Trap Manager 1, 2, or 3 by clicking the button beside a defined event type in that Manager's column. The factory default setting is the total blocking of notification (`Disable Event Traps`).

  Note: This setting is locked unless the Trap feature is enabled via the `Traps Enabled/Disabled` setting, above.

  - `Disable Event Traps`
  - `Emergency Events`
  - `Alert Events`
  - `Critical Events`
  - `Error Events`
  - `Warning Events`
  - `Notify Events`
  - `Info Events`
  - `Debug Events`
  - `Trap All Events`

- Trapped events are also logged directly to the control module, in its Event Log. This log can hold over 2,000 event entries. When full, new events will begin replacing the oldest event entries.

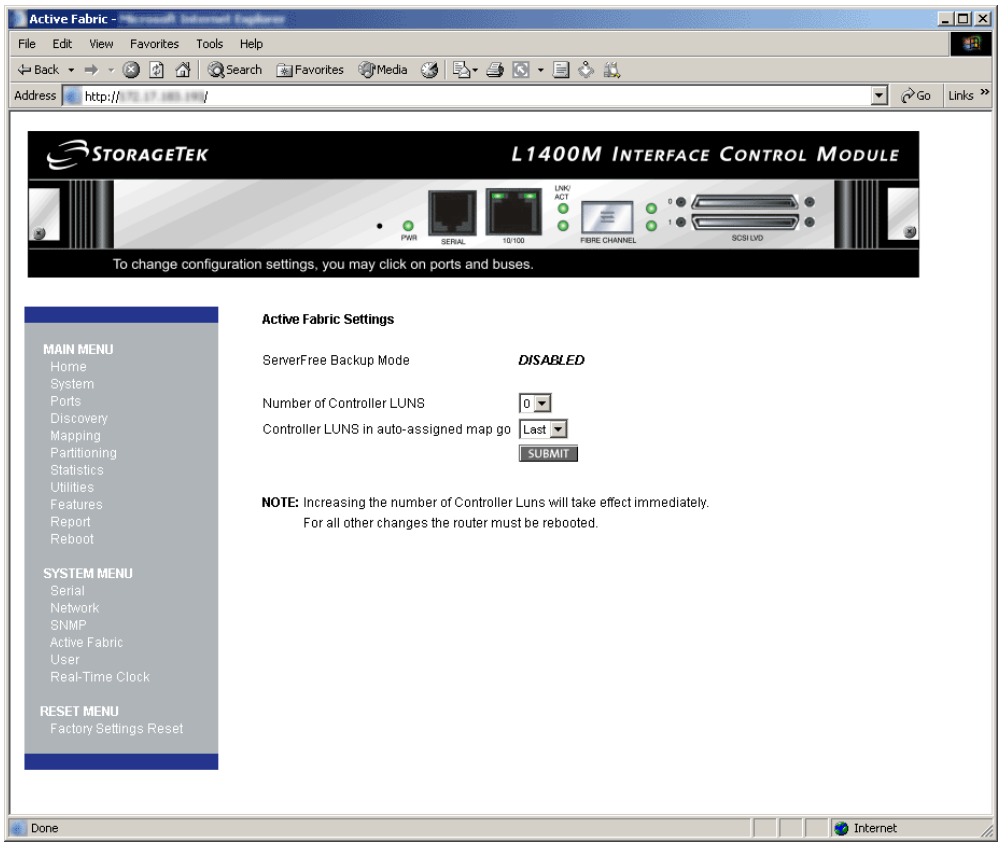
  Note: Be sure to correctly set the clock and date (see “Main Menu > System > Real-Time Clock” on page 80), so that event logging timestamps are accurate.

- `Row State`: Use the field's down arrow to select an integer in the range of 0 through 3.
  - `Disabled (0)`: Clears to the default settings.
  - `No traps (1)`: No traps exist.
  - `Row Exists (2)`: Row created in inactive mode; row exists but traps are not sent to the Trap Manager.
  - `Send Traps (3)`: Row created in active mode; row exists and traps are sent to the Trap Manager.

Main Menu > System > Active Fabric

The active fabric configuration menu allows setup of Active Fabric® options.

Figure 19. Active Fabric Configuration Screen



To make any changes, modify the entries as described below and then select the `Submit` button.

- `Server-Free Backup Mode` toggles between Enabled and Disabled. This feature must remain disabled.
- `Number of Controller LUNs` sets the number of controller LUNs reported by the router. The number must be in the range of 0 to 4.

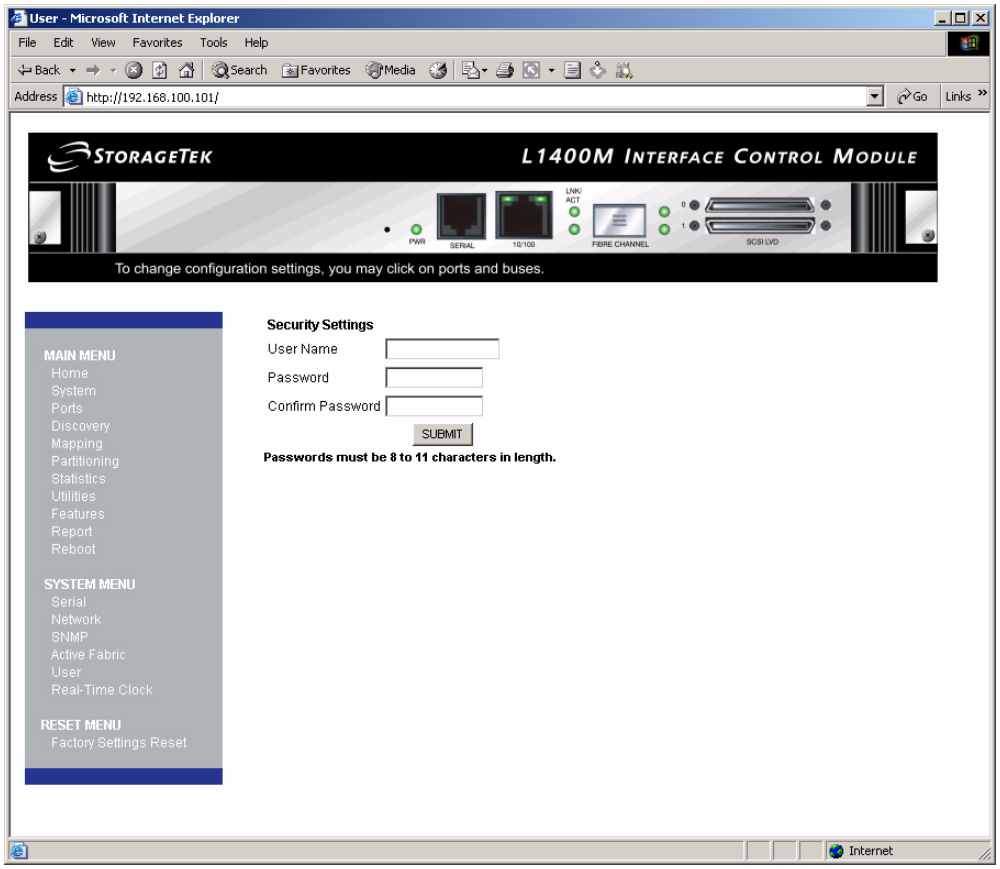
For information on controller LUNs, see Appendix B, “Inband SCSI-3 Commands.”

Chapter 1, “Introduction” also has general information on server-free backup.

Main Menu > System > User

Use the user configuration page (Figure 20) to configure user access security options.

Figure 20. User Configuration Page



Security settings include the `User Name` and `Password`. The user name and password should be unique and kept confidential. Use a combination of letters and numbers when creating user names and passwords. For the password, enter the password in the `Confirm Password` field to help ensure there are no errors made in the password. Then, click the `Submit` button to activate the user name and password you have setup.

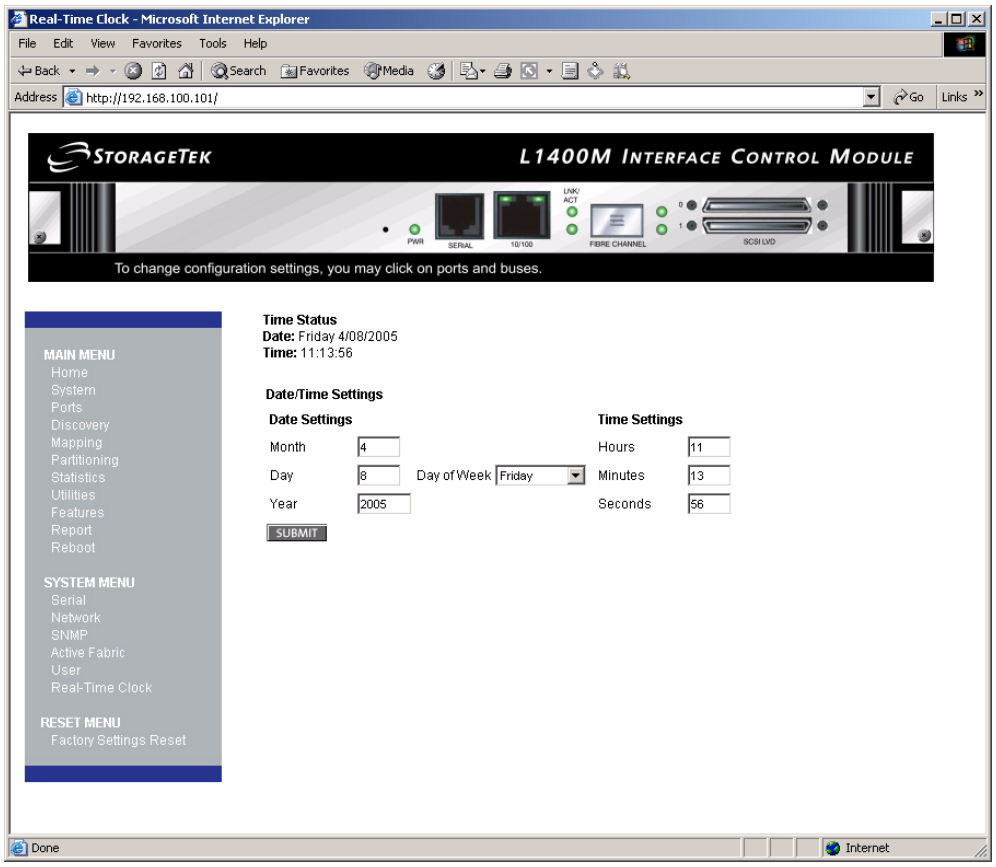
The default settings are `root` for the user name and `password` for the password.

Note: The security settings entered here affect all user interfaces of the control module.

Main Menu > System > Real-Time Clock

Use the real-time clock configuration page (Figure 21) to set the current time and date.

Figure 21. Real Time Clock Configuration Page



To make any changes, modify the entries as described below and then click the `Submit` button.

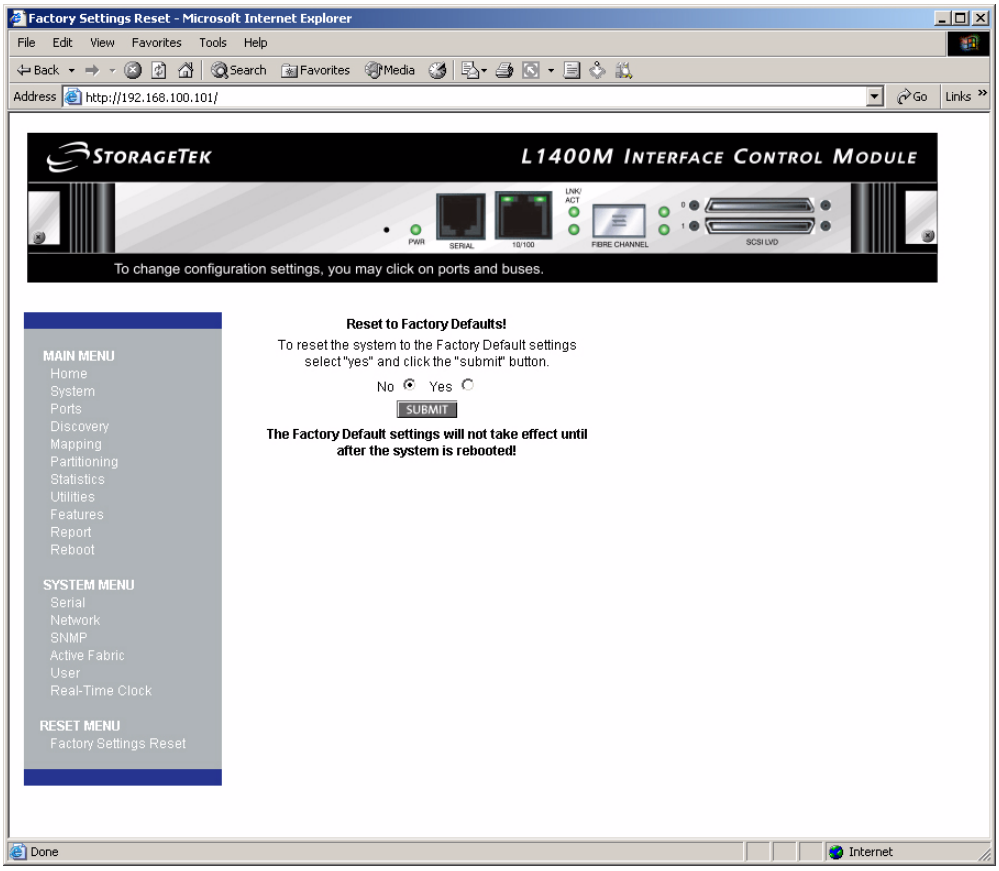
- `Date Settings:` set the month, day, and year. Use a four digit number to represent the year.
- `Day of Week`: set day of week (Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, or Saturday).
- `Time Settings`: set the hours, minutes, and seconds. This is a 24 hour clock.

Note: Be sure to correctly set the clock and date on the Real Time Clock configuration page so that event logging is accurate.

Main Menu > Reset Menu > Factory Settings Reset

Use the factory settings reset page (Figure 22) to reset the control module settings to the factory defaults.

Figure 22. Factory Settings Reset Page



When selected, a confirmation message verifies the selection. If a response of `Yes` is given to the confirmation message, current control module activities are disrupted while the unit resets the current configuration to the factory defaults and saves those options to flash memory as the current configuration.

Note: Resetting to factory defaults from the HTTP interface will not affect Ethernet connectivity. User configured values for the IP address and gateway are retained after the control module resets.

The control module must be rebooted before the changes become effective.

Main Menu > Ports

Use the ports page (Figure 23) to display the current settings for all the Fibre Channel and SCSI ports.

Figure 23. Ports Page

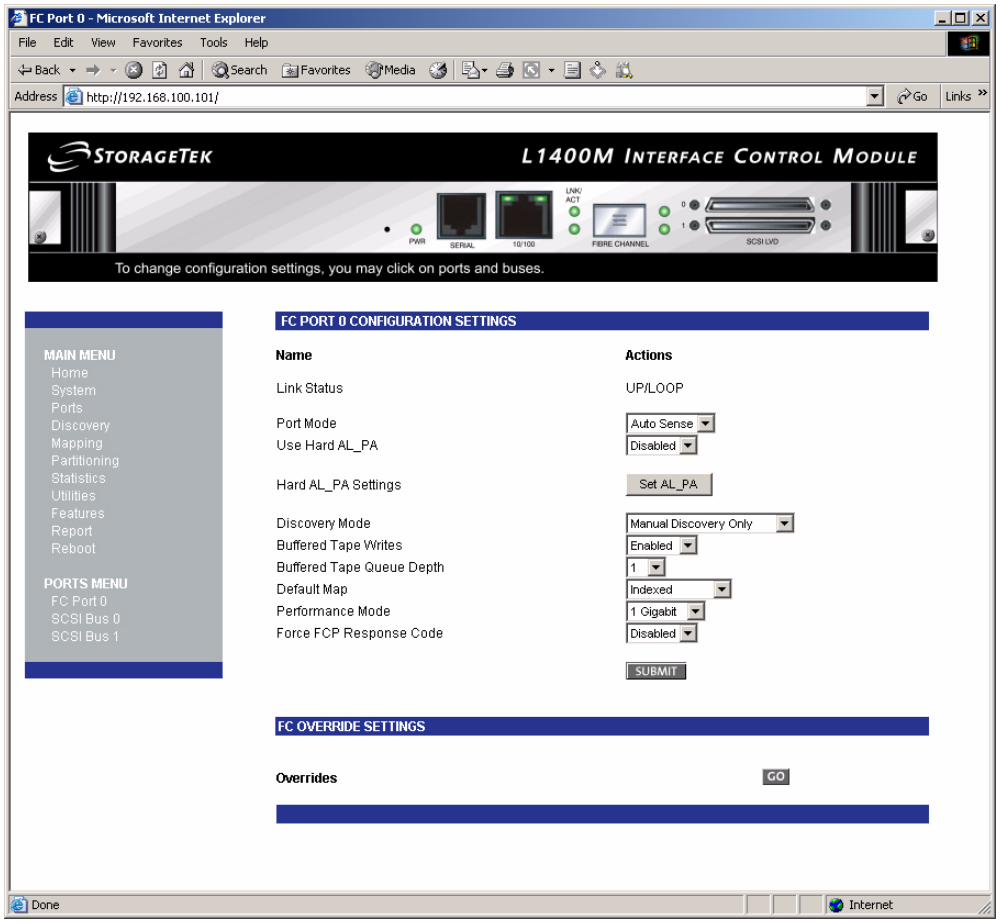
You an also view status information for the various ports and buses and access configuration options for each port.

To make configuration changes or view the status of a specific port, select one of the choices from the `Ports Menu` on the left side of the screen or click on a port in the control module image at the top of the screen.

Main Menu > Ports Menu > FC Port 0

Use the FC port configuration page (Figure 24) to view or change current settings for the Fibre Channel port.

Figure 24. FC Port Configuration Page



To make any changes, modify the entries as described below and then click the `Submit` button.

- `Link Status` indicates whether the port link status is currently up, down, or pending.

- `Port Mode` can be set to either `Auto Sense` (default setting) or `N_Port` mode.

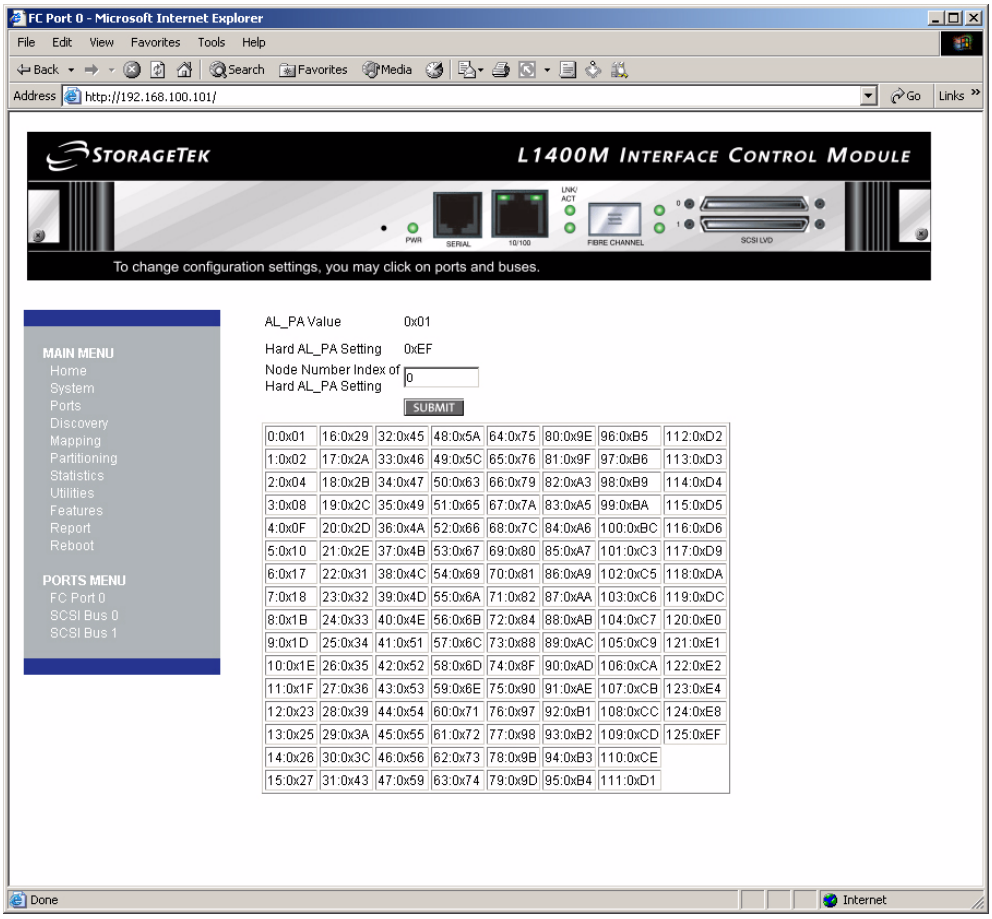
  In `Auto Sense` mode, the control module FC port tries to come up as a loop and if not successful then tries to come up as a fabric. If the port comes up as a loop, it then determines whether it's on a private or public loop.

  In `N_Port` mode, the control module's FC port skips trying to come up as a loop and instead tries coming up as a fabric only. If the control module is on a loop and `N_Port` mode is selected, an error in communication may occur.

- `Use Hard Alpa` sets the Hard AL_PA usage, which can be `Enabled` or `Disabled`. If set to `Enabled`, a unique one-byte valid value (derived from an Arbitrated Loop Topology as defined in ANSI specification FC_AL version 4.5) is used for the Fibre Channel configuration. When configuring the FC AL_PA, the control module presents a list of loop addresses along with the corresponding AL_PA (Figure 25). From here, the user can click the loop address desired.

- When Hard AL_PA usage is set to `Enabled`, you can set the Hard AL_PA value by selecting the `SET ALPA` button and entering a node number from the AL_PA lookup table that appears. For more information, see Table 11 on page 194. Click the `Submit` button to finalize your choice.

Figure 25. AL_PA Settings Screen



- `Discovery Mode` toggles the Discovery Mode among the following options:

  `Auto Discovery on Reboot Events`
  `Auto Discovery on Link Up Events`
  `Manual Discovery Only`

  Discovery Mode determines how the control module will discover new FC devices. See "Main Menu > Discovery" on page 93 for additional information.

  `Auto Discovery` allows the control module to automatically discover all Fibre Channel devices when the control module reboots or whenever link-up events occur, such as connecting cables or rebooting network hubs.

  - `Reboot Events` sets auto discovery to occur in conjunction with reboot events. Both ports and the devices behind the ports are discovered.
  - `Link-up Events` discovers both the ports and the devices behind the ports for the first link-up event. Subsequent link-up events will only discover the ports and not the devices behind the ports.

Note: SCSI devices attached to a Fibre Channel port need not be mapped as sequential FC LUNs. If the device in question supports the REPORT LUNS command, then any mapping desired by the user is acceptable. However, if the device does NOT support the REPORT LUNS command, the discovery process will stop whenever the LUN scan finds an empty 16-LUN block, starting on a 16-LUN boundary. If such a block is found, FC Discovery discovers only the LUNs up to the empty block; LUNs after the empty block are not discovered.

- `Manual Discovery` sets discovery of new devices to only occur after the user selects the `Discovery` option from the `MAIN MENU` or when a Registered State Change Notification (RSCN) is received from a fabric. With this option, the ports are discovered but the devices behind the ports are not discovered. This option is the default setting for discovery.

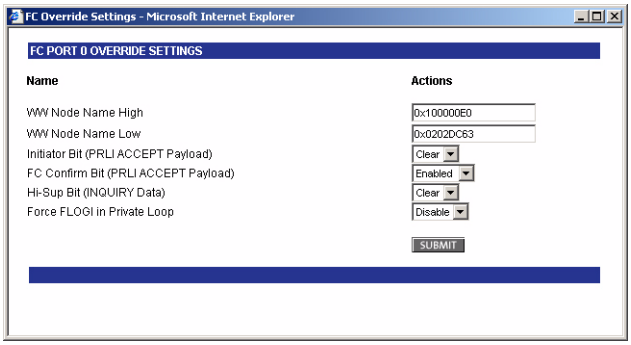
- `Buffered Tape Writes` enables/disables the Buffered Tape Writes option. When enabled, the Buffered Tape Writes option returns status on consecutive write commands prior to the tape device receiving data so that performance may be enhanced.
- `Buffered Tape Queue Depth` sets the Buffered Tape Queue Depth. Select a setting of `0` through `10` from the drop-down list.
- `Default Map` sets the mapping mode for the current port. Default Map can be set to either `Indexed`, `Auto-assigned`, or `SCC`. The default value for Default Map is `Indexed`. The FC Auto-assigned map contains all the SCSI devices that are attached to the control module. When a new initiator contacts the control module through the selected port, it will be able to access the devices that are in this map by default. For more information about mapping modes, see Appendix C, “Addressing, Structures, and Operation.”
- `Performance Mode` toggles between `1` and `2` Gigabit Fibre Channel. The default is `1`.

  Note: If set incorrectly and the control module is plugged into a Loop or Fabric, the unit may receive Framing errors as a result of the incorrect FC link speed.

- `Force FCP Response Code` toggles between `DISABLED` and `ENABLED`. The default setting is `DISABLED`.

- `Override Settings` are provided to enhance interoperability with some storage devices that require special consideration during setup of the control module configuration menus. To access the Override Settings screen (Figure 26), click the `Go` button.

Figure 26. Override Settings Screen



To finalize any changes for the override settings, click the `Submit` button beneath the override menu options.

Note: Normally, override settings should not be changed except when directed to do so by an authorized Sun/StorageTek service representative.

- `World Wide Node Name High` is normally not changed.
- `World Wide Node Name Low` is normally not changed.

CAUTION: Changing the WWN Name can result in duplicate names on a single Storage Area Network (SAN). Using the default values for World Wide Names is recommended.

Note: For Controller LUN commands to operate, WWN naming schemes MUST be compliant with IEEE Fibre Channel Format 1, where the left-most hexadecimal character (the NAA field) of the WWN is `1`. Also, the upper nibble of the third byte (sixth hexadecimal value from right) must be `0` or `1`.

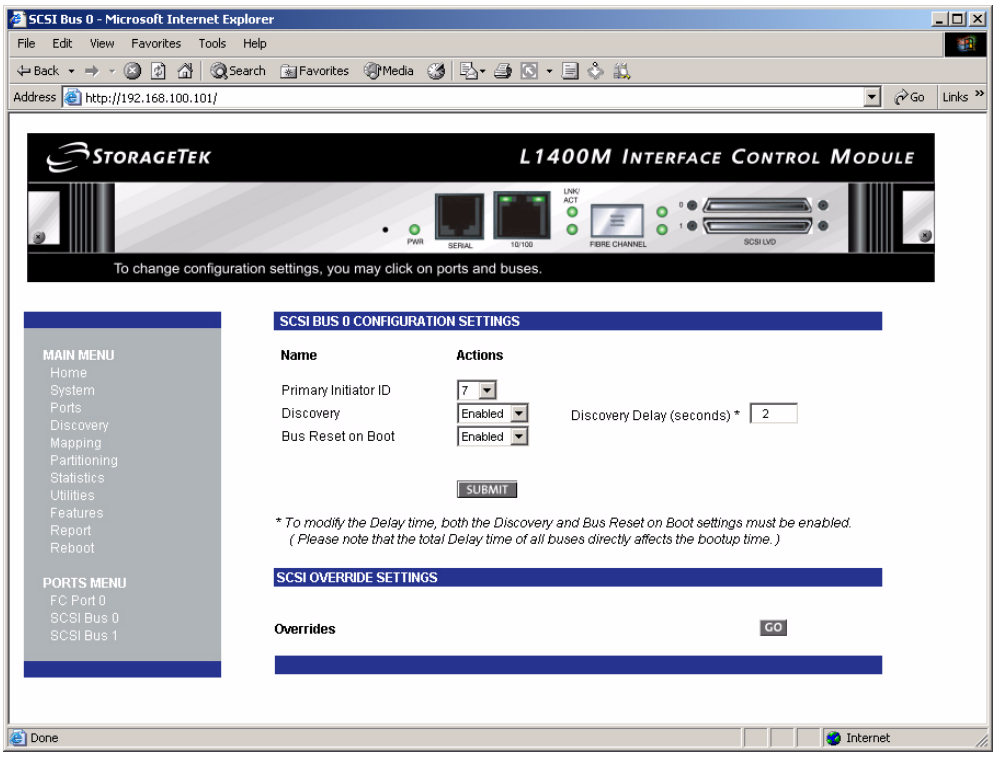
Resetting to factory defaults overwrites current values for WWN Name.

- `Initiator Bit (PRLI ACCEPT Payload)` toggles between SET and CLEAR. This option should be configured to `SET` when using the control module and at least one other control module in a control module-to-control module configuration, where the control module is in Initiator Mode and the other control module(s) appears as a target to the control module. The default setting is CLEAR.
- `FC Confirm Bit (PRL Accept Payload)` toggles between `SET` and `CLEAR`. The default setting is `CLEAR`. This option should be toggled to `SET` when the server uses QLogic HBAs.
- `Hi-Sup Bit (INQUIRY Data)` toggles between `SET` and `CLEAR`. The default setting is `CLEAR`.
- `Force FLOGI in Private Loop` toggles between `Disable` and `Enable`. The default setting is `Disable`. FLOGI Fabric Login is a process by which a node makes a logical connection to a fabric switch. Use this setting to connect the attached Fibre Channel devices as private loop devices for certain switched fabric environments.

Main Menu > Ports Menu > SCSI Bus 0, SCSI Bus 1

Use the SCSI bus status and configuration page to view or change the current attributes for the selected SCSI Bus. For example, if the `SCSI Bus 0` icon is clicked, the `SCSI Bus 0 Configuration Settings` page (Figure 27) appears:

Figure 27. SCSI Bus 0 Configuration Page

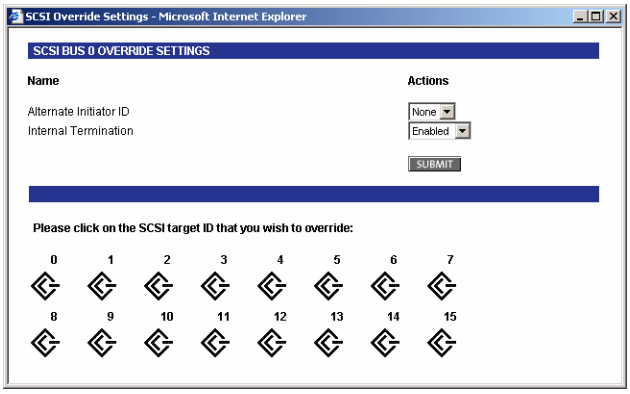


To make any changes, modify the entries as described below and then click the `Submit` button.

- `Primary Initiator ID` must be assigned an Initiator ID, which is the ID for the SCSI device that requests operations from other SCSI devices, or targets. This ID should be a unique ID on the bus. The default setting is `7`.
- `Discovery` enables/disables device discovery on this SCSI bus.
- `Discovery Delay` is the time the control module waits after a power-up or reboot before starting to discover SCSI devices. Sun Microsystems recommends you set the value to at least 2 seconds to ensure all SCSI devices complete their individual power-ups.

- `Bus Reset on Boot` enables/disables automatic discovery of SCSI devices after an initial power up or reboot of the control module.
- `Override Settings` are provided to enhance interoperability with some storage devices that require special consideration during setup of the control module configuration menus. To access the Overrides Settings screen (Figure 28), click the `Go` button.

Figure 28. Overrides Settings Screen



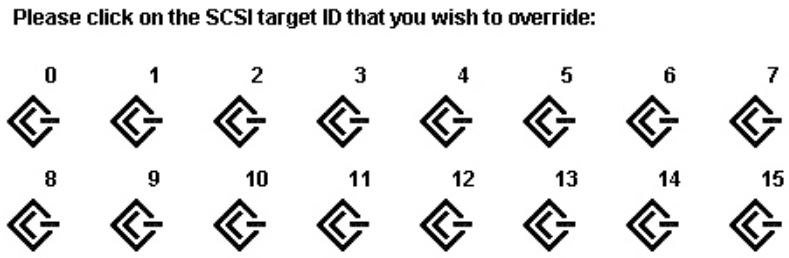
To finalize any changes for the override settings, click the `Submit` button beneath the override menu options.

Note: Normally, override settings should not be changed except when directed to do so by an authorized Sun/StorageTek service representative.

- `Alternate Initiator ID` can be assigned an Initiator ID, which is the ID for a second SCSI device that can request operations from other SCSI devices, or targets. This ID should be a unique ID on the bus. The default setting is `OFF`.
- `Internal Termination` enables/disables internal termination of the selected SCSI bus. The default setting for this option is enabled, which allows the control module to internally terminate a SCSI connection. Setting this option to disabled allows the SCSI Bus, not the control module, to handle SCSI terminations.

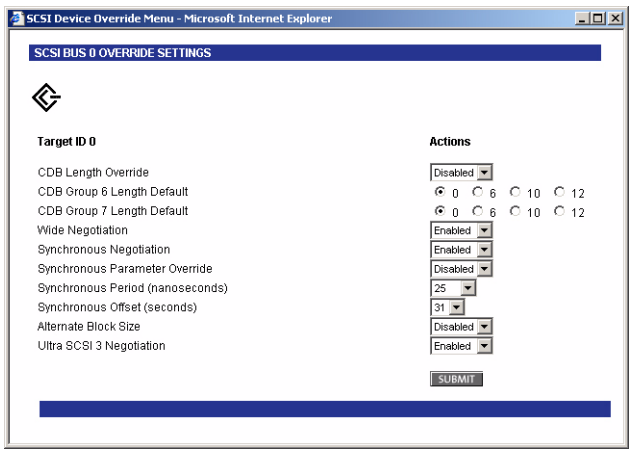
To override the settings of a SCSI target, click on a Target ID icon with the appropriate Target ID number at the bottom of the screen (Figure 29).

Figure 29. Target ID Icons



For example, if the Target ID 0 icon is selected, the screen in Figure 30 appears.

Figure 30. SCSI Device Override Screen



To make any changes, modify the entries as described below and then click the `Submit` button.

Note: Normally, override settings should not be changed except when directed to do so by an authorized Sun/StorageTek service representative.

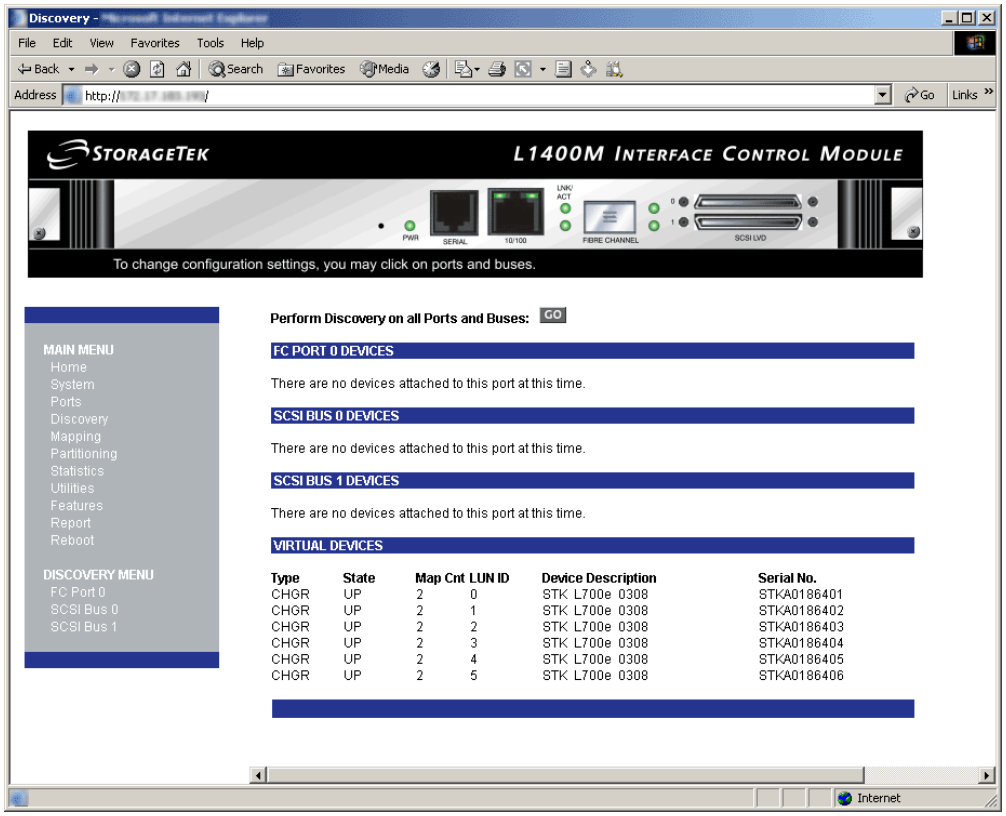
- `CDB Length Override` enables/disables the option to override the default CDB lengths. This option must be enabled before either of the CDB Group defaults will be used by the control module.
- `CDB Group 6 Length Default` can be set to `0`, `6`, `10`, or `12`. The default setting is `0`.
- `CDB Group 7 Length Default` can be set to `0`, `6`, `10`, or `12`. The default setting is `0`.
- `Wide Negotiation` enables/disables the option for negotiation on a wide SCSI bus.

- `Synchronous Negotiation` enables/disables synchronous negotiation on the SCSI bus.
- `Synchronous Parameter Override` enables/disables parameters for synchronous negotiation.
- `Synchronous Period` is the maximum seconds allowed for negotiation. The default is `25`.
- `Synchronous Offset` is the max variation in transfer rate negotiated in MB/s. Default is `31`.
- `Alternate Block Size` enables/disables block sizes of 520 bytes each, which is the common block size used in AS/400 environments.
- `Ultra SCSI-3 Negotiation` enables/disables Ultra SCSI-3 support for the selected Target ID. This feature helps solve compatibility issues in mixed vendor environments, such as where there is a device that cannot handle automatic negotiation of the bus speed or the speed itself.

Main Menu > Discovery

Use the discovery page (Figure 31) to view currently known Target devices and discover new Target devices.

Figure 31. Discovery Page

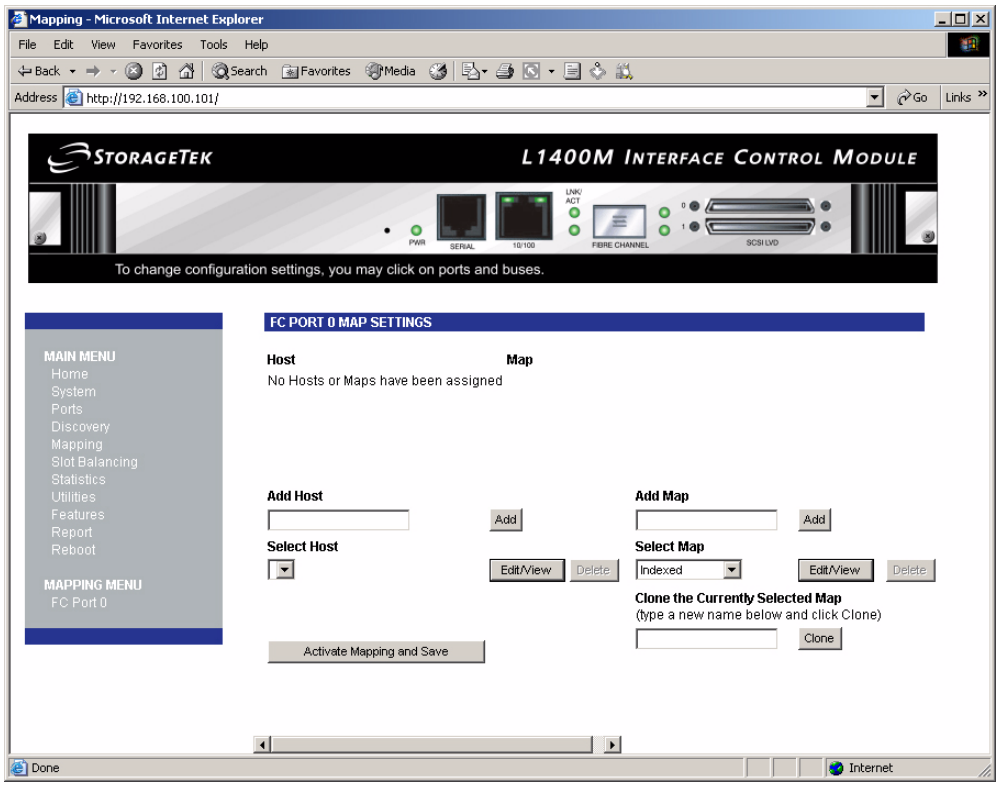


From the `Discovery Menu`, click the FC Port or a SCSI bus. The `Go` button activates discovery for the selected port/bus. When a selection is made, the discovery process is activated. This process is performed according to the settings configured in the Fibre Channel Configuration Menu (see “Main Menu > Ports Menu > FC Port 0” on page 83).

Main Menu > Mapping

Use the mapping page (Figure 32) to view all available hosts with maps that have been assigned to the port. Maps and hosts may be added, edited, or deleted.

Figure 32. Mapping Page



Selecting the FC port displays mapping information for the port, including the name of the port and the currently selected host and map. The following options are also available:

- Add a new host or map by selecting the respective `Add` button.
- Select a previously set up host or map from the pull-down lists for `Select Host` and `Select Map`.

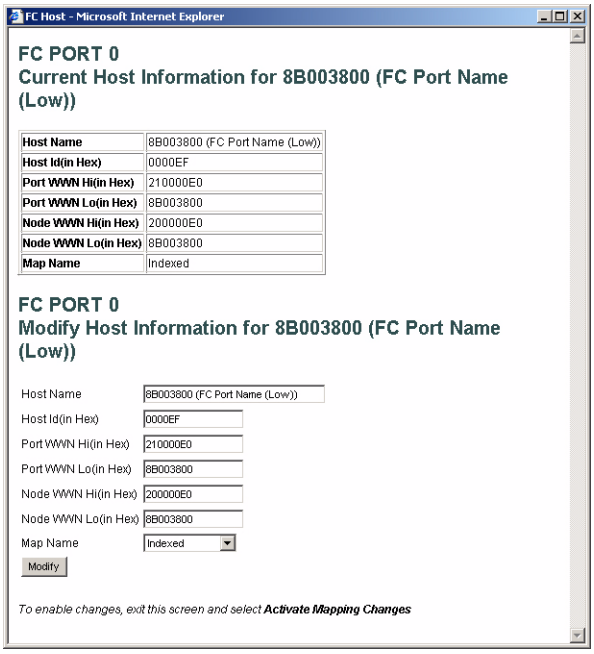
  Note: '7 (SCSI Initiator)' hosts (where 7 is the ID of the host that scanned the bus on the FC side) cannot be deleted. Maps named 'Indexed', 'Auto Assigned', or 'SCC' cannot be deleted or renamed.

- Delete the currently selected host or map by selecting the respective `Delete` button.
- View or Edit the currently selected host or map by selecting the respective `Edit/View` button.

- Clone (via the `Clone Map` button) the currently selected map and set up the name of the new cloned map. This option makes it easier to setup new maps with similar information to previously created maps. SCC and Auto Assigned maps cannot be cloned.

Figure 33 shows the dialog box that appears for the FC Port when the `Select Host Edit/View` button is selected.

Figure 33. Select Host for FC Port



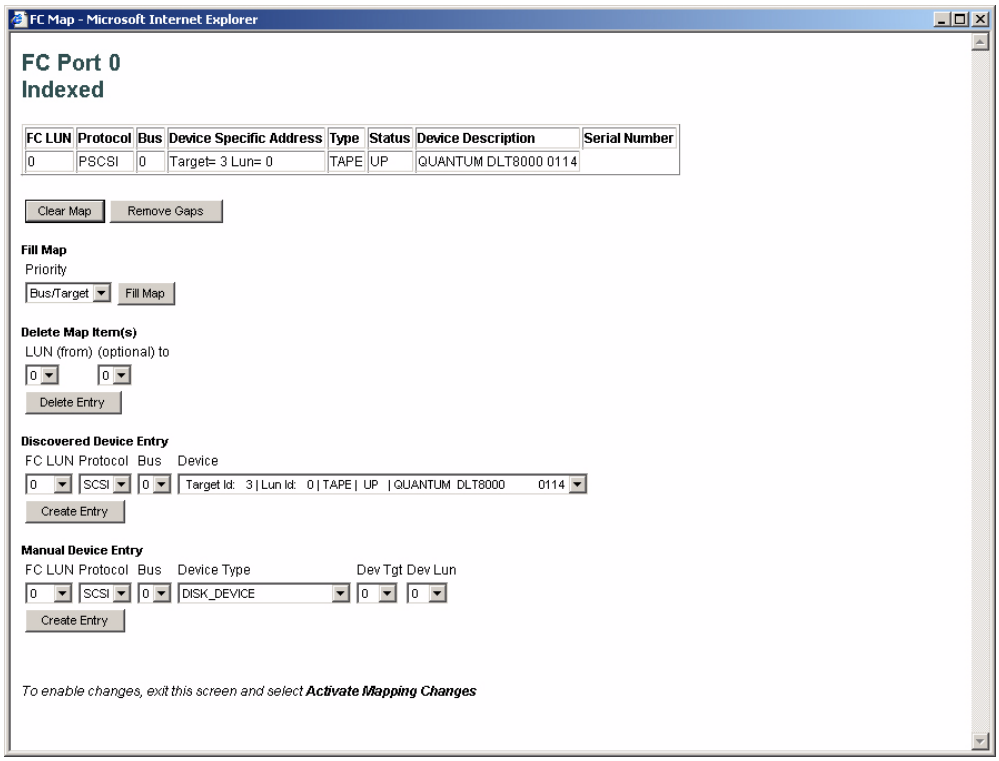
The current host information is shown at the top of the dialog box. This information can be changed in the Modify FC Host section.

- New or updated information can be typed into the field boxes for `Host Name`, `Host Id (in Hex)`, `Port WWN Hi (in Hex)`, `Port WWN Lo (in Hex)`, `Node WWN Hi (in Hex)`, or `Node WWN Lo (in Hex)`.
- The Map Name can be selected from the drop-down list.
- To make the changes permanent, click the `Modify` button.

  Note: Host settings are saved to memory when the `Modify` button is selected.

Figure 34 shows the dialog box that appears for the FC Port when the `Select Map Edit/View` button is selected.

Figure 34. Select Map for FC Port



The current map information is shown at the top of the dialog box. This information can be changed as described below.

- To completely clear the current map of all entries, click the `Clear Map` button.
- To fill the map, select the fill option from the pull-down list and then click the `Fill Map` button. When the map is filled, the menu shows the current mappings.
- To delete a specific map entry, select a LUN from the pull-down list under Delete Map Item. To delete multiple LUNs, also select the end of the range from the optional pull-down list. Either way, click the `Delete Entry` button to remove the item(s) from the map.
- To delete all gaps, or unfilled entries, from this map, click the `Remove Gaps` button. When removing gaps from the table, this option also renumbers all LUNs in sequential order starting with LUN 0.

  Note: Some operating systems require gaps be removed in the mapping table in order to detect all devices.

- To create a specific map item, the LUN, Protocol, Bus, and Device can be selected from the pull-down lists for either Discovered Device Entry or Manual Device Entry. Discovered Device Entry is limited to devices already discovered. Manual Device Entry allows you to manually set up a device type at a specific Target and LUN. To make the changes permanent, click the `Create Entry` button.

Note: Maps named `Auto Assigned` or `SCC` may not be modified, cleared, filled, or have entries removed.

Map settings are saved to memory when any of the buttons within the page are selected.

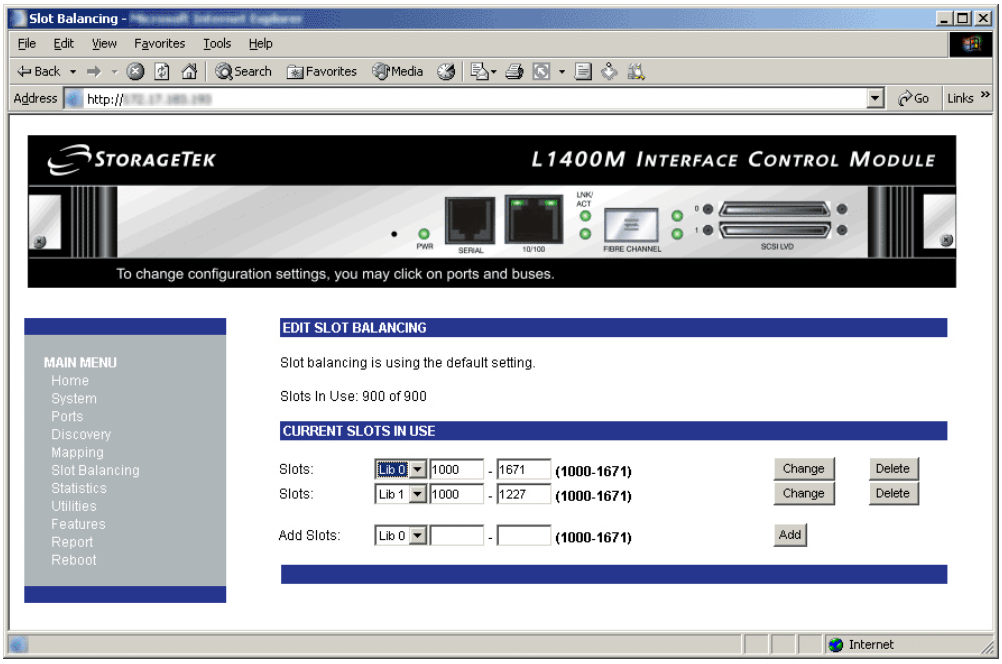
Main Menu > Slot Balancing

Use the slot balancing menu to create up to 10 slot ranges in a standalone library or balance them between two connected L1400M libraries when:

- Continuous Capacity™ technology is enabled (default)
- Library Partitioning is not enabled

Note: Once library partitioning has been purchased and enabled, use library partitioning to balance slots between two connected L1400M libraries.

Figure 35. Slot Balancing Page



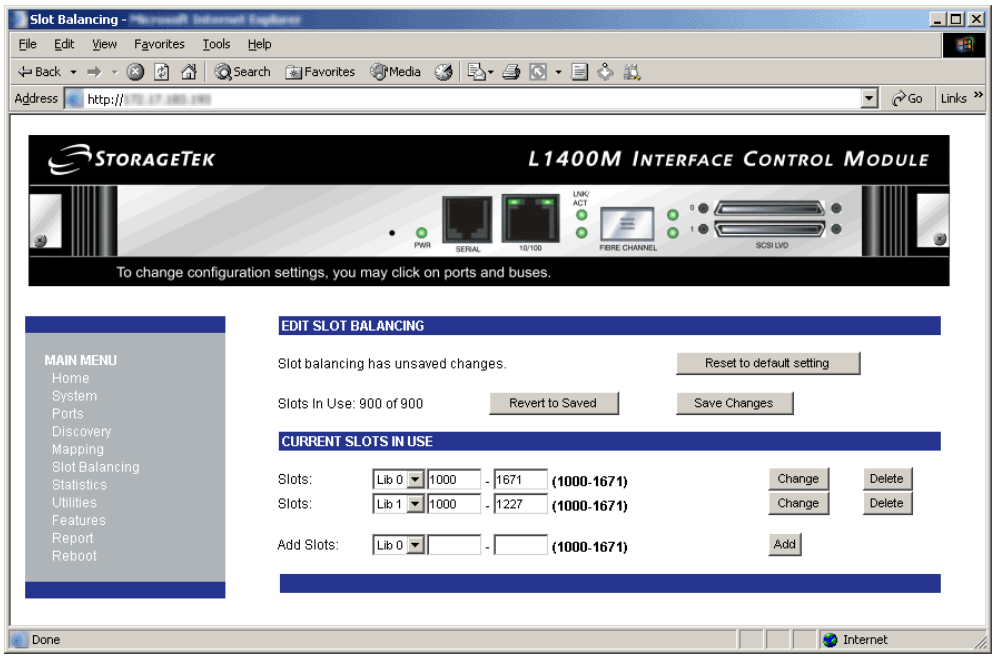
Unless additional slot licenses are purchased, the default setting for the control module is support for 200 slots (Continuous Capacity enabled). In this case, you must have at least one slot configured on the slot balancing page.

The following options and buttons are available on the slot balancing page:

- `Slots` pull down list (`Lib 0` or `Lib 1`): Specifies the physical library where the slot range resides.
- `Slots` range: These two fields specify the minimum and maximum slot numbers available for use by hosts. You must configure a range of at least one slot (indicated by the same slot number in both fields).

- `Change` button: If either of the above two settings are changed (`slots` range or `Lib` pull-down option), click the `Change` button next to that slot information. Clicking the `Change` button does not make the change permanent, but does make the following additional buttons appear: `Revert to Saved`, `Reset to default setting`, and `Save Changes` (Figure 36 on page 99).

Figure 36. Slot Balancing Page with Unsaved Changes



- `Delete` button: When the `Delete` button is clicked, the slot row next to that button is removed. Clicking the `Delete` button does not make the change permanent, but does make the following additional buttons appear: `Revert to Saved`, `Reset to default setting`, and `Save Changes`.

- `Add Slots` To specify additional slot ranges:

  - Select the library (`Lib 0` or `Lib 1`) from the pull-down list (if aggregation is enabled)

  - Enter the slot range (within the min/max range shown in parenthesis)

  - Click the `Add` button. Clicking the `Add` button does not make the change permanent, but does make the following additional buttons appear: `Revert to Saved`, `Reset to default setting`, and `Save Changes`.

  Note: You may create a up to 10 slot ranges.

- `Revert to Saved` button: Clicking the `Revert to Saved` button undoes any changes that have been made via the `Change`, `Delete`, and/or `Add` buttons.

- `Reset to Default Setting` button: Clicking the `Reset to default setting` button resets the slot balancing settings back to factory defaults. These changes also become active immediately.
- `Save Changes`: To make any changes to the Slot Balancing page permanent, click the `Save Changes` button to submit all changes to the control module. The changes become active immediately.

Main Menu > Partitioning

Compared to the slot balancing page ("Main Menu > Slot Balancing" on page 98) which is concerned with slots only, the partitioning pages are concerned with slots, drives, and caps. Each partition can include a user-defined number/range of slots, drives, and caps for that partition. You can configure up to six library partitions with ten slot ranges per partition.

Notes: If Library Partitioning is not enabled, `Slot Balancing` appears in the `Main Menu` instead of `Partitioning`.

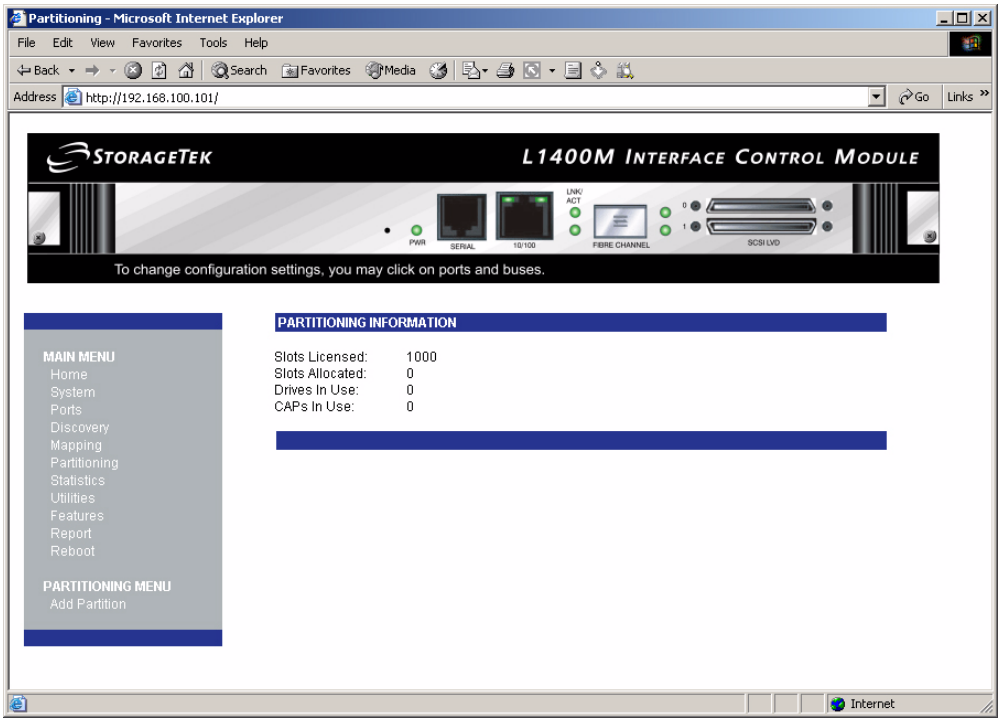
Library partitioning is an optional feature that must be unlocked with a softkey before the `Partitioning` option appears in the `Main Menu`.

For information on ordering the Library Partitioning feature, refer to *L180/L1400x/L1400x Ordering and Configuration Guide*, PN MT9112.

For more information on requesting a library partitioning softkey, enabling library partitioning, and configuring library partitions, refer to *L700x/L1400x Tape Libraries and Pass-thru Port Operator's Guide*, PN 95845.

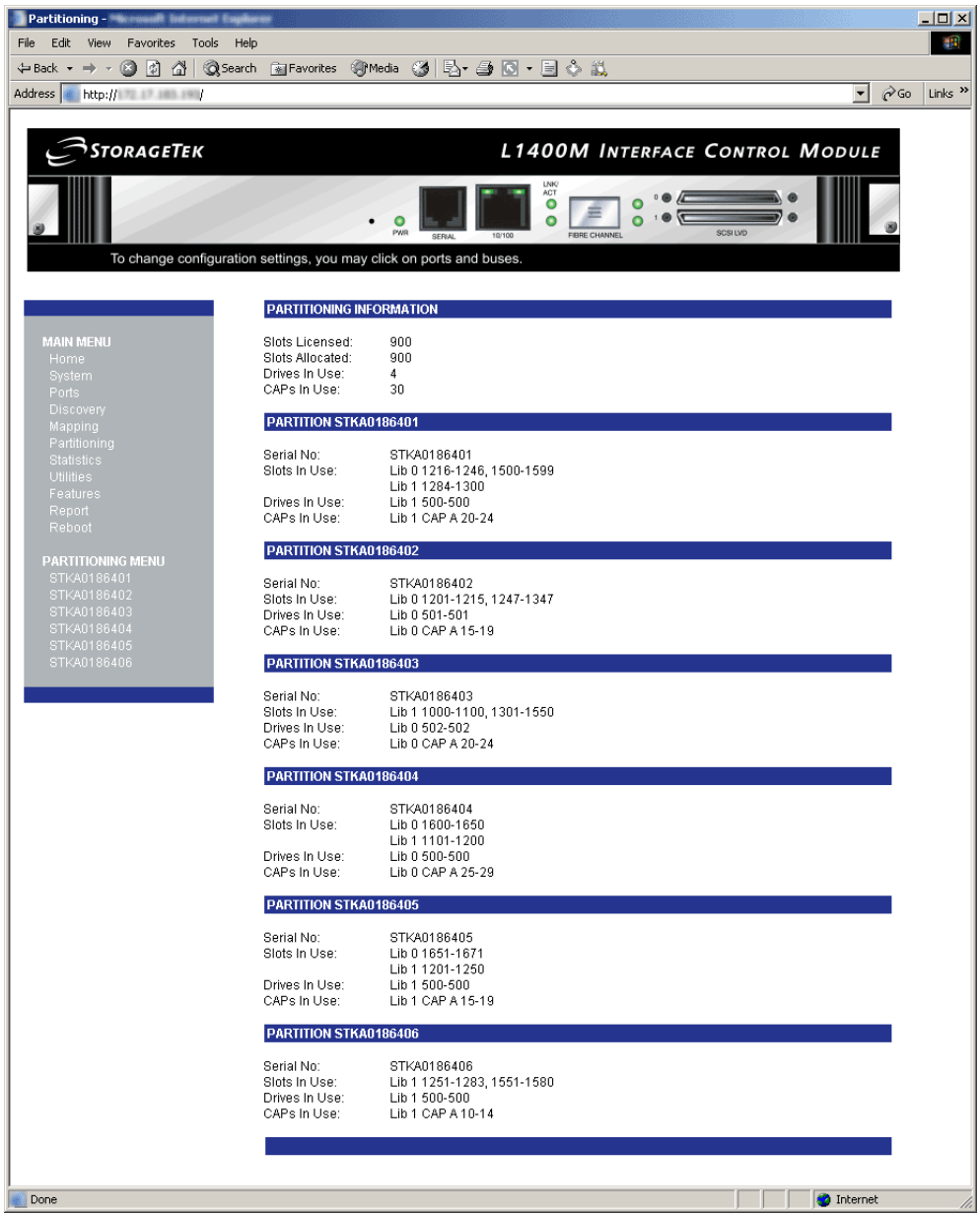
Figure 37 shows the main partitioning page before creating any partitions.

Figure 37. Main Partitioning Page Before Creating Partitions



After creating partitions, the main partitioning page provides a summary list of all current partitions (Figure 38). From here you can select to view/edit an existing partition (if one was previously created) by selecting a partition from the `Partitioning Menu` shown on the left side of the Visual Manager interface.

Figure 38. Main Partitioning Page Showing Six Partitions



Partitioning allows the combined assets of up to two libraries to be allocated into smaller virtual libraries. This function applies to both an individual library and for an aggregated virtual library consisting of two libraries. Up to six partitions are supported.

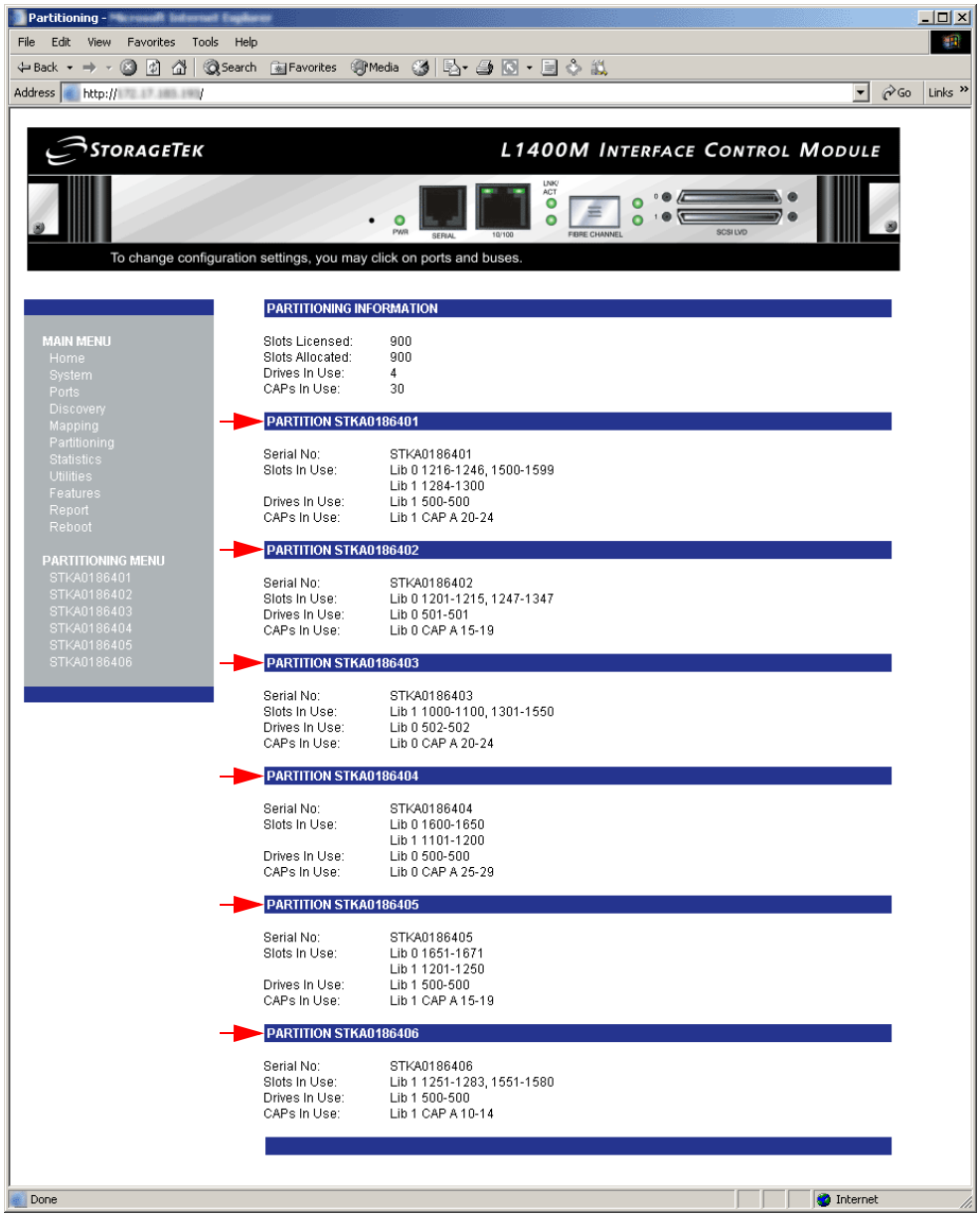
By presenting a “virtual” media changer LUN for each partition, hosts on the SAN will see multiple libraries. By properly defining access controls in the Control Module, partitions will share the physical media changer but may not share slots.

This feature is configurable through the serial, Visual Manager, and telnet user interfaces. The user interfaces will display information on the drives, media elements, partitions, resources, unassigned slots, and drives.

Each library partition consists of the following:

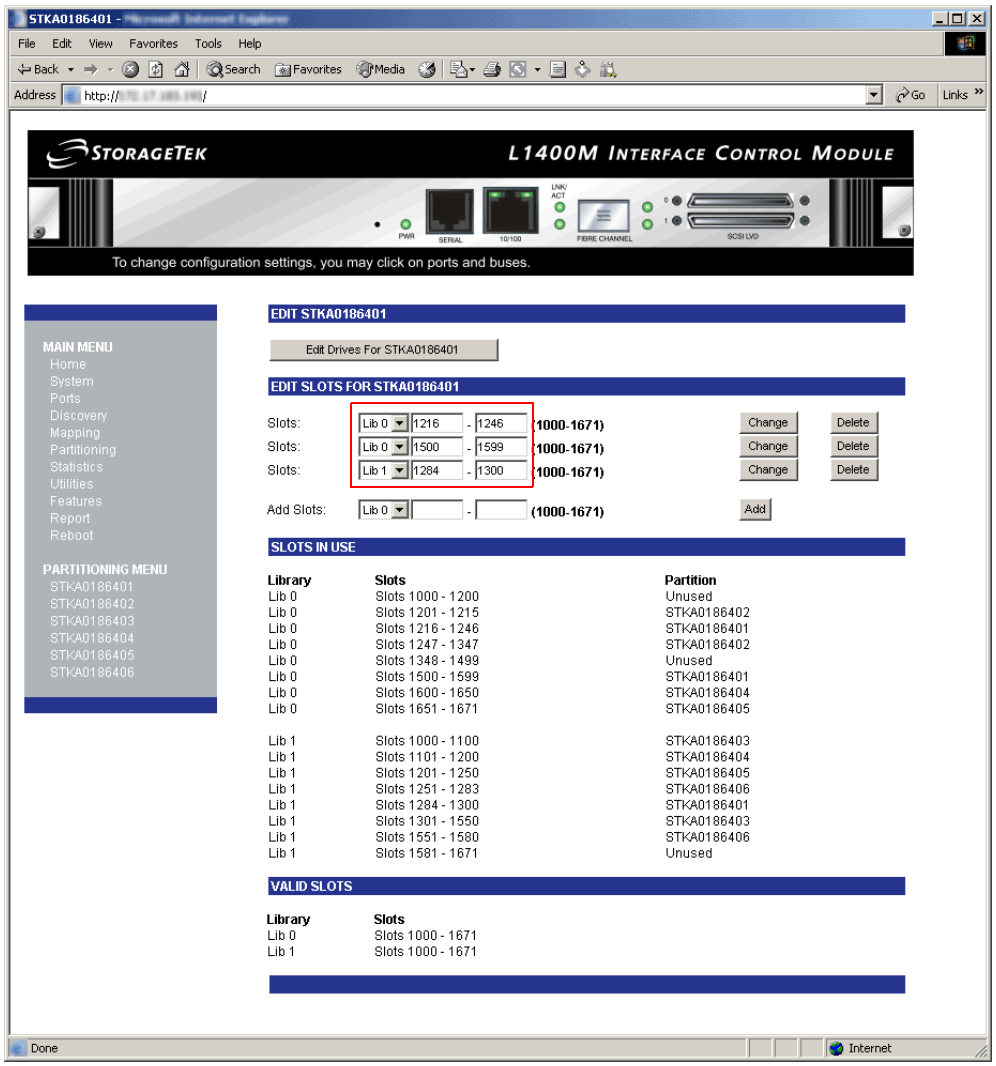
- A single virtual Logical Unit that represents a library controller. Figure 39 shows a library configured with the maximum of six virtual logical units (library partitions).

Figure 39. Library Partitions



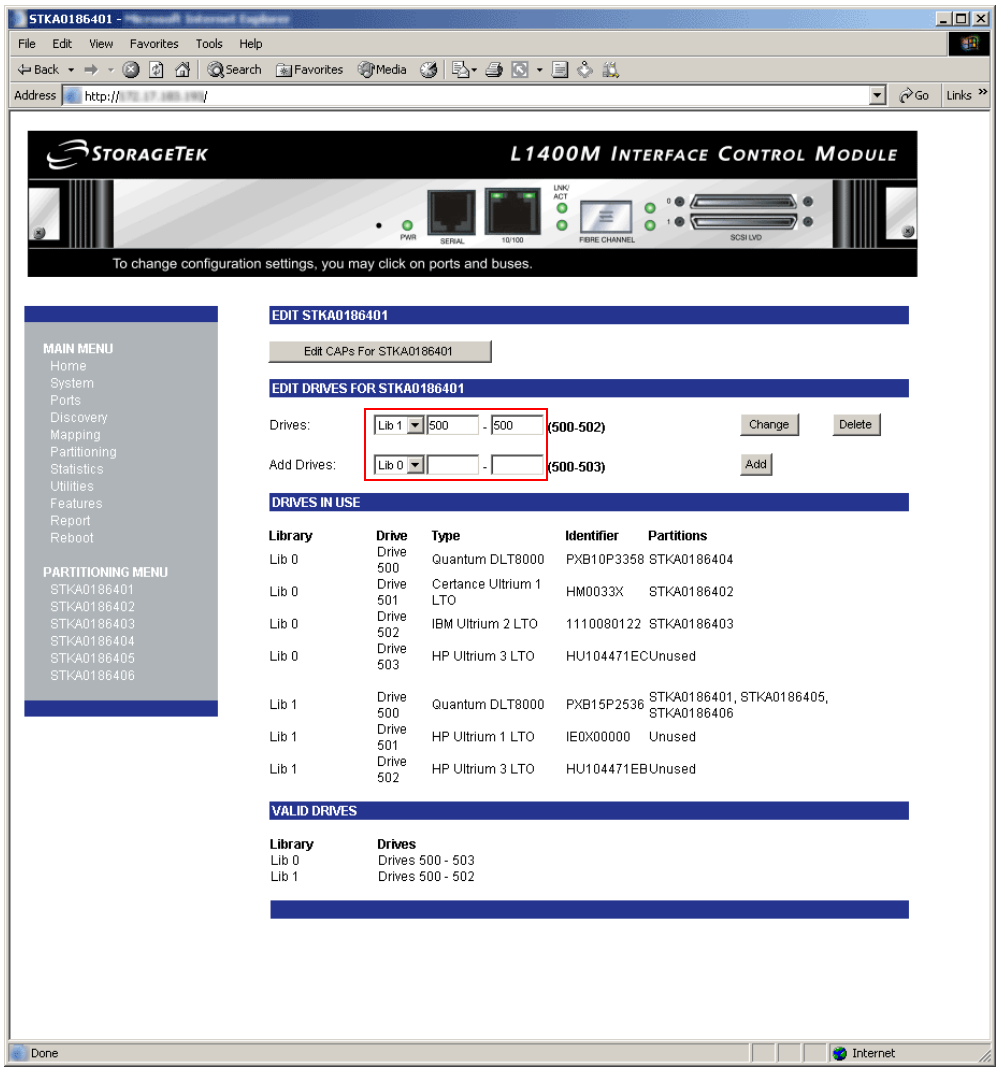
- One or more areas of storage slots that hold cartridges. Each partition can have up to 10 slot ranges. Figure 40 shows three slot ranges assigned to the first partition. Two ranges reside in Lib 0 and one range in Lib 1.

Figure 40. Storage Slot Partition Assignments



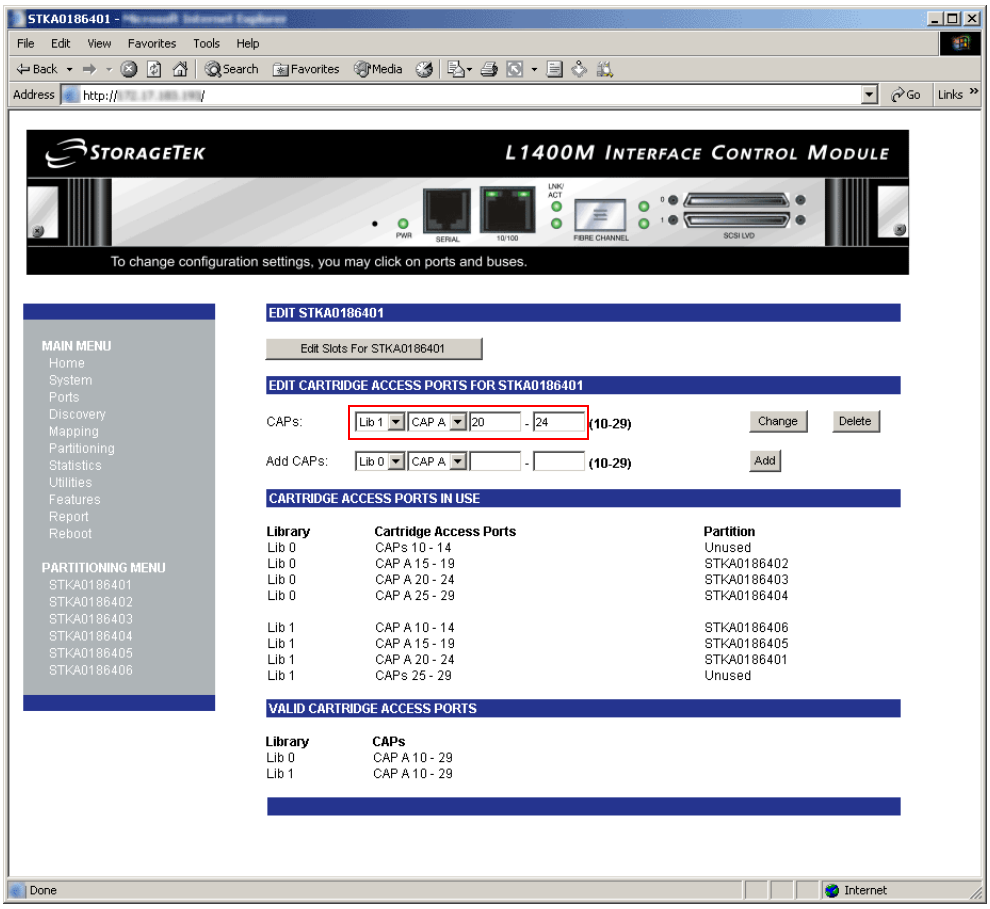
- One or more tape drives. Figure 41 shows one tape drive in Lib 0 assigned to the first partition.

Figure 41. Tape Drive Partition Assignments



- Zero or more Cartridge Access Port (CAP) slots representing a range of import/export slots. Figure 42 shows Lib 1, CAP A slots 20 through 24 assigned to the first partition.

Figure 42. CAP Partition Assignments



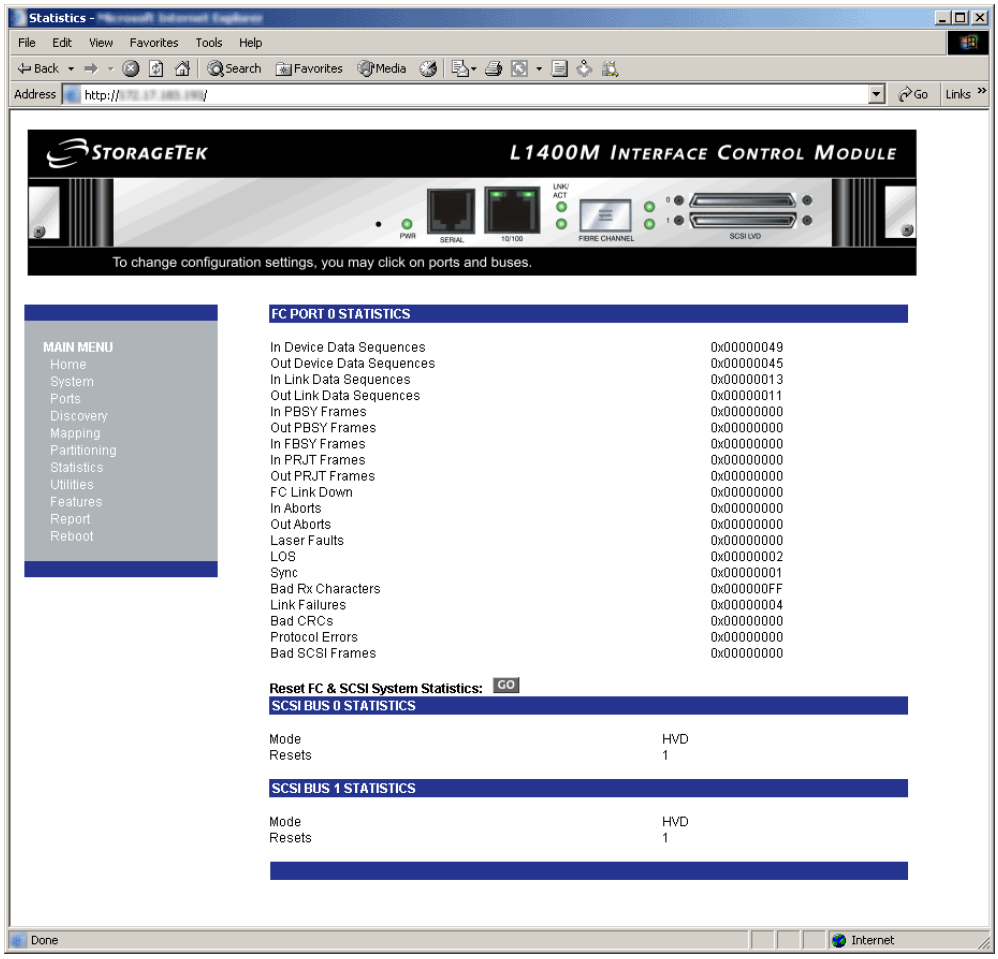
When partitioning is first enabled, all resources are available for assignment, but each slot may be assigned to only one partition. The user can assign the available slots to a partition by selecting them in up to 10 groups of sequential but possibly non-contiguous blocks. The user can then assign drives and transport elements. The partition can be given a name, and one or more initiators that have been identified by the system can be associated with it. The user can also delete a partition, causing its assigned slots to be available to other partitions, its initiators to return to an unassigned state, and its name to be deleted.

Note: When aggregation is used in conjunction with partitioning, slot licenses are affected as described in "Slot Licenses" on page 121.

Main Menu > Statistics

Use the statistics page (Figure 43) to view port statistics.

Figure 43. Statistics Page



Verifying that you have a target on each bus tells you that both physical libraries are seen. If only one library is connected, you should see only one target.

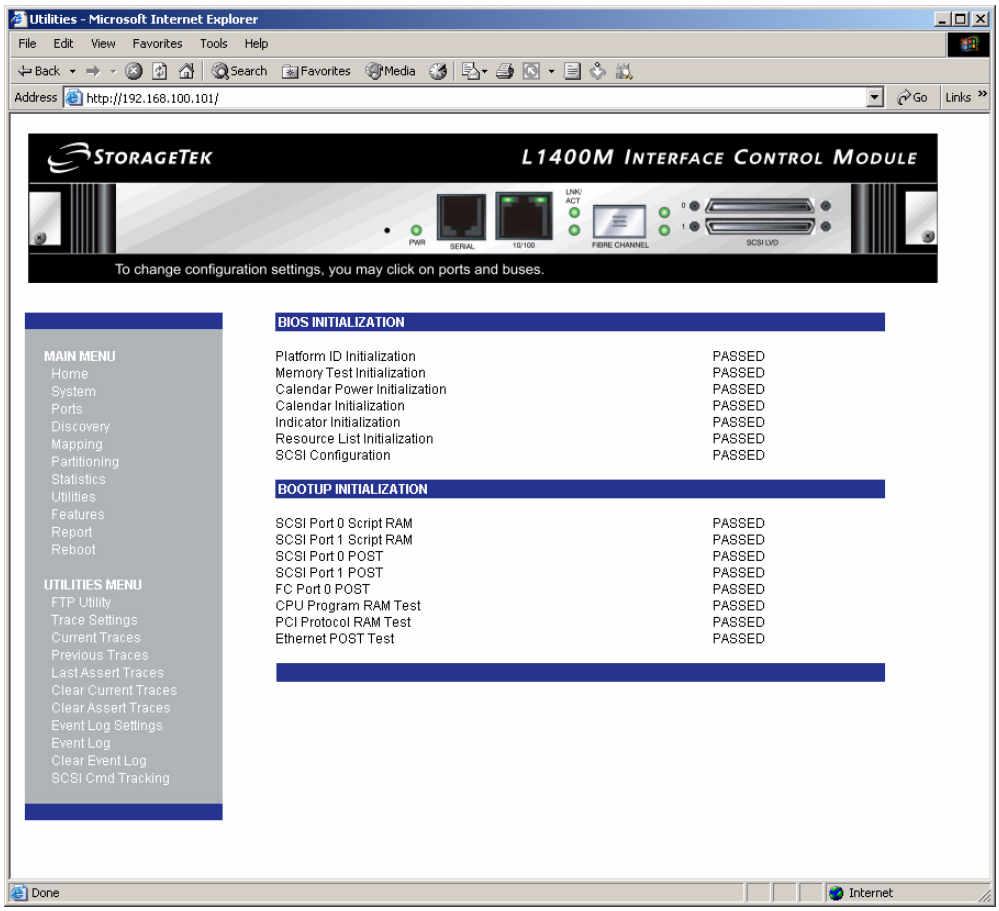
Click the `Go` button to clear all current statistics for the selected buses and continue logging any new statistics.

You can also view enclosure status from the home or report pages.

Main Menu > Utilities

Use the utilities page (Figure 44) to access to the FTP utility, and the settings and information for the event log and various traces. Select from the list of options shown in the navigation bar under the heading `Utilities` by clicking on the desired option.

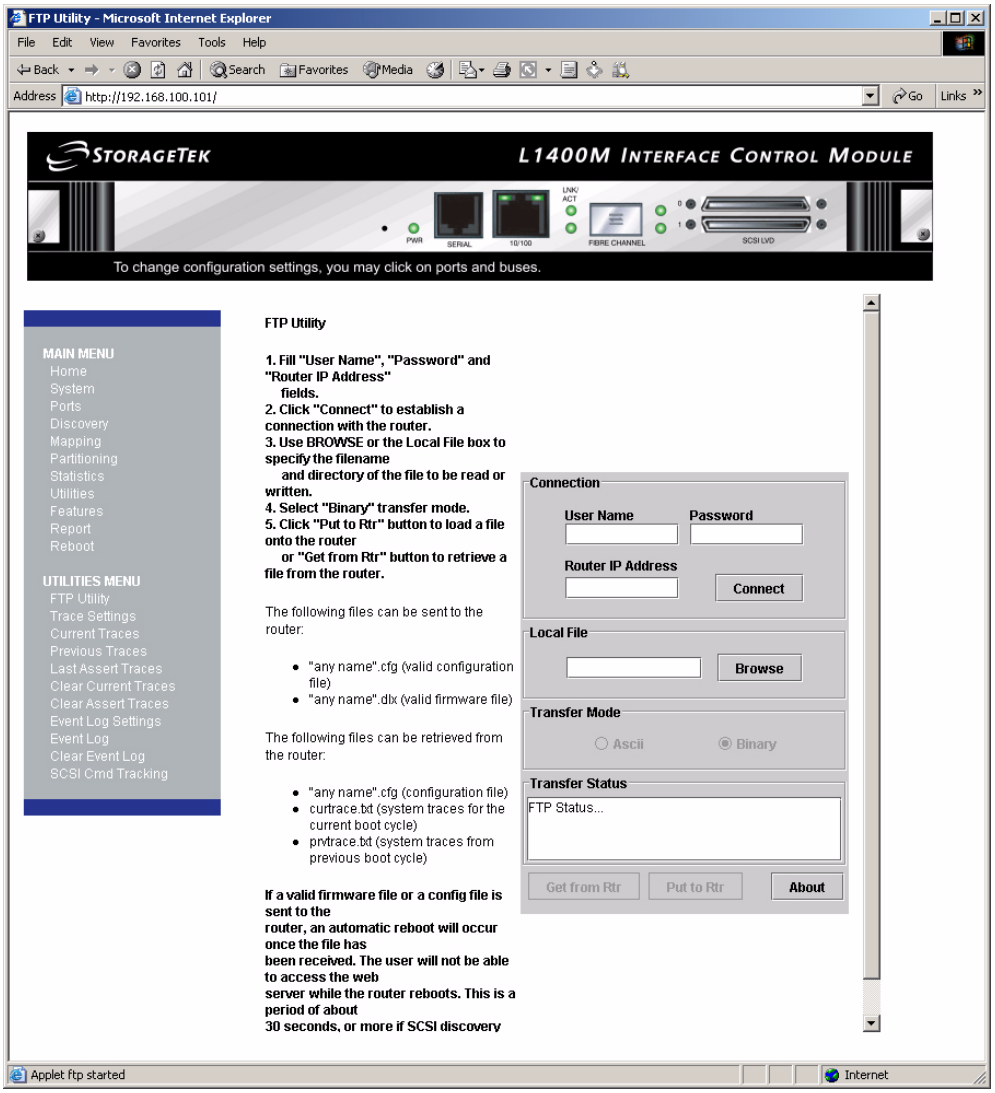
Figure 44. Utilities Page



Main Menu > Utilities > FTP Utility

Use the FTP Utility page (Figure 45) to access an FTP Utility.

Figure 45. FTP Utility Page



Internet access is required to verify the signature for the Sun/StorageTek FTP applet and to download the JAVA applet plug-in for your browser. The FTP Utility requires the use of a JAVA applet and will prompt for permission to install the applet, if needed. If you receive this prompt, follow the on-screen instructions to complete installation of the applet. The FTP Utility then prompts for permission to run the applet.

To proceed, click the `Grant this session` button so the FTP Utility becomes available for use.

To use the FTP Utility, do the following:

1. Fill in the User Name, Password, and IP Address of the control module.
2. Click the `Connect` button to establish an FTP session with the control module.
3. Select a local file to upload or download. The following file types are supported.

   For uploads, or files sent to the control module, you can select from .cfg (configuration files) and .dlx (firmware files) formats.

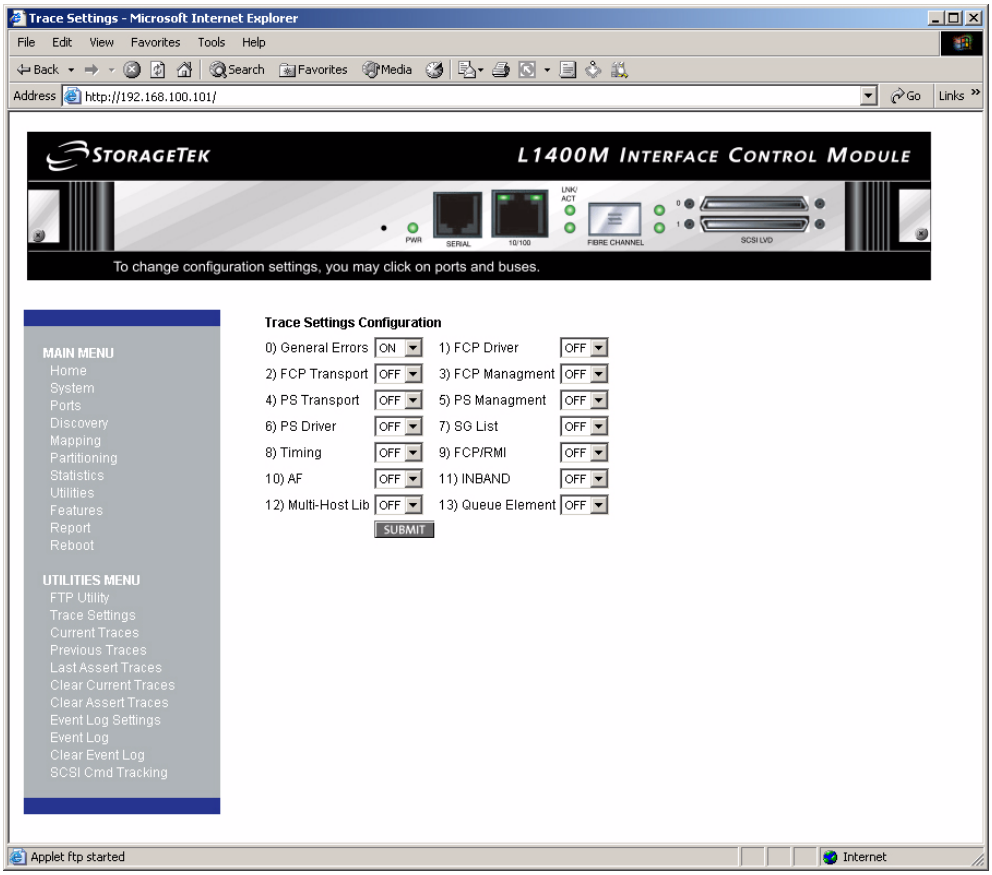
   For Downloads, or files retrieved from the control module, you can select from .cfg (configuration files) as well as from either curtrace.txt (system traces for current boot cycle) or prvtrace.txt (system traces from previous boot cycle).
4. Select binary transfer mode for the control module.
5. Click the `Put` button to upload a file to the control module or the `Get` button to download a file from the control module.

If a valid firmware or configuration file is sent to the control module, an automatic reboot will occur once the file has been received by the control module. The user will not be able to access the control module from the Visual Manager web interface during the time that the reboot is in process, usually a period of about 30 seconds.

Main Menu > Utilities > Trace Settings

Use the Trace Settings Configuration page (Figure 46) to configure trace settings.

Figure 46. Trace Settings Screen



Below are brief descriptions of each of the trace settings. Click the `Submit` button to submit changes to the control module.

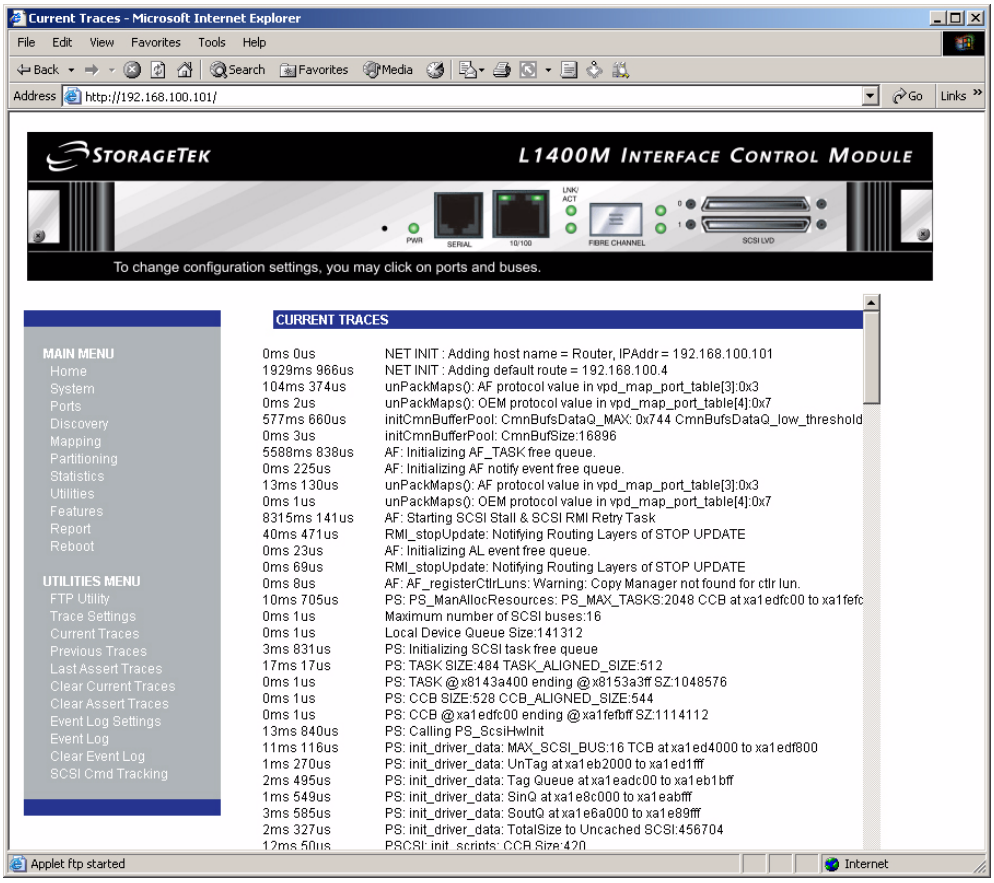
`General Errors`	Displays the most serious errors and exception conditions.
`FCP Transport`	Fibre Channel Protocol transport functionality will be monitored and recorded.
`PS Transport`	Parallel SCSI transport functionality will be monitored and recorded.
`PS Driver`	Parallel SCSI driver functionality will be monitored and recorded.
`Timing`	Timer functions will be monitored and recorded.
`AF`	Active Fabric firmware will be monitored and recorded.
`Multi Host Lib`	Debugging capability for Multi-Host library features.
`FCP Driver`	Fibre Channel Protocol driver functionality will be monitored and recorded.
`FCP Management`	Fibre Channel Protocol management functionality will be monitored and recorded.
`PS Management`	Parallel SCSI functionality will be monitored and recorded.
`SG List`	Scatter/gather list will be monitored and recorded.
`FCP/RMI`	Fibre Channel Protocol routing layer will be monitored and recorded.
`INBAND`	Controller management functionality will be monitored and recorded.
`Queue Element`	Debugging capability for specific control module resources.

Main Menu > Utilities > Current Traces, Previous Traces, or Last Assert Traces

Use these menus to view the indicated trace information.

- `Current Traces` (Figure 47) shows data since the control module was last booted.
- `Previous Traces` shows data from the last boot cycle.
- `Last Assert Traces` shows data since the last assertion.

Figure 47. Current Traces Screen

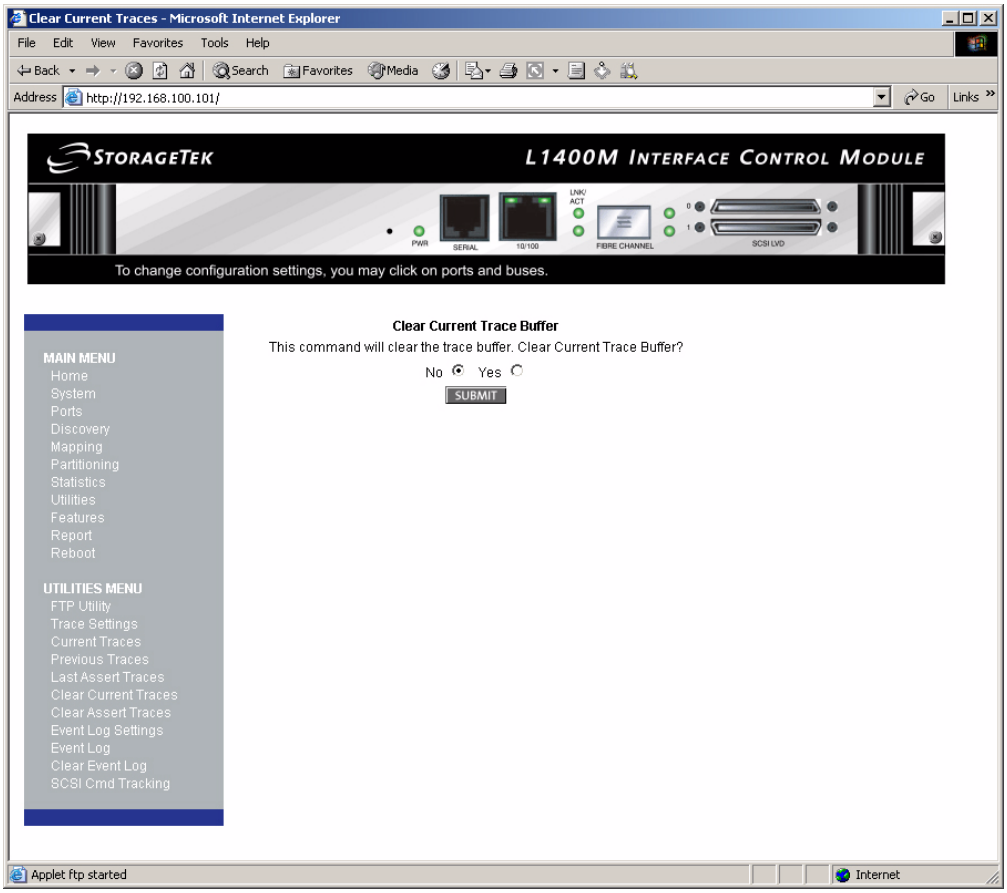


Trace buffers can be cleared by selecting either the `Clear Current Traces` option or the `Clear Assert Traces` option.

Main Menu > Utilities > Clear Current Trace

Use the Clear Current Trace Buffer page (Figure 48) to clear the current trace buffer.

Figure 48. Clear Current Trace Buffer Page

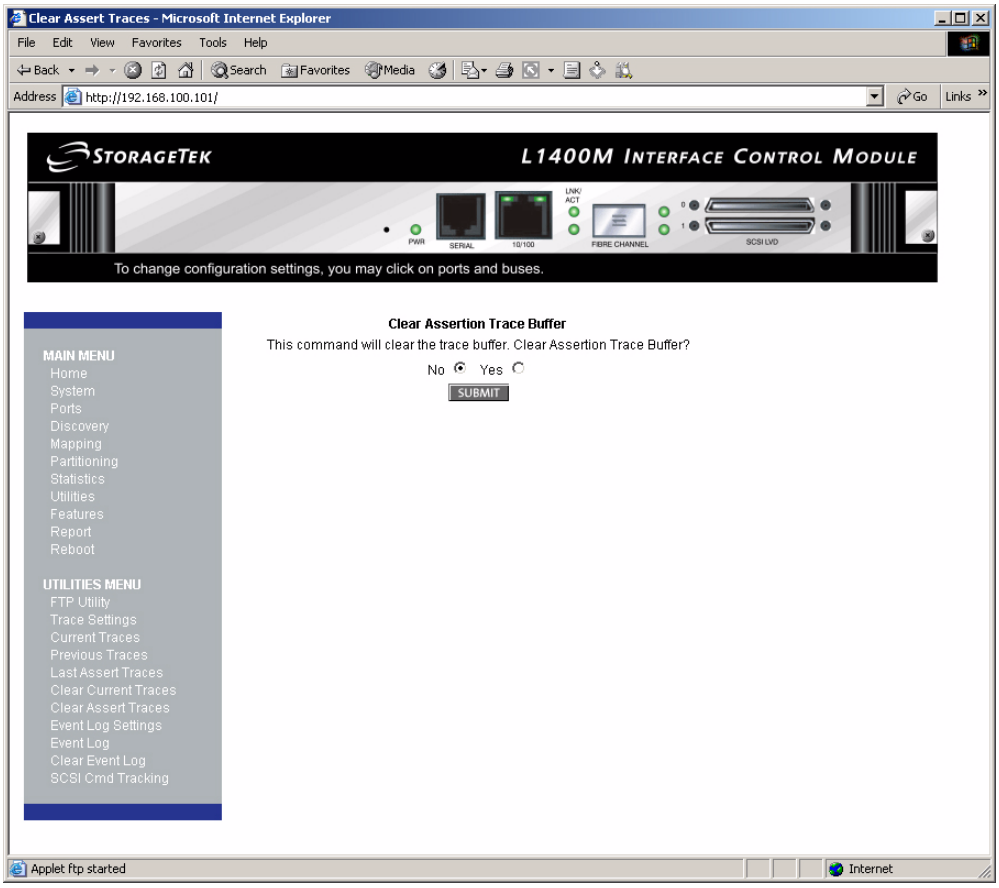


When selected, a confirmation message verifies the selection. If a response of `Yes` is given to the confirmation message, the unit clears the current trace buffer. Current control module activities will *not* be disrupted by this operation. Click the `Submit` button to finalize your choice.

Main Menu > Utilities > Clear Assert Traces

Use the Clear Assertion Trace Buffer page (Figure 49) to clear the assert trace buffer.

Figure 49. Clear Assertion Trace Buffer Page

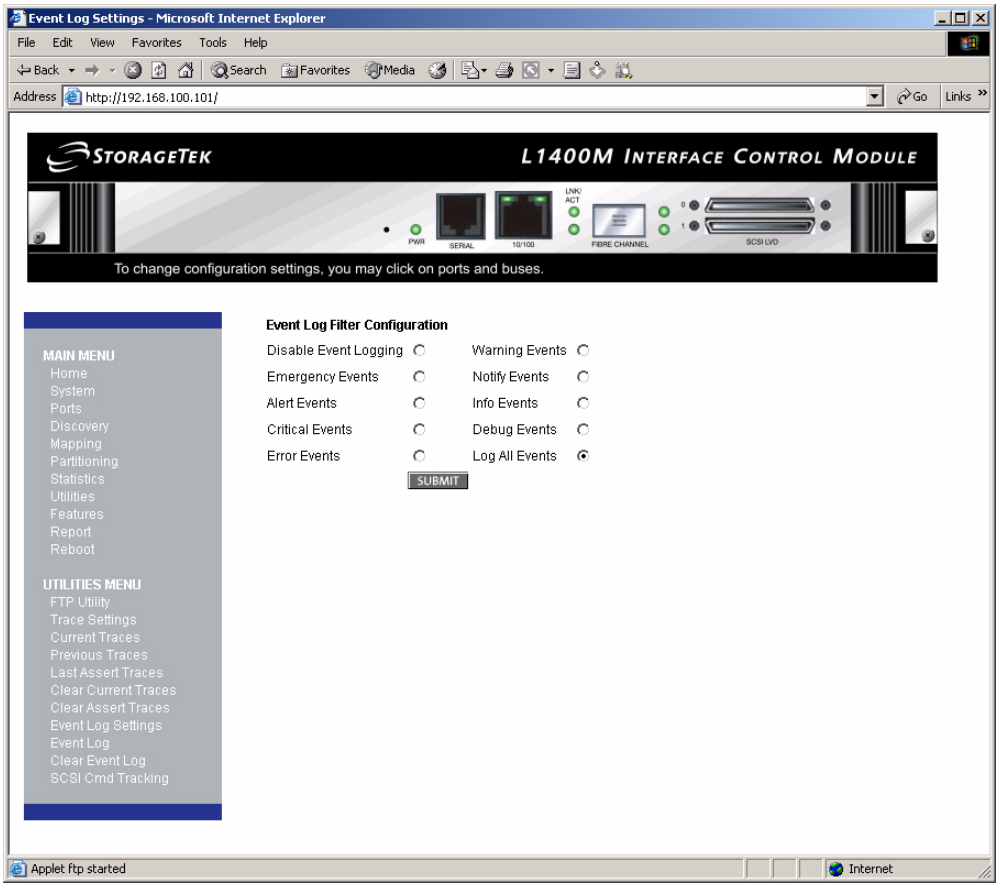


When selected, a confirmation message verifies the selection. If a response of `Yes` is given to the confirmation message, the unit clears the assert trace buffer. Current control module activities will *not* be disrupted by this operation. Click the `Submit` button to finalize your choice.

Main Menu > Utilities > Event Log Settings

Use the Event Log Filter Configuration page (Figure 50) to configure the Event Log.

Figure 50. Event Log Settings Page



To make any changes, modify the entries as described below and then click the `Submit` button.

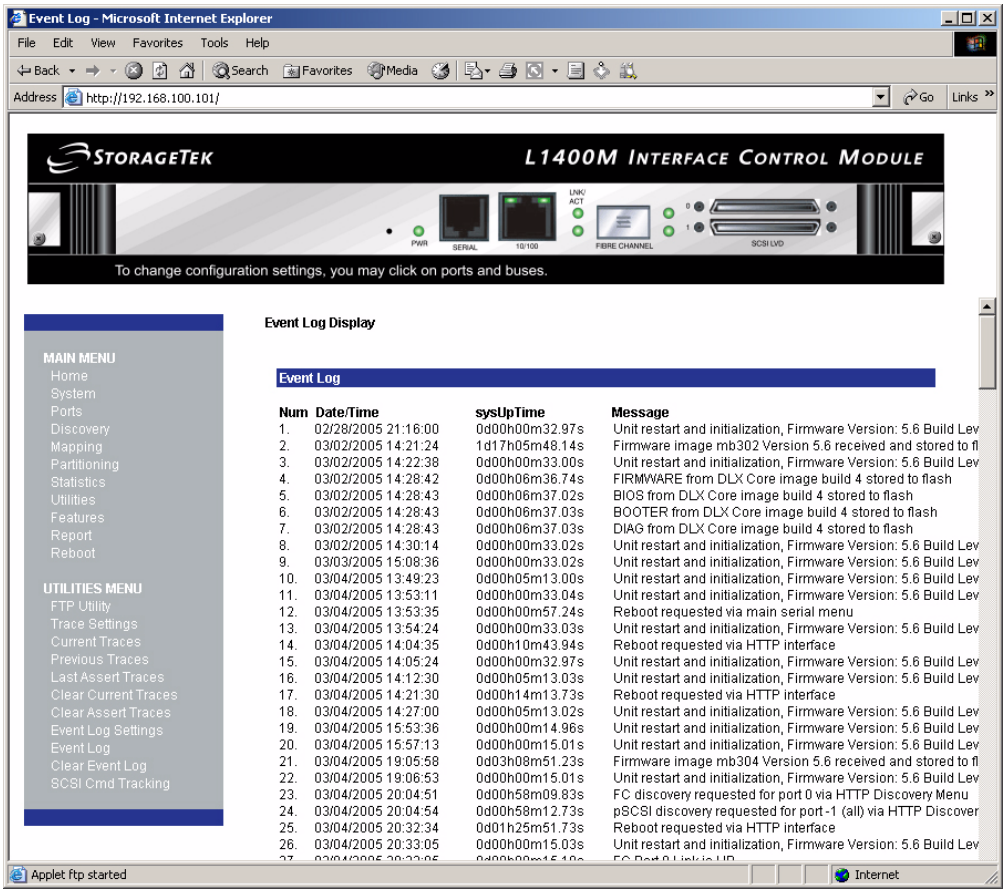
Select from the event log settings shown. Each option enables/disables its respective filtering option. Event logging captures up to the last 215 events and then starts overwriting the log when full.

Note: So that event logging is accurate, be sure to correctly set the clock and date in the real time clock configuration menu (see "Main Menu > System > Real-Time Clock" on page 80).

Main Menu > Utilities > Event Log

Use the Event Log Display page (Figure 51) to display the Event Log.

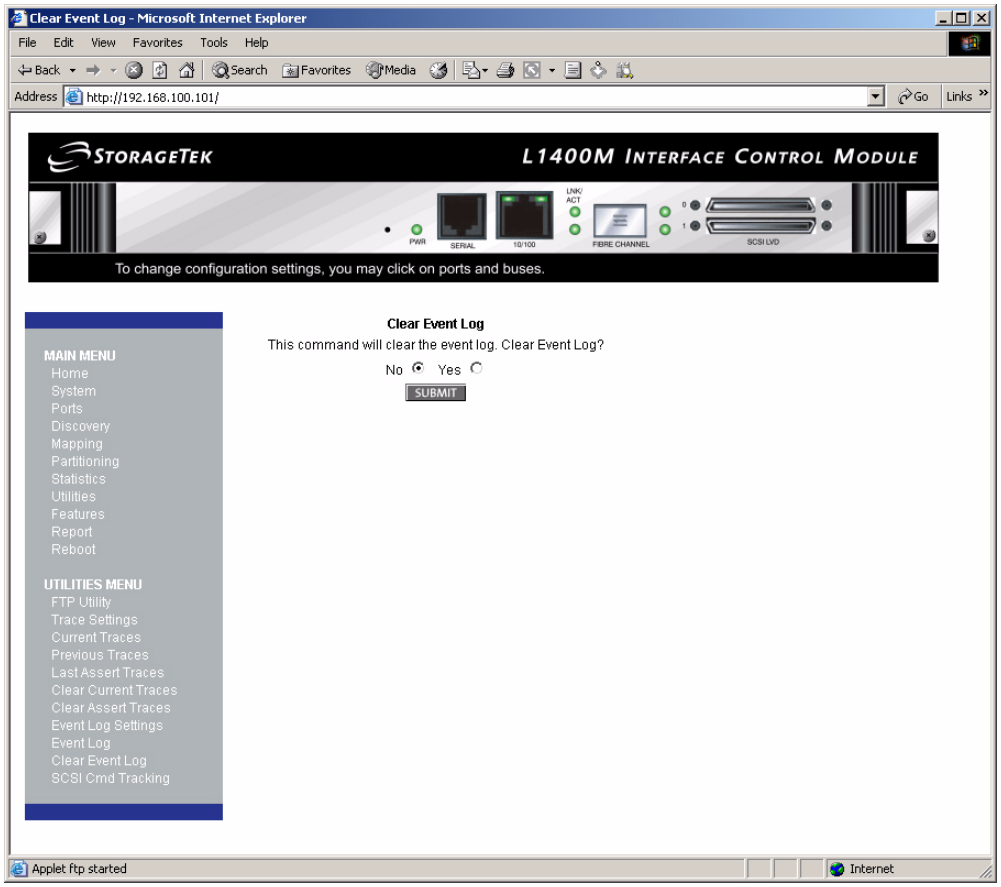
Figure 51. Display Event Log Page



Main Menu > Utilities > Clear Event Log

Use the Clear Event Log page (Figure 52) to clear the event log.

Figure 52. Clear Event Log Page



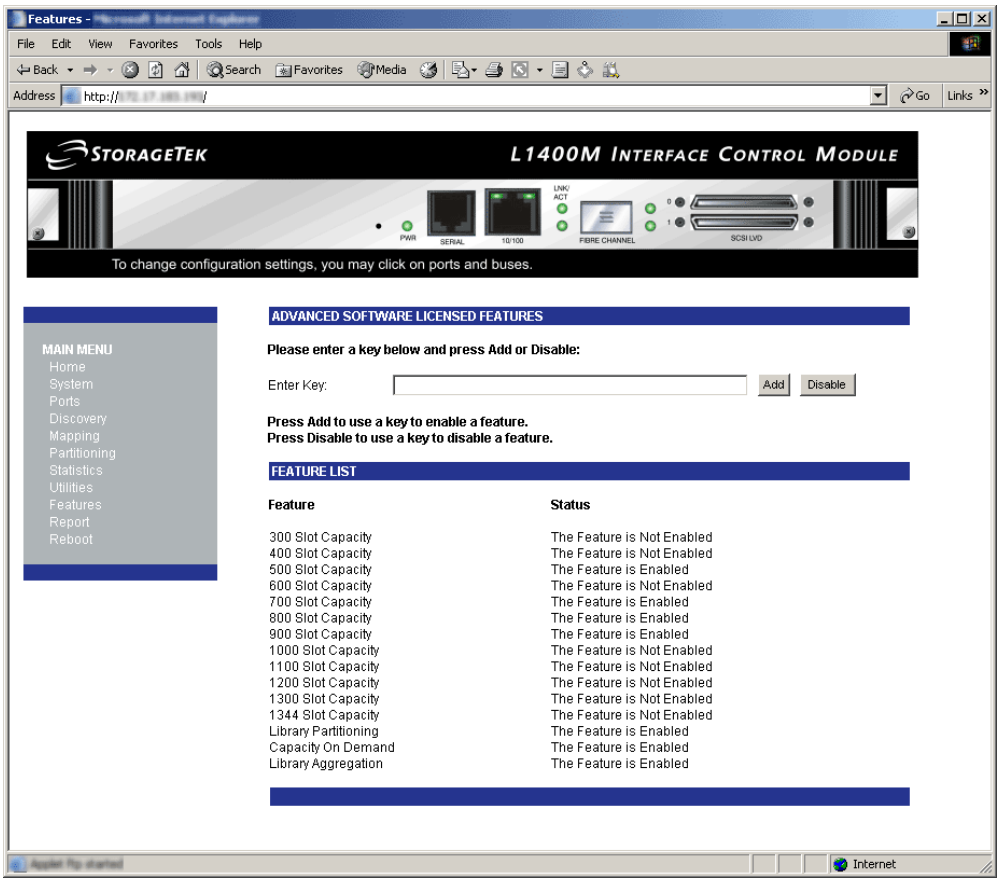
When selected, a confirmation message verifies the selection. If a response of `Yes` is given to the confirmation message, the unit clears the event log. Current control module activities will *not* be disrupted by this operation. Click the `Submit` button to finalize your choice.

Main Menu > Features

The Advanced Software Licensed Features page (Figure 53) is where you enter softkeys to activate advanced features.

- Softkeys for capacity upgrades and partitioning must be ordered from Sun Microsystems after purchasing the feature.
- The Sun Service Representative enters the Library Aggregation softkey when installing an L1400P1 library.

Figure 53. Features Page



Advanced features that can be activated from this page are shown in the Features List:

- Slot licences
- Library partitioning
- Continuous capacity (enabled by default)
- Library aggregation

Slot Licenses

Slots are licensed in blocks of 100 slots. The control module ships with 200 slots enabled. The initial licensed slots appear as slots 0 thru 199 and are available for a single L1400M library. By purchasing/enabling additional slot licenses from Sun Microsystems, you can increase slot capacity to provide the following expanded slot ranges:

- 0-299
- 0-399
- 0-499
- 0-599
- 0-699

When library aggregation is enabled after installing an L1400P1 library, you may need to expand the number of slots to accommodate the increased number of available slots. When adding an L1400P1 library with pass-thru port (PTP), slots appear in the following increments:

- 0-799
- 0-899
- 0-999
- 0-1099
- 0-1199
- 0-1299
- 0-1343

Library capacity additions are enabled by entering the appropriate license softkey using the Visual Manager interface. For more information on ordering library capacity upgrade features, refer to *L180/L1400x/L1400x Ordering and Configuration Guide*, PN MT9112

For more information on requesting library capacity softkeys and enabling capacity upgrades, refer to *L700x/L1400x Tape Libraries and Pass-thru Port Operator's Guide*, PN 95845

Adding a second drive column and/or a PTP (when connecting two libraries) reduces the total slots to less than 1,344.

For license levels that are less than the total number slots, you will only receive access to the number of slots that are authorized by the license key value provided.

If a license value is entered that exceeds the total number of slots installed in an L1400M1 library, the firmware adjusts to enable the remaining slots in the library. No error message is displayed if this occurs.

Library Partitioning

Library partitioning is purchased as an optional feature and activated by entering a softkey on the Advanced Software Licensed Features page. When library partitioning is enabled, the Partitioning menu item replaces the Slot Balancing menu item in the Main Menu.

For a description of the Visual Manager Partitioning page, see "Main Menu > Partitioning" on page 101.

For information on ordering the library partitioning feature, refer to *L180/L1400x/L1400x Ordering and Configuration Guide*, PN MT9112

For more information on requesting a library partitioning softkey, enabling library partitioning, and configuring library partitions, refer to *L700x/L1400x Tape Libraries and Pass-thru Port Operator's Guide*, PN 95845

Slot Balancing

This page is available when the following conditions exist:

- Continuous Capacity is enabled (default)
- Partitioning is not enabled

Slot balancing allows you to balance available slots between connected L1400M0/L1400M1 and L1400P1 libraries when library partitioning has not been purchased and enabled. At least one slot must be configured for slot balancing.

For information on how to use slot balancing, see "Main Menu > Slot Balancing" on page 98

Library Aggregation

This feature allows library administrators to consolidate the assets of two L1400 libraries (L1400M1 and L1400P1 connected by PTP) into one virtual library that can be managed as a single system. Aggregation must be enabled by a Sun/StorageTek service representative using a special encrypted key code. Aggregation can only be enabled if Continuous Capacity has been enabled. The feature may also be disabled, but a Sun/StorageTek service representative would still be needed to perform this task as well.

When Aggregation is enabled, the system aggregates a second library with the initial library and presents the two libraries as one virtual library. If Aggregation is not enabled, the system recognizes one L1400M1 library with 200 slots plus however many additional slots may have been licensed.

You may distribute the number of slots that are licensed between the aggregated libraries by specifying the highest slot number to allow in the first library. This will cause any remaining slots to be taken from the second library. You may set the division point using the Visual Manager interface to 200, 300, 400, 500, 600 or the maximum slot count of the first library. This slot division

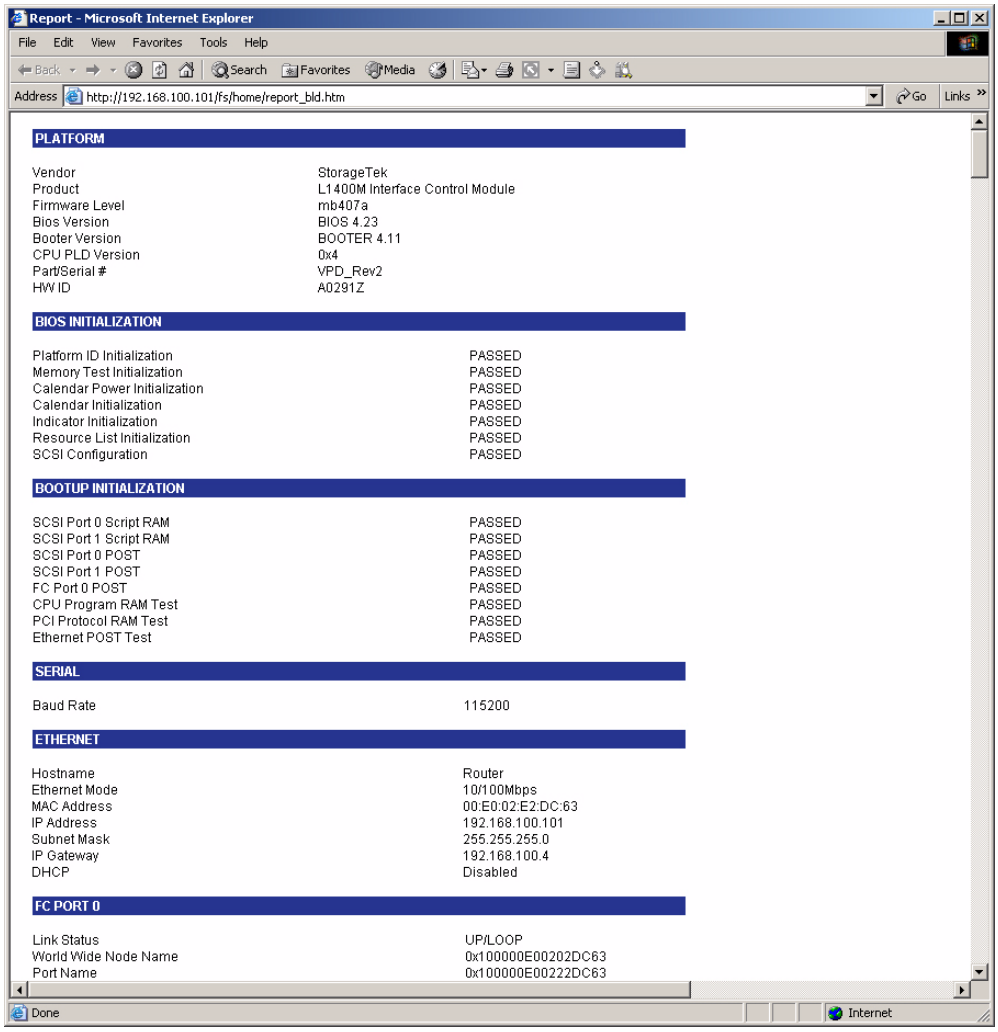
point is referred to as the “licensed slot balancing point”. The user will not be able to take slots away from the base level of 200 in the first (L1400M1) library.

When Aggregation is enabled, the Slot Balancing and Partitioning pages/ menus function differently, as described in “Slot Balancing” on page 122 and “Library Partitioning” on page 122.

Main Menu > Report

Use the report page (Figure 54) to view a consolidated image of all system information.

Figure 54. Report Page

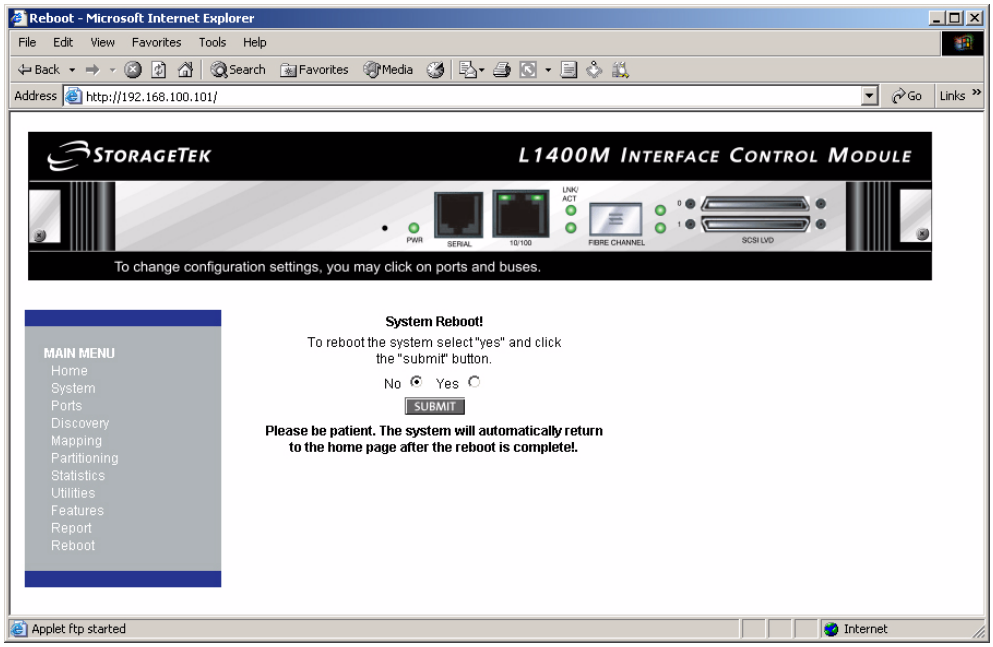


From your web browser, it may also be possible to save or email a copy of the report page. Refer to the user documentation for your specific web browser for details.

Main Menu > Reboot

Use the Reboot page (Figure 55) to reboot the control module.

Figure 55. Reboot Page



When selected, a confirmation message verifies the selection. If a response of `Yes` is given to the confirmation message, current control module activities are disrupted while the control module reboots. The last submitted configuration changes will also take effect after the control module powers on again.
Click the `Submit` button to finalize your choice.

Using the Serial/Telnet Interface 7

This chapter describes specific configuration options available from the perspective of the serial/Telnet interfaces. For an overview of using the other configuration methods available, see Chapter 5, “L1400M Interface Control Module Management.”

The L1400M Interface Control Module (control module) allows the user to access many configuration settings through the serial/Telnet interface. Among these settings are:

- Baud rate of the serial port
- Fibre Channel addresses
- Ethernet IP and MAC addresses
- Device Mapping
- Trace level settings

All of the above settings may be changed and saved.

Note: Unless otherwise indicated, configuration changes take effect when the unit next powers on or reboots.

Power Up Messages

When the control module is powered on, a series of messages similar to the following appear on the terminal or terminal emulation program for the serial interface (see "Setting Up Serial Port Communications" on page 51) or the Telnet utility for Telnet sessions.

Figure 56. Power up Messages

```
STK_3300 X.X\XXXXX
 CPU Program RAM: XXXXXXXX
 PCI Protocol RAM: XXXXXXXX
 SCSI Script RAM (I): XXXXXXXX
 SCSI Script RAM (II): XXXXXXXX
 Ethernet POST Test: PASSED
 SCSI POST Test (I): PASSED
 SCSI POST Test (II): PASSED
 Fibre Channel POST: PASSED

 Attaching network interface XXXXXX… done.
 Attaching network interface XXX... done.
 Initializing sioc...
 Initializing SCSI port 0   (Differential)
 SCRIPTS start @ 0x88002000 (4064)
 Initializing SCSI port 1   (Differential)
 SCRIPTS start @ 0x88006000 (4064)
 Bridge:
Self test completed successfully
```

The main menu appears as follows

Figure 57. Main Menu

```
                    L1400M Interface Control Module
               X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                         06/29/2005 08:56:22

1) Perform Configuration
2) System Utilities
3) Display Trace and Assertion History
4) Reboot
5) Download a New Revision of The Firmware
6) Advanced Software Licensed Features

Copyright (C) 2002 Crossroads Systems, Inc. All rights reserved.

Command >
```

The main menu allows for various operations to be performed on the control module.

- Select `1` to access control module configuration settings. This option is described later in this chapter.
- Select `2` to access System Utilities. This option is described later in this chapter.
- Select `3` to display trace and assertion history. This option is described later in this chapter.
- Select `4` to reboot the control module. A confirmation message will appear verifying you want to do this. If you enter `N` for No, you are returned to the System Utilities menu. If you enter `Y` for Yes, the control module will restart. This option is further described later in this chapter.
- Select `5` to download a new revision of the firmware. A confirmation message will appear verifying you want to do this. If you enter `N` for No, you are returned to the System Utilities menu. If you enter `Y` for Yes, the control module begins accepting firmware data from the serial port. This option is further described later in this chapter.
- Select `6` to display the Features page. The Features page is where advanced software licensed features can be enabled. To enable an advanced software licensed feature, enter a softkey number in the field and click the `Add` button. To remove an advanced software licensed feature, enter the softkey number and click the `Disable` button.
- Current advanced software licensed features include slot capacities (with choices ranging from 300 to 1,344 slots), Library Partitioning, and Library Aggregation.

Perform Configuration

The Configuration Menu (Figure 58) allows the administrator to configure the various options on the control module. For most configuration changes to take effect, you must reboot the control module.

Note: Menus are not case sensitive. You can enter uppercase and lowercase characters interchangeably whenever menus indicate letters as choices.

Figure 58. Configuration Menu

```
                    Configuration Menu
          X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                    06/29/2005 08:56:22

1) Baud Rate Configuration
2) Ethernet and SNMP Configuration
3) Fibre Channel Configuration
4) Parallel SCSI Configuration
5) Device Mapping
6) Trace and Event Settings Configuration
7) Real-Time Clock Configuration
8) Active Fabric Configuration

A) Save Configuration
B) Restore Last Saved Configuration
C) Reset and Save Configuration to Factory Defaults

X) Return to main menu
```

Baud Rate Configuration

This menu (Figure 59) changes the baud rate used on the serial port. Select 1 through 5 for the appropriate baud rate setting. If you are using the Autobaud feature, it may not be necessary to set a baud rate. See "Autobaud Feature" on page 51 for more information on using the Autobaud feature.

Figure 59. Baud Rate Configuration Menu

```
             Baud Rate Configuration Menu
       X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                 06/29/2005 08:56:22

1)   9600   2)   19200
3)   38400  4)   57600
5) * 115200

X) Return to previous menu
```

Note: The asterisk (*) symbol indicates the current baud rate setting.

Ethernet and SNMP Configuration

This menu (Figure 60) allows for setting up all Ethernet network settings including IP address, Subnet mask, IP gateway, SNMP and security settings, Ethernet mode, physical address, and hostname.

Figure 60. Ethernet Configuration Menu

```
                    Ethernet Configuration Menu
              X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                         06/29/2005 08:56:22

IP Address                      : 1.1.1.1
Subnet Mask                     : 255.255.255.0
IP Gateway                      : 0.0.0.0
Ethernet Physical Address       : 08:06:07:05:03:09
Ethernet Mode                   : 10/100Mbps (Auto-Neg)
Hostname                        :
DHCP Configuration              : Disabled

1) Change IP Address
2) Change IP Subnet Mask
3) Change IP Gateway
4) Change Ethernet Physical Address
5) Toggle Ethernet Mode
6) Change Hostname
7) Toggle DHCP Configuration
8) Change SNMP Settings
9) Change Security Settings

X) Return to previous menu
```

- Select `1` to change the IP address of the control module. The default for this setting is `1.1.1.1`.
- Select `2` to change the IP Subnet mask for the control module. The default for this setting is `255.255.255.0`.
- Select `3` to change the IP gateway for the Ethernet network of the control module.
- Select `4` to change the Ethernet Physical Address, or MAC address, of the control module. Ethernet physical addresses are always assigned to Ethernet adapters by the manufacturers.
- Select `5` to toggle the Ethernet mode among the following options:

  ```
  10Mps Only
  100Mps (half duplex) Only
  100Mps (full duplex) Only
  10/100Mps (Auto-Neg.)
  ```

- Select `6` to change the hostname. This is an alphanumeric entry of one word up to 8 characters long.

Note: Do not use a capital ‘Z’ as a part of the hostname as this is the autobaud hot key used by the MS Windows Hyperterminal utility for serial connections.

- Select `7` to toggle the DHCP setting. This setting enables/disables support for Dynamic Configuration Protocol. When enabled, the control module will retrieve a dynamic IP address from a DHCP server located on the Ethernet network that the control module control module is connected to.

  Once DHCP is enabled, it is necessary to save the current configuration and reboot the control module before an IP address will be requested from the DHCP server. Use the following four steps:

  a. Select `X, Return to previous menu`

  b. Select `A, Save Configuration`

  c. Select `X, Return to previous menu`

  d. Select `4, Reboot`

After the control module finishes rebooting, the Main Menu will appear on the serial interface but, for Telnet, a new session will need to be opened to continue configuring the control module. DHCP status can be verified from the Ethernet Configuration Menu where DHCP Configuration is indicated as “Enabled” if DHCP has been successfully activated. Note that the IP address may also appear different than the former non-DHCP IP address.

Note: To use the DHCP feature, a DHCP server must be operational on the Ethernet network used by the control module control module. If the DHCP feature is used when there is no DHCP server, the standard for DHCP requires that the control module wait three minutes for a response from a DHCP server before timing out.

Your DHCP server may allow you to set up a lease reservation for an IP address by providing the server with the Ethernet MAC address of the control module. This sets the DHCP server to always provide the same IP address to the control module. This setup can be useful for remote management of the control module via Telnet or Visual Manager. Because the method of setting up a lease reservation varies depending on the DHCP server being used, you should contact your Network Administrator for assistance.

- Select `8` to access the SNMP Settings for the control module, including the community names for GET and SET as well as SNMP Trap settings. For Trap settings, select the IP address of the device to send the SNMP trap notifications. SNMP Settings are described later in this chapter.

- Select `9` to change security settings, including the user name and password. User names and passwords should be unique and kept confidential. You should use a combination of letters and numbers when creating user names and passwords.

SNMP Configuration

The SNMP Configuration menu (Figure 61) is accessible through the Ethernet Configuration menu and allows for various SNMP options to be configured. This includes the Trap Manager IP address, community names, and the Trap priority.

Figure 61. SNMP Configuration Menu

```
                        SNMP Configuration
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                        06/29/2005 08:56:22

Current SNMP Configuration:

      Community Name for GET: public
      Community Name for SET: private

Traps are disabled.

1) Change Community Name for GET
2) Change Community Name for SET
3) Toggle Trap

X) Return to previous menu
```

Current SNMP Configuration indicates the community names for GET and SET and indicates trap status, including the Manager IP Address for enabled traps.

The SNMP GET community name is checked for each GET request received by the control module. The community name in the SNMP packet must match the community name configured here for the SNMP GET request to be successfully completed. Configure your SNMP manager to have the same GET and SET community names as the control module.

- Select `1` to change the `Community Name for GET`.
- Select `2` to change the `Community Name for SET`.
- Select `3` to toggle traps on or off.

If SNMP Traps are disabled, no trap events are sent.

Figure 62. SNMP Configuration Menu With Traps Enabled

```
                        SNMP Configuration
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                        06/29/2005 08:56:22

Current SNMP Configuration:

      Community Name for GET: public
      Community Name for SET: private

Traps are enabled.

       1) Change Community Name for GET
       2) Change Community Name for SET
       3) Toggle Trap
       4) Modify Trap Manager IP Addresses and Filters

       X) Return to previous menu
```

- Select 4 to change one of a maximum of three Manager IP Addresses for Traps. The Trap Manager IP address is the address used for sending Trap notifications. Typically, this is the IP address of the machine using the network management application and/or a MIB browser.

  Note: Be sure to correctly set the clock and date in the real time clock configuration menu so that event logging is accurate.
  See “Real-Time Clock Configuration” on page 157.

Trap Configuration

The Trap IP Address Configuration menu (Figure 63) is accessible through the SNMP Configuration menu and allows for the set up of IP addresses for Trap Managers.

Figure 63. Trap IP Address Configuration Menu

```
                  Trap IP Address Configuration
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                      06/29/2005 08:56:22

SNMP Trap Manager Configuration :

    Trap Manager 1   (Disabled)
IP Address: 1.1.1.1  Port#: 162  Trap Filter: 1
    Trap Manager 2   (Disabled)
IP Address: 1.1.1.1  Port#: 162  Trap Filter: 1
    Trap Manager 3   (Disabled)
IP Address: 1.1.1.1  Port#: 162  Trap Filter: 1

1) Change Trap Manager 1 Settings.
2) Change Trap Manager 2 Settings.
3) Change Trap Manager 3 settings.

X) Return to previous menu
```

Select 1 through 3 to set the a Manager IP address for Traps. The Trap Manager IP address is the address used for sending Trap notifications. Typically, this is the IP address of the machine using the network management application and/or a MIB browser.

Current settings are shown for each menu option.

For more information on Trap Manager Filter settings, see page 76.

Fibre Channel Configuration

The Fibre Channel Configuration Menu (Figure 64) allows for setting the Fibre Channel Address method, Hard Address value, discovery mode, WWN overrides, tape backup settings, default map value, and FC port mode.

Figure 64. Fibre Channel Configuration Menu

```
                    Fibre Channel Configuration Menu
                   X.XX.XX  XXXXXX  XXXXXXXXXXXXXXXX
                          06/29/2005 08:56:22

Current Fibre Channel Configuration - Port 0
FC Link Status: UP
Node Name: 0x100000E0 020102AB
Port Name: 0x100000E0 022102AB
Port Mode: N_Port Mode
Discovery Mode: Manual Discovery Only
Buffered Tape Writes: Enabled, Queue Depth = 1
Current Default Map: 'Indexed'
Port Speed: 2 GigaBit

1) Change World Wide Name High      2) Change World Wide Name Low
3) Toggle Port Mode                 4) Change ALPA Value
5) Toggle Discovery Mode            6) Toggle Buffered Tape Writes
7) Change Buffered Tape Queue Depth 8) Change Default Map Value
9) Edit FC Override Settings
A) Toggle Port Speed
X) Return to previous menu

Command, <enter> for next FC Port >
```

Note: For In-Band Management to be operational, WWN naming schemes MUST be compliant with IEEE Fibre Channel Format 1, where the left-most hexadecimal character (the NAA field) of the WWN is `1`. Further, the upper nibble of the third byte (the sixth hexadecimal value from the right) must be a value of `0` or `1`.

- Select `1` to enter a new value for the World Wide Name High. Ordinarily, this value should not be changed.
- Select `2` to enter a new value for the World Wide Name Low. Ordinarily, this value should not be changed.
- Select `3` to toggle Port Mode between `Auto Sense, SoftAL_PA`; `AutoSense, Hard AL_PA`; and `N_Port`. The default setting is `Auto Sense, Soft AL_PA` mode. In this mode, the Fibre Channel port of the control module will try to come up as a loop and if not successful then will try to come up as a fabric. If the port comes up as a loop, it will then determine whether it's on a private or public loop.

If `Auto Sense, Hard AL_PA` is selected, a unique one-byte valid value (derived from an Arbitrated Loop Topology as defined in ANSI specification FC_AL ver 4.5) is used for the Fibre Channel configuration. When configuring the Fibre Channel AL_PA, the control module interface presents a list of loop addresses along with the corresponding AL_PA. From here, the user can select the loop address desired.

In `N_Port` mode is selected, the Fibre Channel port of the control module will try coming up as a fabric port. If the control module is on a loop and N_Port mode is selected, an error in communication may occur.

- Select `4` to set the Hard AL_PA Value by entering a node number from the AL_PA lookup table that appears when this option is selected. For more information, see Table 11 on page 194.
- Select `5` to toggle the Discovery Mode among the following options:

  ```
  Auto Discovery on Reboot Events
  Auto Discovery on Link Up Events
  Manual Discovery Only
  ```

  Discovery Mode determines how the control module will discover new FC devices.

  Auto Discovery allows the control module to automatically discover all Fibre Channel devices when the control module reboots.

  - Reboot Events discovers both the ports and the devices behind the ports.
  - Link-up Events discovers both the ports and the devices behind the ports for the first link-up event (which is the first reboot of the control module). Subsequent link-up events will only discover the ports and not the devices behind the ports.

  Note: SCSI devices mapped to a Fibre Channel port must be mapped as sequential FC LUNs starting at LUN number 00. Skipping LUN numbers is not recommended when mapping FC LUNs because FC Discovery stops the discovery process whenever an empty LUN position is found.

  Manual Discovery is the default selection and sets discovery of new devices to only occur after the user selects the Refresh Device Display option from the Display Attached Fibre Channel Devices menu, located under `Main Menu` > `System Utilities` > `System Statistics` > `Display Fibre Channel Protocol Status`.

- Select `6` to toggle Buffered Tape Writes to `enabled` or `disabled`. Buffered Tape Writes is an option designed to enhance system performance. By returning status on consecutive write commands prior to the tape device receiving data, Buffered Tape Writes remove the latency of waiting for responses from the tape device. In the event that data does not transfer correctly for any reason, the control module will return a check condition on a subsequent command.

  Commands other than Write(6) are not issued until status is received for any pending write. Also, status is not returned until the device completes the command. For instance, when a synchronizing command is sent to a drive, such as sending a Write File mark, a good status means all prior commands have been successfully completed and data has been successfully written to the medium. This is appropriate for such tasks as file backup/restore.

  Note: If the application requires confirmation of individual blocks being written to the medium, such as audit trail tapes or log tapes, this option should be disabled.

- Select `7` to change the Tape Backup Queue Depth. Select a value from `0` thru `10`.
- Select `8` to change the Default Map Value for the current port. This can be `Indexed`, `Auto-assigned`, or `SCC`. The default setting is `Indexed`. The Auto-assigned map contains all the devices that are attached to the control module, and when a new initiator contacts the control module through the selected port, it will be able to access the devices that are in this map.
- Select `9` to edit the FC override settings. When this option is selected, the following menu appears.
- Select `A` from the `Fibre Channel Configuration Menu` to toggle the port speed between `1` and `2` Gb/s (Gigabits per second) for the selected Fibre Channel port.

Following are descriptions for each of the override settings (Figure 65):

Note: Normally, override settings should not be changed except when directed to do so by an authorized Sun/StorageTek service representative.

Select `1` to toggle the Hi-Sup Bit between `SET` and `CLEAR`. The default setting is `CLEAR`. This option should be toggled to `SET` when the server uses the Hi-Sup bit to scan for FC LUNs greater than eight.

Note: Hi-Sup is only set in an AF LUN which needs to be mapped as the first device (FC LUN 00).

Figure 65. Fibre Channel Override Configuration Menu

```
            Fibre Channel Override Configuration Menu
                 X.XX.XX XXXXXX  XXXXXXXXXXXXXXXX
                        06/29/2005 15:00:28

Current Fibre Channel Override Configuration - Port 0
Hi-Sup Bit in INQUIRY DATA is CLEAR
Force FCP Response Code is OFF
PRLI Payload - INITIATOR & TARGET Bits SET
PRLI ACCEPT Payload - INITIATOR & TARGET Bits
SET PRLI ACCEPT Payload - FC CONFIRM
SET Target reset mode is ALTERNATE
Force FLOGI in Private Loop is DISABLED

1) Toggle Hi-Sup Bit Setting
2) Toggle Forcing FCP Response Code
3) Toggle Initiator/Target Bit Settings in PRLI
4) Toggle Initiator/Target Bit Setting in PRLI_ACC
5) Toggle FC Confirm Setting in PRLI_ACC
6) Change Target Reset Mode
7) Toggle Forcing FLOGI when in Private Loop
8) Capacity On Demand
9) Dual Library Aggregation
A) Library Diagnostic Mode

X) Return to previous menu
```

- Select `2` to toggle the Force FCP Response Code between `OFF` and `ON` for support of Compaq-specific HBAs #223180-B21 and #120186-001. The default setting is `OFF`.
- Select 3 to toggle the Initiator/Target Bit Setting in PRLI between `INITIATOR Bit Set`, `TARGET Bit Set`, `INITIATOR & TARGET Bits Set`, and `INITIATOR & TARGET Bits CLEAR`. This should be configured to one of the options for SET on both controllers when using the control module in a dual configuration (a configuration where at least one control module appears as a target to at least one other controller that appears as an initiator). The default setting is `INITIATOR & TARGET Bits is SET`.

- Select 4 to toggle the Initiator/Target Bit Setting in PRLI_ACC between INITIATOR Bit Set, TARGET Bit Set, INITIATOR & TARGET Bits Set, and INITIATOR & TARGET Bits CLEAR. This should be configured to one of the options for SET on both controllers when using the control module in a dual configuration (a configuration where at least one control module appears as a target to at least one other controller that appears as an initiator). The default setting is TARGET Bit Set.
- Select 5 to toggle FC Confirm Setting in PRLI_ACC between FC CONFIRM SET and FC CONFIRM CLEAR. The default setting is FC CONFIRM CLEAR. This option should be toggled to FC CONFIRM SET when the server is using QLogic HBAs.
- Select 6 to access the Target Reset Mode menu. The default setting is setting ALTERNATE. The Alternate Target Reset Menu (Figure 66) appears when this option is selected:

Figure 66. Alternate Target Reset Menu

```
                    Alternate Target Reset
              X.XX.XX  XXXXXX  XXXXXXXXXXXXXXXX
                     06/29/2005 15:00:37

FOR ALL PORTS: Target reset mode is ALTERNATE

1) ALL PORTS: Use normal pass through target reset (4x50 compatible)
2) ALL PORTS: Use alternate behavior (like PRLO with no actual logout)

X) Return to previous menu
```

Following are descriptions for each of the Alternate Target Reset settings:

- Select 1 to use a normal SCSI bus reset code to recover from a bus problem. This setting is comparable with Sun/StorageTek 3250 Fibre Channel Routers.
- Select 2 to uses a progressive SCSI bus recovery mechanism that first attempts to recover the bus by attempting a target reset and, if this fails, then trying the bus reset.

- Select 7 to toggle Force FLOGI in Private Loop between Disabled and Enabled. The default setting is Disabled. FLOGI Fabric Login is a process by which a node makes a logical connection to a fabric switch.

  This setting should be used to connect the attached Fibre Channel devices as private loop devices for certain switched fabric environments.

- Select 8 to toggle Capacity On Demand (Continuous Capacity) support between Disabled and Enabled. The default setting is Disabled. In order to use Capacity On Demand, the feature must also be activated from the Advanced Software Licensed Features menu using an authorized key code.

- Select 9 to toggle Dual Library Aggregation support between Disabled and Enabled. The default setting is Disabled. In order to use Dual Library Aggregation, the feature must also be activated from the Advanced Software Licensed Features menu using an authorized key code.
- Select A to toggle Library Diagnostic Mode support between Disabled and Enabled. The default setting is Disabled.

Parallel SCSI Configuration

Use this menu (Figure 67) to set up SCSI attributes.

Figure 67. Parallel SCSI Configuration Menu

```
                Parallel SCSI Configuration Menu
            X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                        06/29/2005 08:56:22

Current SCSI Configuration - Bus 0

Discovery               : Enabled
Bus Reset on Boot       : Enabled
Discovery delay time    : 2 seconds
Internal Termination    : Enabled

1) Edit Initiator Settings
2) Enable/Disable SCSI Discovery
3) Enable/Disable SCSI Reset on Boot
4) Set Discovery Delay Time
5) Set SCSI Termination Mode
X) Return to previous menu

Command, <enter> for next SCSI bus >
```

Press the <Enter> key to toggle the current menu to the next SCSI bus.

- Select 1 to edit the SCSI Initiator menu settings, described later in the chapter.
- Select 2 to enable/disable SCSI Discovery.
- Select 3 to enable/disable SCSI Bus Reset on Boot. When enabled, the control module will automatically reset SCSI buses after initial power up and after reboots.
- Select 4 to set the discovery delay time for SCSI devices. This is the time the control module waits after a power-up or reboot before starting to discover SCSI devices. This value should be set to no less than 250ms, according to the SCSI standard for Reset-to-Selection Time. Sun Microsystems recommends you set the value to at least 2 seconds to ensure all SCSI devices complete their individual power-ups.

- Select `5` to toggle the SCSI termination mode between `Enabled` and Disabled. This option is automatically set to `Enabled` for internal termination. The Internal setting allows the control module to internally terminate a SCSI connection. Setting this option to `Disabled` allows the SCSI Bus, not the control module, to handle SCSI terminations.

SCSI Initiator Menu

Use this menu (Figure 68) to set up the SCSI Initiator.

- Select 1 to enable/disable the SCSI Initiator.

Figure 68. Selecting Primary and Alternate SCSI IDs

```
                    SCSI Initiator Menu
          X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                    06/29/2005 08:56:22

Current Initiator Configuration - Bus 0

Initiator ID's         : Primary:07 Alternate:06

1) Select primary SCSI Initiator ID
2) Enable/Disable alternate SCSI ID
   (The "alternate" ID is used to enhance the performance
    of status ("agent") commands that are being issued to a
    serial device. To use this feature enable the alternate
    ID and pick an ID that is currently unused on this bus.)
3) Select alternate SCSI Initiator ID
X) Return to previous menu
```

- Select 1 to select the primary SCSI Initiator ID. This is the ID for the SCSI device that request operations from other SCSI devices known as targets. This should be a unique ID on the bus. This value is initially blank and the user must enter a integer value in the range of 0-15 prior to saving the configuration to the control module.
- Select 2 to enable/disable an alternate SCSI Initiator ID.
- Select 3 to select an alternate SCSI Initiator ID. This should be a unique ID on the bus. The default value is 6. This option is used to enhance the performance of status (agent) commands issued to a serial device.

Device Mapping

This option allows the user to manipulate maps and associate selected host with a particular map. Each physical port/bus on the system has at least an *Indexed* map and *Auto Assigned* map. In addition, there is a *SCC Map* on FCP ports. Each map has a unique name and map ID. User may rename all maps, except for `Indexed`, `Auto Assigned`, and `SCC Map`. The map that is set to be current must always contain valid information, since many of the operations on the map menu are executed against this map.

Figure 69. Device Mapping Main Menu

```
                    Device Mapping Main Menu
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                       06/29/2005 08:56:22

Current Default Map for FCP Port 0 - Name 'Auto Assigned'

1) Select Current Map
2) Display Current Map
3) Create New Map
4) Remove Current Map
5) Edit Current Map
6) Clone Current Map
7) Edit Host List for Current Map
8) Display Device List
9) Activate Mapping and Save

X) Return to previous menu

Command >
```

- Select `1` from the `Device Mapping Main Menu` to display all the maps defined by the system for the current protocol/port and to choose one of the maps from the list to make it a “current” map. The map selected from this list will be the one used by the control module to direct data to the appropriate targets and initiators.

Note: Because the entire list of Maps may not fit on one screen, select N or P to go back and forth between screens displaying more maps. Select X to return to the Device Mapping Main Menu.

Figure 70. Select Current Map

```
                        Select Current Map
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                        06/29/2005 08:56:22

Current Map for FCP Port - 'Indexed'
+-------+------------+------+-------------------------------+
| MAP # |  Protocol  | Port |      Map Name                 |
+-------+------------+------+-------------------------------+
|     1 |  FCP       |   0  |                       Indexed |
|     2 |  FCP       |   0  |                 Auto Assigned |
|     3 |  FCP       |   0  |                       SCC Map |
+-------+------------+------+-------------------------------+
Page # 1 out of 1 pages.
Total Number of Maps = 3
Enter(N=Next, P=Prev, Number=Select, X=Exit) >
```

Enter the number from the column on the left side of the table to select a map and make it 'Current'. For example, entering 3 from the picture above would select map named SCC Map on Fibre Channel Port 0 and make it a 'Current' map.

- Select 2 from the Device Mapping Main Menu to display the content of the 'Current' map. This option displays all the entries in the map. Information in the local part of the address(left) depends on the type of protocol for which the map is defined. The specific device address information depends on the protocol/port where the device resides. Mapping a device to the same port where it resides is not allowed. (i.e. you can not map a disk on FCP Port 0 to an address on FCP Port 0.)

Figure 71 is an example of an FCP map:

Figure 71. Current FC Port Map Display

```
                          Current Map Display
                   X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                             06/29/2005 08:56:22

Port Map Display

Map:FCP Port 0:Name 'Indexed'
+--------++------+------+------+------+-------------------------------+
| FC LUN || Prtl | Port | TYPE | STAT | Protocol Specific Information |
+--------++------+------+------+------+-------------------------------+
|    0   || AF   |  0   | CHGR |  UP  | Lun=0  SN= STKKA0186401       |
|  -     ||  -   |  -   |   -  |   -  |   STK      L700e        0308  |
|    1   || AF   |  0   | CHGR |  UP  | Lun=1  SN= STKKA0186402       |
|  -     ||  -   |  -   |   -  |   -  |   STK      L700e        0308  |
|    2   || AF   |  0   | CHGR |  UP  | Lun=2  SN= STKKA0186403       |
|  -     ||  -   |  -   |   -  |   -  |   STK      L700e        0308  |
|    3   || AF   |  0   | CHGR |  UP  | Lun=3  SN= STKKA0186404       |
|  -     ||  -   |  -   |   -  |   -  |   STK      L700e        0308  |
|    4   || AF   |  0   | CHGR |  UP  | Lun=4  SN= STKKA0186405       |
|  -     ||  -   |  -   |   -  |   -  |   STK      L700e        0308  |
+--------++------+------+------+------+-------------------------------+
Page #1 out of 2 pages.
Number of entries in the Map = 6
Enter(N=Next,P=Prev,X=Exit)>
```

Note: Because the entire list of Maps may not fit on one screen, select `N` or `P` to go back and forth between screens displaying more maps. Select `X` to return to the `Device Mapping Main Menu`.

- Select `3` from the `Device Mapping Main Menu` to create a new map. This option allows adding a new map for the current protocol/port or bus. Once the map is created it becomes the ‘current’ map.

Figure 72. Create New Current Map

```
                    Create New Current Map
            X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                       06/29/2005 08:56:22

Create FCP Map on Port 0

Enter New Map Name (X=Cancel) > New Map
Created Map: ‘New Map’ at FC Port 0 with ID=4
```

- Select `4` from the `Device Mapping Main Menu` to delete current map. The screen will ask for confirmation before deleting the map. After the map has been deleted, the default map becomes the current map. Maps with names `Auto Assigned` or `SCC Map` may not be removed.

Figure 73. Delete Current Map

```
This will delete current map - 'New Map', ID=4.
Are you sure (y/n)? > y

Map: 'New Map' with ID=4 was deleted
```

- Select 5 from the Device Mapping Main Menu to edit current map. This option displays the Map Edit Menu (Figure 74) and allows user to edit the name of the map, change content of the map, clear, and fill the map. Editing an Auto Assigned or SCC Map is not allowed.

Figure 74. Map Edit Menu

```
                        Map Edit Menu
          X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                    06/29/2005 08:56:22

Current Map: FCP Port 0 - Name 'Indexed'

1) Edit Name
2) Edit Map Entries
3) Clear Map
4) Fill Map

X) Return to previous menu

Command >
```

Note: Enter the number of one of the available selections or enter X to exit to the Device Mapping Main Menu.

- Select 1 from the Map Edit Menu to edit the name of the current map (Figure 75). The name of the Indexed map may not be changed. Map name also cannot be left empty.

Figure 75. Edit Map Name

```
Current Name: New Map Name

Enter New Name (X=Cancel) > New Map

Map Name Changed to: 'New Map'
```

- Select 2 from the Map Edit Menu to edit entries in the current map. This screen allows the user to navigate up and down the map entries and create or remove entries. Device lists are also available to the user to make it easier to identify the device to be mapped. Mapping a device to its native port/bus is not allowed. The information needed to create entries is protocol/port dependent.

Figure 76 is an example of the Edit Map Entries screen for an FCP map:

Figure 76. Edit Map Entries

```
                              Edit Map Entries
                   X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                              06/29/2005 08:56:22

Port Map Edit Display

Map: FCP Port 0: Name 'Indexed'
+--------++------+------+------+------+-------------------------------+
| FC LUN || Prtl | Port | TYPE | STAT | Protocol Specific Information |
+--------++------+------+------+------+-------------------------------+
|    0   || AF   |  0   | CHGR |  UP  | Lun=0  SN= STKKA0186401       |
|  -     ||  -   |  -   |  -   |  -   |   STK      L700e        0308  |
|    1   || AF   |  0   | CHGR |  UP  | Lun=1  SN= STKKA0186402       |
|  -     ||  -   |  -   |  -   |  -   |   STK      L700e        0308  |
|    2   || AF   |  0   | CHGR |  UP  | Lun=2  SN= STKKA0186403       |
|  -     ||  -   |  -   |  -   |  -   |   STK      L700e        0308  |
|    3   || AF   |  0   | CHGR |  UP  | Lun=3  SN= STKKA0186404       |
|  -     ||  -   |  -   |  -   |  -   |   STK      L700e        0308  |
|    4   || AF   |  0   | CHGR |  UP  | Lun=4  SN= STKKA0186405       |
|  -     ||  -   |  -   |  -   |  -   |   STK      L700e        0308  |
+--------++------+------+------+------+-------------------------------+
Page #1 out of 2 pages.
Number of entries in the Map = 6

Enter(N=Next,P=Prev,A=Add,C=Create,R=RemoverGapsD=Delete,X=Exit)>
```

Note: Control of the editing process is done with simple single letter commands. N and P controls allow scrolling up and down the map entries. Select X to return to the Map Edit Menu. Select A to add a new entry to the map or D to delete an already existing entry in the map. Select R to get rid of the gaps in the map.

Adding an Entry

To add a new entry, the user must enter the desired LUN ID for an FCP Map or a Target/LUN ID combination for the SCSI Map. If the selected LUN or Target / LUN is already present in the map, the user is asked to confirm the override or enter different address information. Next, the operator will be prompted for the protocol and port at which a device selection list is generated. (Devices may not be mapped to their native port).

Figure 77 is an example of adding an entry for an FCP map:

Figure 77. Adding an FCP Port Entry

```
Enter desired lun address > 0

Select Protocol (0 - SCSI, 1 - AF, X=Cancel) > 0
Select SCSI Port:  Port# = ? (0-1,X=Cancel) > 1
```

Figure 78 is an example of a Device List generated for an FCP port:

Figure 78. Device List for FCP Port

```
                                Device List
                     X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                               06/29/2005 08:56:22

AF Device List:
+-----++------+--------+------+--------------+-----------------------------
-+
| Num || LUN  | State  | TYPE | Serial Num   | Decription                  |
+-----++------+--------+------+--------------+-----------------------------
-+
|   1 ||  -   |   -    |   -  |      --      |              --             |
|   2 ||   0  | ACTIVE | CHGR | STKKA0186401 | STK      L700e        0308   |
|   3 ||   1  | ACTIVE | CHGR | STKKA0186402 | STK      L700e        0308   |
|   4 ||   2  | ACTIVE | CHGR | STKKA0186403 | STK      L700e        0308   |
|   5 ||   3  | ACTIVE | CHGR | STKKA0186404 | STK      L700e        0308   |
+-----++------+--------+------+--------------+-----------------------------
-+
Page #1 out of 2 pages.
Number of entries in the device table = 7

Enter(Number=Select, N=Next, P=Prev, X=Exit)>
```

Note: If the operator selects a device with LUN '-', all LUNs for this Target will be added to the map.

Select number from the left column `Num` to add a device to the map. Selecting a device where LUN='-' adds all LUNS for this target. If the selected device is already mapped, an error message will appear to warn the user about adding a duplicate device. `N` and `P` controls allow scrolling up and down the device list. `X` brings the user back to the `Edit Map Entries` display table.

Creating an Entry

The user can create an empty map or use an existing map to pre-enter devices that are not yet online (Figure 79 on page 150). To perform this operation, the user has to know all the essential information about the device. A series of questions will be asked to guide the user through the process. The questions will vary based on the 'Current' map protocol. If 'Current' map is an FCP Map, the user will be asked to select the LUN address for a device, then the protocol/port on which device will reside, then the Name for the device (which can be left empty), then the type of device:

Figure 79. Creating an Entry for FCP Port Map

```
Enter desired lun address > 1

Select Protocol (0 - SCSI, X=Cancel) > 0
Enter desired Device Name (could be empty) >

DISK_DEVICE        - 0,  TAPE_DEVICE          - 1
PRINTER_DEVICE     - 2,  PROCESSOR_DEVICE     - 3
WORM_DEVICE        - 4,  CDROM_DEVICE         - 5
SCANNER_DEVICE     - 6,  OPTICAL_DEVICE       - 7
MEDIUM_CHGR_DEVICE - 8,  COMM_DEVICE          - 9
ARRAY_CTLR_DEVICE  - 12, ENCLOSURE_SRV_DEVICE - 13

Enter desired Device Type > 1

Enter device target id > 5

Enter device lun id > 0
```

Note: If the device being added is a SCSI device, the user will also be asked to enter Target ID and LUN ID for the device. Target ID must already be defined in the SCSI Configuration. Otherwise, adding a device will not be permitted.

When creating a device that does not exist, it will be displayed with `Down` status.

Remove Gaps

This option removes any incremental gaps in the sequence of LUNs listed in the table.

Deleting an Entry

The user selects a LUN ID for an FCP Map, or Target ID and LUN ID for a SCSI Map (Figure 80).

Figure 80. Deleting an Entry

```
Select LUN to delete (X=Cancel, D=DeleteMulitple) > 0

Are you sure you want to delete LUN 0? (Y=Confirm, X=Cancel) > y
```

Select `D` to delete multiple LUNs (Figure 81).

Figure 81. Deleting Multiple LUNs

```
Select LUN to delete (X=Cancel, D=DeleteMulitple) > d

Enter comma delimited LUNs to delete > 0, 1, 4

Are you sure you want to delete LUN 0? (Y=Confirm, X=Cancel) > y

Are you sure you want to delete LUN 1? (Y=Confirm, X=Cancel) > y

Are you sure you want to delete LUN 4? (Y=Confirm, X=Cancel) > y
```

Note: When deleting multiple LUNs, the user can list the LUNs to delete in a comma or space delimited format. This can be done for both FCP and SCSI maps.

- Select `3` from the `Map Edit Menu` to clear (i.e. remove all entries from) the current map. The user is prompted for confirmation (Figure 82).

Figure 82. Clear All Entries From Current Map

```
This will clear all entries from SCSI map 'Default' on Port 7.
Are you sure (Y=Confirm, X=Cancel) > y

SCSI map 'Indexed' on Port 7 was cleared.
```

- Select `4` from the `Map Edit Menu` to fill the current map. This selection scans the device list and appends all unmapped devices at the end of the ‘current’ map. Devices marked as `DOWN` will not be mapped. After this operation completes, the `Edit Map Entries` screen appears.

- Select `6` from the `Device Mapping Main Menu` to clone ‘Current’ map (Figure 83). This option allows the user to make an exact copy of already existing map complete with all entries. Cloning of ‘Auto Assigned’ or ‘SCC Map’ is not allowed. The new map must have a unique map id and name. Once cloning is complete, the newly created map becomes ‘Current’ map. The purpose of this option is to create a base for a new map that is similar to an already existing map.

Figure 83. Clone Current Map

```
                    Clone Current Map
          X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                    06/29/2005 08:56:22

Clone Map: FCP Port 1: Name 'Indexed'

Enter New Map Name (X=Cancel) > Clone Fcp Map
```

- Select `7` from the `Device Mapping Main Menu` to edit the host list for the current port/protocol. The ‘Current’ map can be associated with hosts available in the host list. Initially all hosts are associated with an Auto Assigned map. These are ‘built at runtime’ hosts. They cannot be edited or deleted; their name cannot be changed.

Figure 84 is an example of a host list for FCP hosts.

Figure 84. Host List for FCP Hosts

```
                          Host List Edit Display
                   X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                             06/29/2005 08:56:22

Current Map: FCP Port 0 - Name 'Indexed'

FCP Port# 0 Host List:
+----+---------------+---------------+-------------------++----------------+
| N# |   Port WWN    |   Node WWN    |    Host Name      || Active Map Name|
+----+---------------+---------------+-------------------++----------------+
|  1 | Hi 0x210000E0 | Hi 0x200000E0 | (built at runtime)|| Auto Assigned  |
|    | Lo 0x8B02C20E | Lo 0x8B02C20E | PortID = 0x0000EF ||                |
+----+---------------+---------------+-------------------++----------------+
Page # 1 out of 1 pages.
Total Number of Hosts = 1
Select Host Number(1 - 1) to associate host with the Current Map
Enter (N=Next, P=Prev, A=Add, D=Delete, E=Edit, X=Exit) >
```

Note: Because the entire list of hosts may not fit on one screen, select `N` or `P` to see any additional pages showing the list of hosts. Select `X` to return to the `Device Mapping Main Menu`. Select number from the column on the left to associate host with the 'Current' map. At this point the user can edit, delete, or change name for the host.

Adding a Host

Select `A` to add a host to the list. The user will be prompted to enter the desired Host Name, Host ID, Port WWN and Node WWN for FCP host (Figure 85). WWN values are hexidecimal. If the user doesn't know the Host ID, the host won't be added to the host list. Duplicate hosts won't be added to the list.

Figure 85. Adding a FCP Host

```
Enter desired Host Name > Fcp Host
Do you know Port ID of the Host? (y/n) > y

Enter Host ID of the host > 0000ef

Enter the new host's Port WWN High > 210000E0

Enter the new host's Port WWN Low > 8B02C20E

Enter the new host's Node WWN High > 200000E0

Enter the new host's Node WWN Low > 8B02C20E
Host was successfully added to the host list!!!
```

Following the successful addition of the host, the host list will be displayed again and the user can make sure that the host information is correct.

Deleting a Host

Select D to delete a host from the host list. The system asks for an index for the host that is displayed in the very left column of the table, and asks for confirmation (Figure 86).

Figure 86. Deleting a Host

```
Select Host to delete (X=Cancel) > 1
Are you sure you want to permanently remove Host 1?
(Y=Confirm, X=Cancel) > y
```

Editing a Host

Select E to edit host information. Old information appears on the screen, and you are asked to enter information to replace it, or just hit <Enter> to keep old information. All of the information entered by the user will be validated.

Figure 87 is an example of editing a host list for an FCP Port:

Figure 87. Editing Host List for FCP Port

```
                          Host List Edit Display
                   X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                             06/29/2005 08:56:22

Current Map: FCP Port 0 - Name 'Indexed'

FCP Port# 0 Host List:
+----+---------------+---------------+--- ---------------++----------------+
| N# |   Port WWN    |   Node WWN    |     Host Name     || Active Map Name|
+----+---------------+---------------+---- --------------++----------------+
|  1 | Hi 0x210000E0 | Hi 0x200000E0 |                   ||    Default     |
|    | Lo 0x8B02C20E | Lo 0x8B02C20E | PortID = 0x0000EF ||                |
+----+---------------+---------------+-------------------++----------------+
Page # 1 out of 1 pages.
Total Number of Hosts = 1
Select Host Number(1 - 1) to associate host with the Current Map
Enter (N=Next, P=Prev, A=Add, D=Delete, E=Edit, X=Exit) > e

Select Host to edit (X=Cancel) > 1
Old Host Name:
Enter desired new name (<enter> = use old name) > New FCP Host

Old host's Port WWN High: 0x210000E0
Enter desired Port WWN High(<enter> = use old Port WWN High)

Old host's Port WWN Low: 0x8B02C20E
Enter desired Port WWN Low(<enter> = use old Port WWN Low) >

Old host's Node WWN High: 0x200000E0
Enter desired Node WWN High(<enter> = use old Node WWN High) >

Old host's Node WWN Low: 0x8B02C20E
Enter desired Node WWN Low(<enter> = use old Node WWN Low) >
```

- Select `8` from the `Device Mapping Main Menu` to display the entire device list. Because the entire device list may not fit on one screen, select `N` or `P` to go back and forth between screens displaying more maps. Select `X` to return to the `Device Mapping Main Menu`.

Figure 88. Entire Device List

```
                              Entire Device List
                    X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                              06/29/2005 08:56:22

+----++------+------+------+------+-------------------------------+--------+
| N# || Prtl | Port | TYPE | STAT | Protocol Specific Information | Map Cnt|
+----++------+------+------+------+-------------------------------+--------+
|  1 || SCSI |    1 | TAPE |  UP  | Target=  3  Lun=   0          |      2 |
|  2 || SCSI |    1 | DISK |  UP  | Target=  4  Lun=   0          |      2 |
|  3 || SCSI |    1 | DISK |  UP  | Target=  5  Lun=   0          |      2 |
|  4 || SCSI |    1 | DISK |  UP  | Target=  6  Lun=   0          |      2 |
|  5 || SCSI |    2 | TAPE | DOWN | Target=  5  Lun=   0          |      1 |
|  6 || SCSI |    5 | TAPE |  UP  | Target=  1  Lun=   0          |      2 |
|  7 || SCSI |    5 | DISK |  UP  | Target=  2  Lun=   0          |      2 |
|  8 || FCP  |    0 | DISK | DOWN | WWN= 0x1545210015326500 Lun= 0|      1 |
|  9 || FCP  |    1 | DISK |  UP  | WWN= 0x22000020374F9BB7 Lun= 0|      1 |
| 10 || FCP  |    1 | DISK |  UP  | WWN= 0x500507650543E065 Lun= 0|      1 |
+----++------+------+------+------+-------------------------------+--------+
Page # 1 out of 1 pages.
Number of entries in the device table = 10

Enter(N=Next, P=Prev, X=Exit) >
```

- Select `9` from the `Device Mapping Main Menu` to activate port mapping changes.

Notes: Before activating any port mapping changes, it is strongly recommended that the user verify there are not any command or data operations occurring in conjunction with devices affected by the mapping changes. For example, deleting a LUN or device from a map may disrupt I/O transfers with that device. It is the user's responsibility to ensure that no operations will be negatively impacted due to the activation of mapping changes.

All current Mapping Settings will take effect immediately! If another management interface has made unsaved mapping changes, those changes will be lost.

If the `Activate Port Mapping Changes` option is not selected, the mapping changes will not take effect unless the control module is rebooted.

Trace and Event Settings Configuration

This option allows set up of trace and events settings. Access the Utility Settings menu (Figure 89) from the Configuration Menu.

Figure 89. Utility Settings

```
                        Utility Settings
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                     06/29/2005 08:56:22

1) Trace Settings Configuration
2) Event Settings Configuration
3) Special Event Logging Configuration

X) Return to previous menu
```

- Select 1 to edit the trace settings configuration.
- Select 2 to edit the event settings configuration.
- Select 3 to edit the special event logging configuration.

Figure 90. Special Events Log Settings

```
                  Special Events Log Settings
               X.XX.XX  XXXXXX  XXXXXXXXXXXXXXXX
                     06/29/2005 08:56:45

Abort Event Logging                     : Disabled
Reservation/Release Events Logging      : Disabled
Prevent Media Removal Events Logging    : Disabled

1) Toggle Abort Event Logging
2) Toggle Reservation/Release Event Logging
3) Toggle Prevent Media Removal Event Logging

U) Update Current Operating Special Event Logging
X) Return to Previous Menu
```

- Select 1 to edit the trace settings configuration.
- Select 2 to edit the event settings configuration.
- Select 3 to edit the special event logging configuration.

Trace Configuration

This option allows trace levels to be set. This should not be modified in normal operation, as performance degradation may result. There are two pages of trace levels (Figure 91 and Figure 92).

Figure 91. Trace Settings

```
                    Trace Settings
        X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                  06/29/2005 08:56:22

      0) General Errors    : ON
      1) FCP Driver        : OFF
      2) FCP Transport     : OFF
      3) FCP Management    : OFF
      4) PS Transport      : OFF
      5) PS Management     : OFF
      6) PS Driver         : OFF

U) Update Current Operating Trace Levels
X) Return to previous menu

Enter the trace level index, <enter> for next page >
```

Figure 92. Trace Settings, Next Page

```
                    Trace Settings
        X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                  06/29/2005 08:56:22

      0) SG List           : OFF
      1) Timing            : OFF
      2) FCP/RMI           : OFF
      3) AF                : OFF
      4) INBAND            : OFF
      5) Multi-Host Lib    : OFF
      6) Queue Element     : OFF

U) Update Current Operating Trace Levels
X) Return to previous menu

Enter the trace level index, <enter> for next page >
```

Enter a level number from the Trace Settings that are shown. This toggles the current setting to either ON or OFF.

Select `U` to update current operating trace levels. This option forces the currently displayed trace settings to become effective immediately, without requiring a reboot or power cycle.

Note: Be sure to set the clock and date in the System Clock Setup Menu so event logging is accurate. See “Real-Time Clock Configuration” on page 157.

Event Configuration

This option allows selecting the Event Threshold for filtering event logging. The asterisk denotes the current setting (Figure 93).

Figure 93. Event Settings

```
                    Event Filter Settings
             X.XX.XX  XXXXXX  XXXXXXXXXXXXXXXX
                     06/29/2005 08:56:22

1)  Disable Event Logging  6)  Warning events
2)  Emergency events       7)  Notify events
3)  Alert events           8)  Info events
4)  Critical events        9)  Debug events
5)  Error events           0)* Log all events

U) Update Current Operating Trace Levels
X) Return to Previous Menu
Enter Event Threshold <0-9> >
```

- Enter 1 to disable event logging.
- Enter 2 through 9 to log the specified events or higher.
- Enter 0 to log all events.
- Select U to send event configuration changes to the control module now.
- Event logging captures over 2,000 events and then starts overwriting the log when full.

Note: Be sure to correctly set the clock and date in the Real Time Clock Configuration menu so that event logging is accurate. See "Real-Time Clock Configuration" on page 157.

Real-Time Clock Configuration

When this option is selected from the Perform Configuration menu, the System Clock Setup Menu appears.

Figure 94. System Clock Setup Menu

```
                   System Clock Setup Menu
          X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                     06/29/2005 08:56:22

TUESDAY, Date: 01/06/2003, Time: 08:56:22

1) Set clock
X) Return to previous menu
```

Select 1 to set the clock. A series of three prompts appear allowing set up of 24 hour time (hh:mm:ss), current date (mm/dd/yyyy), and the day of week (SUN, MON, TUE, WED, THU, FRI, SAT). For time, it is not necessary to enter the seconds (hh:mm is an acceptable format). For the date, enter the month and day as single digits, for instance 6 instead of 06.

Active Fabric Configuration

When this option is selected from the Perform Configuration Menu, the Active Fabric Configuration Menu appears.

Figure 95. Active Fabric Configuration Menu

```
                Active Fabric Configuration Menu
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                      06/29/2005 08:56:22

Current Active Fabric Configuration:

Server Free Backup Mode                : ON
Number of Controller LUNS (0-4)        : 1

1) Toggle Server Free Backup Mode
2) Change number of Controller LUNs

NOTE : FC DISCOVERY mode must be enabled
       when Server Free Backup Mode is ON in order
       to access Fibre Channel targets.

X) Return to previous menu
```

- Select 1 to toggle the Server-Free Backup Mode to OFF.
- Select 2 to change the number of controller LUNs reported by the router. This value can be set to a number in the range of 0 to 4.

Save Configuration

This option saves the current configuration state in FLASH, which updates the saved previous configuration state. Saved changes are retained across future device resets or power cycles.

Restore Last Saved Configuration

This option restores the most recently saved configuration. This can be useful when configuration changes are made, but the user wishes to return to the previously saved configured state.

Reset and Save Configuration to Factory Defaults

This option resets all current configuration options to the factory defaults and saves those options to FLASH memory as the current configuration.

System Utilities

Figure 96. System Utility Menu

```
                    System Utility Menu
          X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                    06/29/2005 08:56:22

1) System Statistics Menu
2) Event Log
3) Enter System Diagnostics Mode
4) Special Fibre Channel Link States
5) SCSI Command Tracking
6) Active Initiators and Device Entries

X) Return to main menu
```

- Select `1` to display the `System Statistics Menu`, described later in this chapter.
- Select `2` to display the `Event Log Menu`, described later in this chapter.
- Select `3` to enter diagnostics mode. A confirmation message will appear verifying you want to do this. If you enter `N` for No, you are returned to the System Utilities menu. If you enter `Y` for Yes, the control module enters System Diagnostics Mode. This option is described in more detail later in this chapter.
- Select 4 to access a special diagnostic utility. This utility should not be used unless under the guidance of an authorized Sun/StorageTek service representative.
- Select 5 to access the SCSI Command Tracking Menu:

Figure 97. SCSI Command Tracking Menu

```
                 SCSI Command Tracking Menu
             X.XX.XX  XXXXXX  XXXXXXXXXXXXXXXX
                    06/29/2005 15:05:45

1) Turn SCSI Command Tracking OFF
2) Display Available Hosts & Devices
3) Display Command Tracking Info
4) Clear ALL Command Info
X) Return to previous menu
```

- Select `1` to toggle SCSI Command Tracking ON or OFF. When toggled ON, all SCSI commands received or transmitted to or from the control module are logged. When OFF, these commands are not logged. When set to ON, menu options 2 thru 4 are also available from this menu.
- Select `2` to display the SCSI Command Tracking information for all selected hosts and devices.

- Select 3 to set the data to be displayed in terms of Type (Device, Host, ALL), Protocol (FC, Other, ALL), and Specific (ID or ALL). If ID is selected for Specific, this ID can be an FC LUN, Switch ID (S_ID), or other ID.
- Select 4 to clear the log of all previously recorded results.

- Select 6 to display the Display Active Initiator Menu (Figure 98):

Figure 98. Display Active Initiator Menu

```
                Display Active Initiator Menu
             X.XX.XX  XXXXXX  XXXXXXXXXXXXXXXX
                          06/29/2005

1) Display Active Initiators
2) Display Device Entries

X) Return to main menu
```

- Select 1 to display a list of active initiators on the Fibre Channel network.
- Select 2 to display a list of device entries from attached devices available over the SCSI buses.

System Statistics

Figure 99. System Status/Statistics Menu

```
                System Status/Statistics Menu
          X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                     06/29/2005 08:56:22

1) Display System Status
2) Display Fibre Channel Protocol Status
3) Display Parallel SCSI Protocol Status

X) Return to main menu
```

- Select 1 from the System Status/Statistics Menu to display the System Status Menu (Figure 100).

Figure 100. System Status Menu

```
                       System Status Menu
          X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                     06/29/2005 08:56:22

 1) Display memory statistics
 2) Display active tasks
 3) Display stack usage
 4) Display SCSI Protocol Resources

 X) Return to previous menu
```

- Select 1 from the System Status Menu to display memory statistics.
- Select 2 from the System Status Menu to display active tasks.
- Select 3 from the System Status Menu to display stack usage.
- Select 4 from the System Status Menu to display SCSI Protocol Resources.

- Select 2 from the System Status/Statistics Menu to display the Fibre Channel Status Menu (Figure 101).

Figure 101. Fibre Channel Status Menu

```
                    Fibre Channel Status Menu
            X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                       06/29/2005 08:56:22

1) Display Fibre Channel Link Status
2) Display Attached Fibre Channel Devices
3) Display FC Resource Status
4) Display FC Driver Resource Status
5) Display FC Driver SeqCmd_Q Resources

X) Return to main menu

Command, <enter> for next FC Port >
```

- Select 1 from the Fibre Channel Status Menu to display the Fibre Channel Status & Statistics menu (Figure 102).

Figure 102. Fibre Channel Status and Statistics

```
                     Fibre Channel Status & Statistics
                  X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                            06/29/2005 08:56:22

Current Fibre Channel Status - Port 0

LinkState     UP/LOOP     ALPA          x00000001   InDevDataSeqs x00000000
OutDevDataSeq x00000000   InLnkDataSeqs x00000005   OutLnkDataSeq x00000084
InP_BSYFrames x00000000   OutP_BSYFrms  x00000000   InF_BSYFrames x00000000
InP_RJTFrames x00000000   OutP_RJTFrame x00000000   LinkDowns     x00000002
InABTSs       x00000000   OutABTSs      x00000000   LaserFaults   x00000000
SignalLosses  x00000000   SyncLosses    x00000000   BadRxChars    x00000000
LinkFailures  x00000001   BadCRCFrames  x00000000   ProtocolErrs  x00000000
BadSCSIFrames x00000000   UNDERFlowErrs x00000000

A) Autorepeat
C) Clear Statistics
X) Return to previous menu

Command, <enter> for next FC Port >
```

`LinkState` is the current FC link status.

`AL_PA` is the arbitrated loop physical address.

`InDevDataSeqs` is the number of Device Data sequences received by this port.

`OutDevDataSeq` is the number of Device Data sequences transmitted by this port.

`InLnkDataSeqs` is the number of Link Data frames received by this port.

`OutLnkDataSeq` is the number of Link Data frames transmitted by this port.

`InP_BSYFrames` is the number of P_BSY frames received by this port.

`OutP_BSYFrms` is the number of P_BSY frames transmitted by this port.

`InF_BSYFrames` is the number of F_BSY frames received by this port.

`InP_RJTFrames` is the number of P_RJT frames received by this port.

`OutP_RJTFrame` is the number of P_RJT frames transmitted by this port.

`LinkDowns` is the number of Link Down conditions detected.

`InABTSs` is the number of ABTS frames received.

`OutABTSs` is the number of ABTS frames transmitted.

`LaserFaults` is the number of laser faults detected.

`SignalLosses` is the number of times Loss of Signal was detected.

`SyncLosses` is the number of times Loss of Sync. was detected.

`BadRxChars` is the number of bad characters received.

`LinkFailures` is the number of Link Failure conditions.

`BadCRCFrames` is the number of frames received with a bad CRC.

`ProtocolErrs` is the number of protocol errors detected.

`BadSCSIFrames` is the number of BAD SCSI frames detected.

`UnderflowErrs` is the number of underflow errors detected

Select `A` to have the status information repeatedly refreshed.

Select C to clear all current Fibre Channel statistics and continue capturing new statistics going forward.

- Select 2 from the Fibre Channel Status Menu to display attached fibre channel devices (Figure 103).

Figure 103. Fibre Channel Device Display

```
                 Fibre Channel Device Display
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                     06/29/2005 08:56:22

FC Port: 0  Port id: 0x000001

R) Refresh Device Display
D) Display Device Details
X) Return to previous menu

Command > r
Port 0: Requesting discovery
Doing device discovery on port 0...
Completed discovery on port 0

                 Fibre Channel Device Display
                       Version X.X XXXX

FC Port: 0  Port id: 0x000001

Port 0: TARGET DEVICE (UP)   Port id: 0x000010
SEAGATE ST39103FC   Revision: 0003  ANSI SCSI Revision: 02
Type: Direct Access

R) Refresh Device Display
D) Display Device Details
X) Return to previous menu
```

Select R to refresh the device display (as shown in the menu above) with the latest status information and perform Manual FC Discovery (as set in the FC Port Configuration Menu, described on page 83).

Select D to display device details.

- Select 3 from the Fibre Channel Status Menu to display FC Resource Status (Figure 104).

Figure 104. FC Resource Status

```
FCP Transport Queues:
   fcpRcvEventQ  fcpCmpltEventQ  fcpSendReqQ
fcpCmdInProgressQ
         0               0               0            0
   fcpRcvRmiQ fcpRmiXmitPendQ  free_fcp_req_q  free_fcp_cmd_q
         0           0            2048             1024
   fcpFreeFcpIuBufsQ  fcpFreeQelmtsQ  fcpFreeSpoofControlQ
      4096                  0               500

(Press any key to continue)
```

- Select 4 from the Fibre Channel Status Menu to display FC Driver Resource Status (Figure 105).

Figure 105. FC Driver Resource Status

```
Port 0 FC Driver Queues:
   SFSBufsQ  TachHdrQ  ESGLQ  QElemsFreeList
    1024       1064    2048       537
   ERQWaitQ SCSIWaitQ
      0        0

(Press any key to continue)

Port 1 FC Driver Queues:
   SFSBufsQ  TachHdrQ  ESGLQ  QElemsFreeList
    1024       1064    2048       537
   ERQWaitQ SCSIWaitQ
      0        0

(Press any key to continue)
```

- Select 5 from the Fibre Channel Status Menu to display FC SeqCmd_Q Resources.

- Select 3 from the System Status/Statistics Menu to display the Parallel SCSI Protocol Status Menu (Figure 106).

Figure 106. Parallel SCSI Protocol Status Menu

```
              Parallel SCSI Protocol Status Menu
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                     06/29/2005 08:56:22

1) Display SCSI Statistics
2) Display Attached SCSI Devices
3) Display SCSI Resource Status

X) Return to previous menu
```

- Select 1 from the Parallel SCSI Protocol Status Menu to display SCSI statistics.
- Select 2 from the Parallel SCSI Protocol Status Menu to display attached SCSI devices (Figure 107).

Figure 107. SCSI Device Display Menu

```
                    SCSI Device Display Menu
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                      06/29/2005 08:56:22

1) Issue discovery for all buses
2) Issue discovery for selected bus
3) Issue boot discovery (includes resets and delays)
4) Display all local devices
5) Display local devices on specified bus

X) Return to previous menu
```

  - Select 1 to issue discovery for all SCSI buses.
  - Select 2 to issue discovery for selected SCSI bus.
  - Select 3 to issue boot discovery (includes resets and delays).
  - Select 4 to display all local SCSI devices.
  - Select 5 to display local devices on specified SCSI bus.

- Select 3 from the Parallel SCSI Protocol Status Menu to display SCSI resource status (Figure 108).

Figure 108. SCSI Resource Display

```
                       SCSI Resource Display
                 X.XX.XX  XXXXXX  XXXXXXXXXXXXXXX
                      06/29/2005 08:56:22

   psNotifyFreeQ  psPendingFreeQ  psTaskFreeQ  psCmdFreeQ
        16              2048          2040         0
   psActiveInitiatorFreeQ  psLocalHostFreeQ  psLocalDeviceFreeQ
          1024                     16               250
   pEventQ  pEventQfree  psDoubleQelmtFreeQ
      0        1024              4096

(Please hit any key to continue)
```

Event Log

When this option is selected from the System Utilities menu, the `Event Log Menu` appears (Figure 109).

Figure 109. Event Log Menu

```
                    Event Log Menu
        X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                  06/29/2005 08:56:22

1) Display event log
2) Clear event log

X) Return to previous menu
```

- Select `1` to display the event log.

  Example of an event log entry:

  ```
  75   06/07/02    16:23:17

  Unit Restart and Initialization,
  Firmware Version X.XX Build XXXX
  ```

- Select `2` to clear the event log of all old entries and start over with an empty list.

  Note: Event logging captures up to the last 215 events and then starts overwriting the log when full.

Diagnostics Mode

When this option is selected from the System Utilities menu, a confirmation message will appear to verify the selection. If a response of `Y` (yes) is given to the confirmation message, current control module activities will be interrupted while the unit restarts itself and enters diagnostics mode. The power up messages appear followed by the diagnostics menu (Figure 110).

Figure 110. System Diagnostics Mode

```
                 System Diagnostics Mode
        X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                  06/29/2005 08:56:22

1) Perform Ethernet External Loopback Test
2) Perform SCSI External wrap Test
3) Perform Fibre Channel Loopback Test
X) Exit diagnostics mode and reboot
```

- Select `1` to perform a loopback test of the Ethernet connection on the control module unit. For the test to be performed correctly, an Ethernet loopback connector must be attached to the control module's Ethernet port before selecting this option.

- Select `2` to perform a wrap test of the SCSI ports on the control module unit. The SCSI wrap test is performed a little differently depending on the model of control module being tested.

  When `Perform SCSI External Wrap Test` is selected, the following prompts appear:

  ```
  Number of Test Iterations (1-10000) or Forever (F):
  ```

  Entering `F` or an integer in the range of `1` to `10,000` sets the number of times the test will repeat—the smaller the number, the quicker the test will reach completion.

  Note: Forever (F) tests in a continuous loop until either the test fails or the control module is powered off and on again.

  ```
  Initiator SCSI Port # (0-1):
  ```

  Enter the port number for the port that will serve as the Initiator during the wrap test.

  ```
  Target SCSI Port # (0-1):
  ```

  Enter the port number for the port that will serve as the Target during the wrap test. The port number designated here should not be the same port number as designated for the Initiator SCSI Port.

  For the SCSI wrap test, it does not matter which port is designated the Initiator and which is designated the Target. Both ports will be tested.

  After entering values for the above prompts, connect the SCSI ports with the wrap cable. Be sure to use the correct SCSI cable type for the type of SCSI port (LVD/SE). When the SCSI wrap cable is securely attached to both ports, press the <Enter> key as indicated in the Diagnostics menu to begin the test.

  For iterative tests, the results “PASSED” or “FAILED” will be displayed upon completion of the test. For tests set to run forever, results will be displayed only in the event of a failure. If a failure does occur, the address of the failure will be displayed. Otherwise, disconnect the SCSI wrap cable to end a forever test. This should result in a failure message (since the cable is now disconnected) and the test will end. If no failure message appears when the SCSI wrap cable is disconnected during the wrap test, then there likely is a problem. Refer to Chapter 9, “Troubleshooting” for additional assistance.

- Select `3` to perform a loopback test of the Fibre Channel connection on the back of the control module unit. For the test to be performed correctly, a Fibre Channel loopback connector must be attached to the control module’s Fibre Channel port before selecting this option.

Selecting X (exit) from System Diagnostics Mode has a confirmation message to verify the selection. If Y (yes) is given to the confirmation message, the control module will restart itself and enter normal operation mode. The power up messages appear followed by the main menu.

Note: When exiting System Diagnostics Mode, remove any diagnostics cables before restarting the unit.

Display Trace and Assertion History

When this option is selected from the main menu, the Trace Dump Menu is displayed (Figure 111). Trace options are set up in the Trace Settings Configuration Menu described in Chapter 4.

Figure 111. Trace Dump Menu

```
                    Trace Dump Menu
        X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                  06/29/2005 08:56:22

1) Display trace for current boot cycle
2) Display trace from previous boot cycle
3) Display trace from last assertion failure
4) Clear current trace buffer
5) Clear (flash) assert trace buffer

X) Return to previous menu
```

- Select 1 to display trace history for the current boot cycle.
- Select 2 to display trace history from the previous boot cycle.
- Select 3 to display trace history from the last assertion failure.
- Select 4 to clear the current trace buffer. If cleared, then the Display trace from current boot cycle option will not show any data.
- Select 5 to clear the assert trace buffer. If cleared, then the Display trace from last assertion failure option will not show any data.

Get a Copy of Trace Buffer

Using the following procedure, you can save copies of the trace buffers over FTP.

1. Connect the control module to the Ethernet network used by your computer.
2. Start your FTP program using the control module's IP address:

   `ftp <IP address>`

   The default is `1.1.1.1`. See "Ethernet and SNMP Configuration" on page 131 for information on changing the control module IP address.

   Note: You may also need to specify the directory location on your computer or network where your FTP program will store the trace file.
3. Use `root` as the user name and `password` as the password.
4. Specify Bin mode:

   `bin`
5. Specify the filename (.txt file) with the `get` command.
6. For the current trace buffer, use `get curtrace.txt`.
7. For the previous trace buffer, use `get prvtrace.txt`.
8. The file will transfer from the control module.

Reboot

When this option is selected, a confirmation message will appear to verify the selection. If a response of `Y` (yes) is given to the confirmation message, current control module activities will be disrupted while the unit restarts itself. The last saved configuration changes will also take effect after the control module powers on again.

Download a New Revision of the Firmware

When this option is selected, a confirmation message will appear to verify the selection. If a response of `Y` (yes) is given to the confirmation message, current control module activities will be interrupted while the unit begins accepting the new firmware from the serial port. Also see "Update Firmware" on page 176.

To download firmware using a terminal or terminal emulator connected to the serial port of the control module:

1. From the `System Utilities` menu, select the `Download a New Revision of The Firmware` option to start the download procedure.
2. When you confirm you want to download, the control module will start the download process.
3. Use the `Transfer` > `Send File` option in the terminal emulator utility.
4. Select the location of the firmware. Use the `Browse` button, if you need help finding it.
5. Make sure you select `XMODEM` as the transfer protocol.
6. Press the `Send` button.
7. The firmware will begin to download to the control module.

When the download process is complete, the system verifies that the firmware image was successfully written to the FLASH memory and then reboots the control module. Upon reboot, the control module detects that there is a newly downloaded firmware image and copies that image to the boot sector of the FLASH and then boots with that image. At that point the control module is using the new firmware.

Figure 112 shows what you might see on your terminal when you download a new revision of the firmware:

Figure 112. Downloading Firmware Over Serial Connection

```
                    Download Firmware Menu
          X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                     06/29/2005 08:56:22


This will replace the current revision of the firmware.
A reboot will also be performed as part of this process.

Are you sure (y/n)? y

Please begin xmodem file transfer...
§§§§§§§§

D O W N L O A D   C O M P L E T E


 ***********************************

...* Start System Cold Reboot!!
```

Using the FTP Interface

8

This chapter describes specific management options available from the FTP interface. For an overview of using the other management interfaces available, see Appendix 5, “L1400M Interface Control Module Management.”

Backup/Restore Configuration Settings

The L1400M Interface Control Module (control module) supports backup and restore of configuration settings over FTP. This allows users to maintain multiple setting configurations externally from the control module and to be able to restore any of the configurations as needed. When backing up, configurations are saved from flash to a binary file.

Configuration Backup Procedure

1. Connect the control module to the ethernet network used by your computer.
2. Start your FTP program using the control module’s IP address:

   `ftp <IP address>`

   The default IP address is `1.1.1.1`.

Note: The control module’s default IP address of `1.1.1.1` is technically not a valid IP address. You should change the setting to a valid address (see “Ethernet and SNMP Configuration” on page 131).

You may also need to specify the directory location on your computer or network where your FTP program will store the backup file.

3. Use `root` as the user name and `password` as the password.
4. Specify binary mode:

   `bin`

5. Specify the filename (.cfg file) with the `get` command:

   `get filename.cfg`

   (where `filename.cfg` can be any name for the configuration file.)

The file will transfer to the current directory.

Note: World Wide Name (WWN) values and Ethernet physical address (MAC address) values will not be saved. Because user defined values for these settings are not retained in the configuration backup file, they must be re-entered after the configuration is restored (see "Configuration Restore Procedure").

Configuration Restore Procedure

1. Connect the control module to the ethernet network used by your computer.
2. Start your FTP program using the control module's IP address:

   `ftp <IP address>`

   The default IP address is `1.1.1.1`.

   Note: The control module's default IP address of `1.1.1.1` is technically not a valid IP address. You should change the setting to a valid address (see "Ethernet and SNMP Configuration" on page 131).
3. Use `root` as the user name and `password` as the password.
4. Specify binary mode:

   `bin`
5. Specify the configuration's path and filename (.cfg file) with the `put` command:

   `put <path:filename.cfg>`

   The file will transfer and the control module will reboot. The control module will then be using the configuration.

Notes: World Wide Name (WWN) values and Ethernet physical address (MAC address) values will revert to the factory default settings. Any user defined values for these settings are not retained and must be re-entered after a configuration is restored (see "Configuration Backup Procedure" on page 173).

You should confirm the new configuration by checking that the settings are correct.

Get a Copy of Trace Buffer

Using the following procedure, you can save copies of the trace buffers over FTP.

1. Connect the control module to the ethernet network used by your computer.
2. Start your FTP program using the control module's IP address:

   `ftp <IP address>`

   The default IP address is `1.1.1.1`.

Notes: You may also need to specify the directory location on your computer or network where your FTP program will store the trace file.

The control module's default IP address of `1.1.1.1` is technically not a valid IP address. You should change the setting to a valid address (see "Ethernet and SNMP Configuration" on page 131).

3. Use `root` as the user name and `password` as the password.
4. Specify Bin mode:

   `bin`

5. Specify the filename (*.txt* file) with the `get` command.

   For the current trace buffer, use `get curtrace.txt`.

   For the previous trace buffer, use `get prvtrace.txt`.

   The file will transfer from the control module.

Update Firmware

Using the following procedure, FTP can be used to update the control module firmware.

1. Connect the control module to the Ethernet network used by your computer.
2. Start your FTP program using the control module's IP address:

   `ftp <IP address>`

   The default IP address is `1.1.1.1`.

Note: The control module's default IP address of `1.1.1.1` is technically not a valid IP address. You should change the setting to a valid address (see "Ethernet and SNMP Configuration" on page 131).

3. Use `root` as the user name and `password` as the password.
4. Specify binary mode:

   `bin`

5. Specify the firmware's path and filename (.dlx file) with the `put` command:

   `put <path:filename.dlx>`

   The file will transfer and the control module will reboot. The control module will then be using the new firmware.

   Note: You may want to confirm the new firmware level by checking the reboot messages on the control module through the serial interface.

Troubleshooting

9

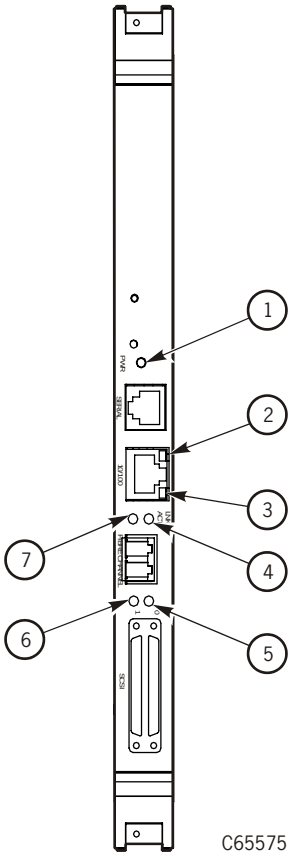
Various problems can arise when configuring and using the L1400M Interface Control Module (control module). This chapter will help guide the you through some of the basic methods of identifying faults in the setup and configuration of the unit.

Most problems are found in the initial installation. In general, it is wise to check all connections and review the configuration before proceeding with further trouble analysis. Simplify the installation if possible, reducing it to the most basic configuration then adding elements one at a time and verifying the operation at each step.

Indicators

The control module is equipped with LED indicators for monitoring overall unit status (Figure 113).

Figure 113. Control Module LEDs



1. Power Indicator
2. Ethernet Link Status
3. Ethernet Activity
4. Fibre Channel Link Status
5. SCSI Activity for Library Bus 0
6. SCSI Activity for Library Bus 1
7. Fibre Channel Activity

- **PWR** (Power and Fault)
  - Green: power is currently active. Lack of power indication suggests that:
    - the unit is off
    - there is a problem with the power suppliy to the unit
    - an internal problem exists
  - Amber: a fault condition exists. Faults can occur as a result of Power On Self Test (POST) failure or operational failures. It is normal for this indicator to flash on when the unit is powered up or reset. If the fault indicator stays lit, contact your product support representative.

- **LNK/ACT** (Fibre Channel)
  - Upper (LNK) indicator (4): Lit green signifies a good Fibre Channel link on the port.
  - Lower (ACT) indicator (7): Lit green signifies Fibre Channel port activity.
  - If the Link indicator fails to light at all, or if the Activity indicator stays continually lit without corresponding SCSI bus activity, there may be a problem with the Fibre Channel configuration. Verify the Fibre Channel configuration.
- **0, 1** (SCSI Bus) (5 and 6)
  - Flickering green: signifies SCSI activity on the bus corresponding to the number of the indicator.
  - Activity should be occur briefly during power up or configuration, and relatively often when the unit is transferring data. If an Activity indicator stays continually lit without corresponding target device activity, there may be a problem with the SCSI bus configuration. Verify the SCSI bus configuration.
- **10/100** (Ethernet)
  - The status indicator (2) stays on continuously to show Ethernet link established.
  - The Ethernet activity indicator (3) flickers to show Ethernet activity.
  - If these indicators fail to operate properly, there may be a problem with the network connection or configuration. Verify the network connection and configuration. The port must be connected to a 10/100BaseT Ethernet network to function properly.

Basic Verification

Serial Port Problems

If you experience trouble communicating with the serial port, verify the configuration of the host terminal or terminal emulation program. The control module requires the baud rate to be set correctly, 8 data bits, 1 stop bit, and no parity. Flow control should be set to none or XON/XOFF, and may cause problems if set to ‘hardware’. Some terminal programs may not support baud rates higher than 19200, so a lower baud rate may be required. If problems persist, you may want to check the cabling or try a different host. If a valid Ethernet IP address is configured, serial configuration settings can also be set via SNMP and telnet.

Login Problems

In a switched fabric environment, if a login problem is experienced, or if the drives can not be seen, confirm that the port settings of the router are set for “auto-sense” or for “N-port.” Using a hard ALPA setting with the N-port setting is not a valid configuration.

Verify SCSI Bus Configuration

Problems with SCSI bus configuration are common. Basic operation of a SCSI bus can be checked by using the configuration menu to view attached SCSI devices. See Chapter 7, “Using the Serial/Telnet Interface” for more information. Other conditions to look for include:

- Termination—Problems with termination can cause intermittent or hard failure. A SCSI bus must be terminated on both ends, and only both ends. Termination issues when both narrow and wide devices are on the same bus are common. Check to make sure that there are no loose terminators. All terminators should be firmly attached.
- Bus Type—The SE and LVD devices can be connected to the same SCSI bus, however on power up, if at least one SE device is detected, the LVD devices must convert to SE mode, and SE mode will be used. Only the LVD interface is being specified for the Fast/40 and higher rates.
- Device ID—Each device on a SCSI bus must have a unique ID. Also check the configured IDs for the control module to verify these are not in use by other devices on the same SCSI bus.
- Cabling—Check SCSI cables to verify they are functional. SCSI rules for total length, distance between devices, and stub length must be adhered to. Connections should also be checked and reseated if necessary.

- SCSI Devices—Verify that the SCSI devices on a particular SCSI Bus can be seen in the configuration menu of the control module. Select System Utilities > System Statistics Menu > Display Parallel SCSI Protocol Status > Display Attached SCSI Devices > Display All Local Devices. If the control module can not see the devices, verify SCSI configuration, cabling, and termination.

  Even if the SCSI devices are displayed, they are not accessible unless the mapping mode is auto-assigned or another non-empty map is used.

Verify Fibre Channel Connection

If SCSI devices are recognized on the SCSI buses, but do not appear to the Fibre Channel host, it may be that the Fibre Channel link is not properly established. Most hubs and switches have link indicators, showing link status. When the control module is connected and powered-on, this link indicator should show a good link. If it does not, check the cabling or connections. As a means of verifying link integrity when connected to a functional host, disconnecting then reconnecting the Fibre Channel cable should cause momentary activity of this indicator as the link itself reinitializes. Also verify that the media type of the control module and attached hub, HBA, or switch are of corresponding types. When using optical media, verify that the attached device is using non-OFC type optical devices.

Verify SCSI Devices in Windows NT

If running FC-to-SCSI mapping mode, open the NT Control Panel, select `SCSI Adapters`, and double click on the FC HBA. The SCSI devices should be listed.

If no devices are listed, verify the control module configuration, FC HBA configuration, and cabling.

If devices are listed, verify FC HBA mapping mode or AL_PA addresses on the control module.

If running SCSI-to-FC mapping mode, open the NT Control Panel, select `SCSI adapters`, and double click on the SCSI controller.

If no devices are listed, verify the control module configuration, SCSI Controller configuration, and cabling.

Sometimes NT may need to be rebooted with all SCSI devices and the control module left on before NT will recognize the devices.

Verify Configuration

A number of configuration changes may result in an invalid configuration. If you are in doubt about the configuration, restore the control module to the factory default configuration and proceed to configure the unit a step at a time, verifying the functionality of the configuration as changes are made.

Verify Mapping

Verify that all desired devices have been discovered and mapped. If using Indexed or SCC mapping, try swapping to Auto-assigned to see if this solves the problem.

Verify Devices

It may be useful to connect the SCSI target devices you are attempting to use to the native SCSI interface to verify that the devices are functional. SCSI target devices can be connected to a host SCSI bus to verify they are functional.

Verify Host Configuration

In some cases, it may be that the FC host bus adapter or host device driver may not be working properly. Check the configuration of these elements. It may be useful to check the release notes for the driver provided to see if there are any specific issues or required configuration. It may also be useful to ensure that you are using a current version of the host bus adapter driver.

PRLI Data

The control module supports the discovery mechanism. The control module returns the PRLI response data as specified in Table 1.

Table 1. Control Module PRLI Response Data

Item	Value
PRLI Command Code	0x20
Page Length	0x10
Payload Length	0x10
Type Code	0x8
Type Code Extension	0x0
OPA	0x0
RPA	0x0
IPE	0x1
Response Code	0x1
Originator Process Associator	0x0
Responder Process Associator	0x0
Initiator Function	0x1
Target Function	0x1
Command/Data Mixed Allowed	0x0
Data/Response Mixed Allowed	0x0
Read XFER_RDY Disabled	0x1
Write XFER_RDY Disabled	0x0

Verify HBA Device Driver Information

Check the HBA device driver `Readme.txt` file for configuration specifics. An HBA may require a different configuration, depending on whether it is connected to a loop or a switch. HBAs typically come with utility programs to view or change their configurations.

Running Diagnostics

You can run a diagnostics wrap test from Diagnostics Mode in the serial interface. For information about Diagnostics Mode, refer to “Diagnostics Mode” on page 167.

Customer Support

If you are unable to resolve an issue, contact your authorized Sun/StorageTek service representative and ask for customer support.

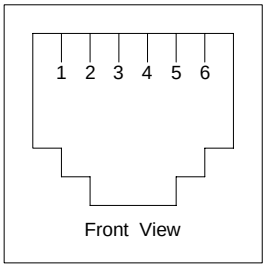
Pin Assignments

A

RJ-11 to DB-9 Serial Pin Assignments

The pin assignments given for the RJ-11 serial connection (Figure 114) are in reference to the serial receptacle on the L1400M Interface Control Module (control module). Use an RS-232 null modem cable to connect the control module to the host system.

Figure 114. RJ-11 Pin Assignments



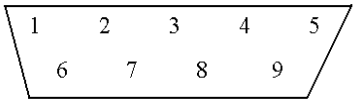
Pins:

1. No Connection
2. Ground
3. Transmit Data from control module
4. Receive Data to control module
5. RTS (Ready to Send)
6. CTS (Clear to Send)

In conjunction with the pin assignments provided for the RJ-11 receptacle on the control module, following are the corresponding pin out assignments for a DB-9 serial connector used to connect the other end of the serial cable to a terminal, or a computer running terminal emulation software.

The pin assignments given in Figure 115 for the DB-9 serial connection are in reference to the serial connector at the end of the cable. Use an RS-232 null modem cable to connect the control module to the host system.

Figure 115. Corresponding Pin Outs of DB-9 Connector



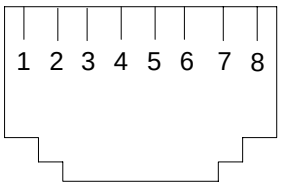
Pins:

1. No Connection
2. RX data (Receive)
3. TX data (Transmit)
4. No Connection
5. Signal Ground
6. No Connection
7. RTS (Request to Send), not used
8. CTS (Clear to Send), not used
9. No Connection

RJ-45 Ethernet Pin Assignments

The pin assignments given for the RJ-45 Ethernet connection (Figure 116) are in reference to the Ethernet receptacle on the control module faceplate. The control module Ethernet connection supports the IEEE specifications for 10BASE-T and 100BASE-TX Ethernet standards.

Figure 116. RJ- 45 Pin Assignments



Pins:

1. Transmit Out +
2. Transmit Out -
3. Receive In +
4. No Connection
5. No Connection
6. Receive In -
7. No Connection
8. No Connection

Inband SCSI-3 Commands

B

The L1400M Interface Control Module (control module) supports a set of SCSI-3 commands that can be received inband over iSCSI/NDMP. When received by the control module, these commands are then executed by the control module itself.

When using SCSI-3 commands to access general management features, the commands can be sent to device LUNs that are mapped through the control module.

The following is a list of the SCSI-3 commands that are supported by the control module. Complete definitions of SCSI-3 commands can be found in the SCSI-3 standard available from the American National Standards Institute (ANSI).

General Commands

- `REPORT LUNS`
- `INQUIRY`

General Commands

Following is a description of a general-use SCSI-3 command. For more information about the other general-use commands, please contact your service representative.

Report LUNs Command

The control module supports the Report LUNs command. The Report LUNs command will return a list of Logical Unit Numbers (LUNs) that can receive commands. The format of the report LUNs command is shown in Table 2.

Table 2. Format of Report LUNs Command

Bit Byte	7	6	5	4	3	2	1	0
0	Operation Code (0xA0)							
1	Reserved							
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	(MSB)							
7	Allocation Length							
8								
9	(LSB)							
10	Reserved							
11	Control Byte							

The control module returns the LUN Parameters as defined in Table 3.

Table 3. Report LUNs Parameter List

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1	LUN list length							
2								
3	(LSB)							
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							
LUN List								
0-7	First LUN							
	:							
0-7	Last LUN							

All LUNs are reported and will appear in the host's map.

Note: The LUN list length is the number of LUNs times 8.

Inquiry Command

The format of the Inquiry Command is shown in Table 4.

Table 4. Format of LUN Inquiry Command

Bit Byte	7	6	5	4	3	2	1	0
0	Operation Code (12h)							
1	Reserved							EVPD
2	Page Code or Operation Code							
3	Reserved							
4	Allocation Length							
5	Control							

The control module returns the LUN Inquiry Data as defined in Table 5.

EVPD Page 0x80

If the EVPD bit is set and the Page Code is 0x80 the *unit serial number page* is returned. The format of this page is shown in Table 5.

Table 5. Format of EVPD Page 0x80

Bit Byte	7	6	5	4	3	2	1	0
0	Device Type (0ch)							
1	Page Code (80h)							
3	Reserved							
4	Page Length							
5 : 20	Serial Number[1]							

[1]The serial number field is a sixteen-byte left justified ASCII string.

Device Identification Page 0x83

If the EVPD bit is set and the Page Code is 0x83 the *device identification page* is returned.

Table 6. Control Module LUN Inquiry Data

Item	Value
Peripheral Qualifier	0x00
Peripheral Device Type	0x0C - Indicates Router/Router function
RMB	0x00
Device Type Qualifier	0x00
ISO Version	0x00
AENC	0x00
TrmIOP	0x00
Response Data Format	0x02 - SCSI-2 Inquiry Data Format
Additional Length	0x20
RelAdr	0x00
Wbus32	0x00
Wbus16	0x00
Sync	0x00
Linked	0x00
CmdQue	0x00
SftRe	0x00
Vendor ID	STK
Product ID	L1400M Interface Control Module
Revision Level	XXXXX

The control module will only reply to a SCSI Inquiry when using 8-byte LUN field of 0x00's.

Note: The Revision Level comes from the last four characters of the build string, which appears in the headings for most menu screens.

Addressing, Structures, and Operation

C

Fibre Channel and SCSI systems employ different methods of addressing devices. The inclusion of a control module requires that a method of translating device IDs be implemented so that each SCSI device is mapped to the appropriate Fibre Channel LUN. The SCSI buses establish bus connections between devices. Targets on a SCSI bus may internally address logical units. The addressing of a specific SCSI device is represented by the BUS:TARGET:LUN triplet.

When a Fibre Channel initiator initializes on a loop, the host must first determine what devices exist on the loop. Device discovery is performed, and an FCP target device list is built. Each device is queried for FCP logical units. The logical units are the actual devices that the operating system will address. When an initiator addresses a logical unit, the LUN field used is consistent in form with the SCC defined fields. All current Fibre Channel host bus adapter drivers are consistent with these methods. The addressing used is the SCC Logical Unit Addressing and Peripheral Device Addressing methods, shown in Table 7 and Table 8. First level addressing is supported, so only the first 2 bytes of the 8 byte FCP LUN are used.

Table 7. SCC Addressing Structure

Bit Byte	7	6	5	4	3	2	1	0
N	Address Method		Address Method Specific					
M+1	Address Method Specific							

Table 8. Address Method Definitions

Codes	Description
00	Peripheral Device Addressing Method
01	Volume Set Addressing Method
10	Logical Unit Addressing Method
11	Reserved

Table 9. SCC Logical Unit Addressing

Bit Byte	7	6	5	4	3	2	1	0
N	1	0	Target					
N+1	Bus			LUN				

Table 10. Peripheral Device Addressing

Bit Byte	7	6	5	4	3	2	1	0
N	0	0	Bus					
N+1	Target/LUN							

The L1400M Interface Control Module (control module) supports the Peripheral Device Addressing Method and the Logical Unit Addressing Method, depending on the configuration.

Table 11. Arbitrated Loop Node Number to AL_PA Lookup Table

0:0x01	21:0x2E	42:0x52	63:0x74	84:0xA6	105:0xC9
1:0x02	22:0x31	43:0x53	64:0x75	85:0xA7	106:0xCA
2:0x04	23:0x32	44:0x54	65:0x76	86:0xA9	107:0xCB
3:0x08	24:0x33	45:0x55	66:0x79	87:0xAA	108:0xCC
4:0x0F	25:0x34	46:0x56	67:0x7A	88:0xAB	109:0xCD
5:0x10	26:0x35	47:0x59	68:0x7C	89:0xAC	110:0xCE
6:0x17	27:0x36	48:0x5A	69:0x80	90:0xAD	111:0xD1
7:0x18	28:0x39	49:0x5C	70:0x81	91:0xAE	112:0xD2
8:0x1B	29:0x3A	50:0x63	71:0x82	92:0xB1	113:0xD3
9:0x1D	30:0x3C	51:0x65	72:0x84	93:0xB2	114:0xD4
10:0x1E	31:0x43	52:0x66	73:0x88	94:0xB3	115:0xD5
11:0x1F	32:0x45	53:0x67	74:0x8F	95:0xB4	116:0xD6
12:0x23	33:0x46	54:0x69	75:0x90	96:0xB5	117:0xD9
13:0x25	34:0x47	55:0x6A	76:0x97	97:0xB6	118:0xDA
14:0x26	35:0x49	56:0x6B	77:0x98	98:0xB9	119:0xDC
15:0x27	36:0x4A	57:0x6C	78:0x9B	99:0xBA	120:0xE0
16:0x29	37:0x4B	58:0x6D	79:0x9D	100:0xBC	121:0xE1
17:0x2A	38:0x4C	59:0x6E	80:0x9E	101:0xC3	122:0xE2

Table 11. Arbitrated Loop Node Number to AL_PA Lookup Table

18:0x2B	39:0x4D	60:0x71	81:0x9F	102:0xC5	123:0xE4
19:0x2C	40:0x4E	61:0x72	82:0xA3	103:0xC6	124:0xE8
20:0x2D	41:0x51	62:0x73	83:0xA5	104:0xC7	125:0xEF

The data shown in Table 11 on page 194 comes from the Fibre Channel Configuration Menu (setting the AL_PA value) on the control module control module. The user enters the node number (number to the left of the colon from Table 11) and the control module translates the node number into the corresponding AL_PA value (number to the right of the colon in Table 11).

Auto Assigned Addressing Option

The Auto Assigned option is similar to the Indexed addressing, but with the distinction that the table used is created through SCSI device discovery on power up or reset, and not otherwise retained. As the unit performs device discovery on the SCSI bus, the Index table FCP LUN values are filled with adjacent FCP LUNs referencing each subsequent SCSI device. The host system will then detect every attached SCSI device without voids, allowing full device discovery to the host. This allows easy configuration in environments where SCSI device ordering is not important, and where hot plugging of SCSI devices will not occur. Tape libraries are excellent candidates for using Auto Assigned Addressing. Configuration options provide for the SCSI discovery to be performed in order of bus, target, or LUN as desired for the specific environment.

Indexed Addressing Option

Indexed Addressing allows for host bus adapter (HBA) drivers that only use Peripheral Device addressing to access SCSI devices attached to the control module. This is done by use of a table, which is indexed by sequential LUN values, indicating selected BUS:TARGET:LUN devices. It is not possible in this mode to address the control module as a controller unit directly. The table has the structure as shown in Table 12 on page 196.

The maximum size of the table is equal to the number of buses times the number of targets per bus, less one initiator ID per bus, times the number of LUNs per target.

The index table can be manually edited. A method is also provided to perform SCSI device discovery, and fill the table in the order that SCSI devices are discovered on the SCSI buses.

Table 12. Indexed Addressing Table

FCP LUN Value	SCSI BUS:TARGET:LUN
0	0:0:0
1	0:1:0
2	0:2:0
3	0:3:0
4	0:4:0
5	0:5:0
6	0:6:0
	(0:7:0 occupied by Initiator ID)
7	0:8:0
(...)	(...)
13	0:14:0
14	0:15:0
15	1:0:0
16	1:1:0
17	1:2:0
(...)	(...)

SCC Addressing Option

When a control module device is configured to use SCSI Controller Commands (SCC) addressing, the unit is capable of responding as a controller device to the FCP Initiator, or routing the FCP request to a specified BUS:TARGET:LUN. When a request using the Peripheral Device Addressing Method is received (An FCP command with the LUN field with bits 7 and 6 of byte 0 are set to 0), the unit routes the request to the internal processor, which acts on the command directly. When a request using the Logical Unit Addressing Method is received (bits 7 and 6 set to 10b), the request is routed to the BUS:TARGET:LUN as specified in the defined field.

Host systems using SCC addressing will typically do initial device discovery using the Peripheral Device Addressing method. On issuing an INQUIRY command to the control module, the host will receive the control module Inquiry data, indicating the device type as a controller device (Inquiry data indicates device type is 0xC). The host will then know, on this basis, that subsequent commands to control module attached devices will use the Logical Unit Addressing method.

The host can perform discovery by either walking through the BUS:TARGET:LUN values as would a standard SCSI driver, or by issuing a REPORT LUNS command. This command is sent to the control module (using the Peripheral Device Addressing Method), and the control module returns a table indicating attached devices. The host can then perform actions on these control module attached devices directly without having to perform discovery by issuing commands through all possible combinations.

Vendor-Unique Commands

D

The L1400M Interface Control Module (control module) supports a set of vendor-unique commands. Table 13 below provides an overview of these commands. For more information about these vendor-unique commands, please contact your Sun/StorageTek service representative.

Table 13. Vendor Unique Commands

Command	Description	Device Type
E7	Initialize Element Status	Tape/Medium Changer
B8	Read Element Status	Tape/Medium Changer/ Communications
E8	Skip Read	Disk
EA	Skip Write	Disk
06	9840 Load Display	Tape/Disk
2E	Write and Verify	Disk/Write Once, Read Multiple/ Optical Memory
2F	Verify	Disk/Write Once, Read Multiple/ CD-ROM/Optical Memory
A5	Move Medium	Tape/Medium Changer/ Sequential Access/CD-ROM

Management Information Bases

E

The L1400M Interface Control Module (control module) supports two Management Information Bases (MIBs) for management using SNMP: the Fibre Alliance (FA) MIB and the Crossroads Enterprise MIB. A Management Information Base contains complete descriptions of the different types of information that can be exchanged between the control module and a management application using SNMP (Simple Network Management Protocol). The FA MIB is an Fibre Channel industry standard MIB that provides support for link status, event logging, traps and other information in conformance with the FA MIB 2.2 guidelines. The Crossroads Enterprise MIB allows access to all configuration information stored in the control module.

Fibre Alliance Management Information Base

Sun Microsystems supports the Fibre Alliance MIB version. 2.2. The Fibre Alliance is an industry consortium dedicated to implementing standard methods of management for SANs. The Fibre Alliance MIB has been submitted to the IETF for review as of September 14, 1999. As of this writing it has not yet been adopted as an IETF standard. For further information contact Sun Microsystems or go to the Fibre Alliance or IETF on the Web.

Fibre Alliance: www.fibrealliance.org **IETF**: www.ietf.org

The control module provides the following support for the Fibre Alliance MIB version 2.2:

View serial number, port info, topology, and statistics even while the control module is running in a SAN environment.

Set and configure options such as the control module name, port connections, and up to three network management stations. Each network management station can receive event traps about unit, port, and sensor changes. These traps can be monitored by various applications including Computer Associates' SANiti™ and Vixel's SANinsite™.

View revision information about the control module such as board, bios, and firmware version numbers. View information about server-free backup agents and their compliance information (the T11 standard supported).

Link and topology information (in the connUnitLink Table leaf) can be used to draw visual maps of the SAN fabric with various applications including Computer Associates' SANiti™ and Vixel's SANinsite™.

Setting Unit Name, Info, Contact, and Location Information

To set the unit name, info, contact, and location information for the control module, use the following steps:

1. Go to the `connUnitTable` in the FA MIB.
2. Go to the `connUnitName` leaf.
3. Do a SET operation on the `connUnitName` leaf making sure to use the community SET string shown in the Serial/Telnet SNMP Configuration menu.
4. Repeat these steps for each `connUnitInfo`, `connUnitContact`, and `connUnitLocation`.

Setting Port Name Information

You should name ports based on each port's connection. For example, a port might be connected to a terabyte RAID storage array and so the name should reflect something about this terabyte RAID storage array. To name a port, use the following steps:

1. Go to the `connUnitPortTable` leaf.
2. Scroll to the `connUnitPortName` leaf.
3. Do a SET operation on the connUnitPortName leaf making sure to use the community SET string shown in the Serial/Telnet SNMP Configuration menu.

Setting Trap IP Addresses

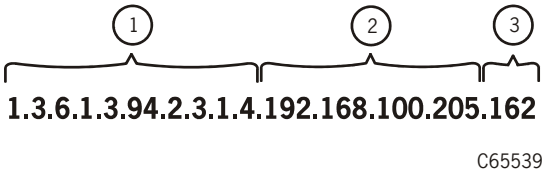
The control module allows configuration of up to three network managers with different filtering levels on each one.

To set up an IP address for a network manager, use the following steps:

1. Go to the trapReg leaf.
2. Do a WALK of the leaf to see how many open slots are available in the `trapClientAccount` leaf. There should be less than three.
3. To set a new trap IP address, go to the `trapRegRowState` leaf in the `trapRegTable`.

Set the Object Identifier (OID) to the IP address and port number. This sets an IP address with a default filter value of ‘6’ which corresponds to warning events and includes events for all lower values of ‘5’ and below.

Example:



The value entered for the port number must be an integer in the range of 1 to 65,535.

To modify trap filters for this IP address, do a SET on the `trapRegFilter` leaf after creation of that row in the trapRegTable.

To change the filter value, use options #5 and #6 in the SNMP Configuration menu.

4. Repeat these steps to a maximum limit provided by `trapMaxClients`.

Viewing the Event Log

From the network management application or SNMP MIB browser, it is possible to view the event log of the control module from the `connUnitEventTable` leaf.

Format of event log entry: `Event Severity, Type, OID Value`

- Event Severity is an integer in the range of 0 to 9 and correspond to the filter values selected from the FA MIB 2.2 Event Filter Settings menu selected from the SNMP Configuration menu.
- Type can be Status (for example, a reboot event), configuration (for example, a change to settings), topology (for example, a discovery event), other (for example, StorageTek internal information), or unknown (for example, an unclassified event).
- OID Value is the Object Identifier associated with this event.

Each entry in the event log also includes a 4-digit time stamp indicating the elapsed time since the last boot. The first two digits of the time stamp represent seconds and the second two digits represent hundredths of a second.

Fibre Alliance MIB 2.2 Table

Table 14 contains all the elements within the FA MIB 2.2.

Table 14. Fibre Alliance MIB 2.2 Elements

OID	Name	Type
1.3.6.1.3	experimental	NODE
1.3.6.1.3.94	fcmgmt	NODE
1.3.6.1.3.94.1	connSet	NODE
1.3.6.1.3.94.1.1	uNumber	LEAF INTEGER
1.3.6.1.3.94.1.2	systemURL	LEAF DisplayString
1.3.6.1.3.94.1.3	statusChangeTime	LEAF TimeTicks
1.3.6.1.3.94.1.4	configurationChangeTime	LEAF TimeTicks
1.3.6.1.3.94.1.5	connUnitTableChangeTime	LEAF TimeTicks
1.3.6.1.3.94.1.6	connUnitTable	NODE
1.3.6.1.3.94.1.6.1	connUnitEntry	NODE
1.3.6.1.3.94.1.6.1.1	connUnitId	LEAF DisplayString
1.3.6.1.3.94.1.6.1.2	connUnitGlobalId	LEAF FcGlobalId
1.3.6.1.3.94.1.6.1.3	connUnitType	LEAF FcUnitType
1.3.6.1.3.94.1.6.1.4	connUnitNumports	LEAF INTEGER
1.3.6.1.3.94.1.6.1.5	connUnitState	LEAF INTEGER
1.3.6.1.3.94.1.6.1.6	connUnitStatus	LEAF INTEGER
1.3.6.1.3.94.1.6.1.7	connUnitProduct	LEAF DisplayString
1.3.6.1.3.94.1.6.1.8	connUnitSn	LEAF DisplayString
1.3.6.1.3.94.1.6.1.9	connUnitUpTime	LEAF TimeTicks
1.3.6.1.3.94.1.6.1.10	connUnitUrl	LEAF DisplayString
1.3.6.1.3.94.1.6.1.11	connUnitDomainId	LEAF DisplayString
1.3.6.1.3.94.1.6.1.12	connUnitProxyMaster	LEAF INTEGER
1.3.6.1.3.94.1.6.1.13	connUnitPrincipal	LEAF INTEGER
1.3.6.1.3.94.1.6.1.14	connUnitNumSensors	LEAF INTEGER
1.3.6.1.3.94.1.6.1.15	connUnitStatusChangeTime	LEAF TimeTicks
1.3.6.1.3.94.1.6.1.16	connUnitConfigurationChangeTime	LEAF TimeTicks
1.3.6.1.3.94.1.6.1.17	connUnitNumRevs	LEAF INTEGER
1.3.6.1.3.94.1.6.1.18	connUnitNumZones	LEAF INTEGER
1.3.6.1.3.94.1.6.1.19	connUnitModuleId	LEAF DisplayString
1.3.6.1.3.94.1.6.1.20	connUnitName	LEAF DisplayString
1.3.6.1.3.94.1.6.1.21	connUnitInfo	LEAF DisplayString
1.3.6.1.3.94.1.6.1.22	connUnitControl	LEAF INTEGER

Table 14. Fibre Alliance MIB 2.2 Elements (Continued)

1.3.6.1.3.94.1.6.1.23	connUnitContact	LEAF DisplayString
1.3.6.1.3.94.1.6.1.24	connUnitLocation	LEAF DisplayString
1.3.6.1.3.94.1.6.1.25	connUnitEventFilter	LEAF FcEventSeverity
1.3.6.1.3.94.1.6.1.26	connUnitNumEvents	LEAF INTEGER
1.3.6.1.3.94.1.6.1.27	connUnitMaxEvents	LEAF INTEGER
1.3.6.1.3.94.1.6.1.28	connUnitEventCurrID	LEAF INTEGER
1.3.6.1.3.94.1.7	connUnitRevsTable	NODE
1.3.6.1.3.94.1.7.1	connUnitRevsEntry	NODE
1.3.6.1.3.94.1.7.1.1	connUnitRevsUnitId	LEAF DisplayString
1.3.6.1.3.94.1.7.1.2	connUnitRevsIndex	LEAF INTEGER
1.3.6.1.3.94.1.7.1.3	connUnitRevsRevId	LEAF DisplayString
1.3.6.1.3.94.1.7.1.4	connUnitRevsDescription	LEAF DisplayString
1.3.6.1.3.94.1.8	connUnitSensorTable	NODE
1.3.6.1.3.94.1.8.1	connUnitSensorEntry	NODE
1.3.6.1.3.94.1.8.1.1	connUnitSensorUnitId	LEAF DisplayString
1.3.6.1.3.94.1.8.1.2	connUnitSensorIndex	LEAF INTEGER
1.3.6.1.3.94.1.8.1.3	connUnitSensorName	LEAF DisplayString
1.3.6.1.3.94.1.8.1.4	connUnitSensorStatus	LEAF INTEGER
1.3.6.1.3.94.1.8.1.5	connUnitSensorInfo	LEAF DisplayString
1.3.6.1.3.94.1.8.1.6	connUnitSensorMessage	LEAF DisplayString
1.3.6.1.3.94.1.8.1.7	connUnitSensorType	LEAF INTEGER
1.3.6.1.3.94.1.8.1.8	connUnitSensorCharacteristic	LEAF INTEGER
1.3.6.1.3.94.1.10	connUnitPortTable	NODE
1.3.6.1.3.94.1.10.1	connUnitPortEntry	NODE
1.3.6.1.3.94.1.10.1.1	connUnitPortUnitId	LEAF DisplayString
1.3.6.1.3.94.1.10.1.2	connUnitPortIndex	LEAF INTEGER
1.3.6.1.3.94.1.10.1.3	connUnitPortType	LEAF INTEGER
1.3.6.1.3.94.1.10.1.4	connUnitPortFCClassCap	LEAF DisplayString
1.3.6.1.3.94.1.10.1.5	connUnitPortFCClassOp	LEAF DisplayString
1.3.6.1.3.94.1.10.1.6	connUnitPortState	LEAF INTEGER
1.3.6.1.3.94.1.10.1.7	connUnitPortStatus	LEAF INTEGER
1.3.6.1.3.94.1.10.1.8	connUnitPortTransmitterType	LEAF INTEGER
1.3.6.1.3.94.1.10.1.9	connUnitPortModuleType	LEAF INTEGER
1.3.6.1.3.94.1.10.1.10	connUnitPortWwn	LEAF FcNameId
1.3.6.1.3.94.1.10.1.11	connUnitPortFCId	LEAF DisplayString
1.3.6.1.3.94.1.10.1.12	connUnitPortSn	LEAF DisplayString

Table 14. Fibre Alliance MIB 2.2 Elements (Continued)

1.3.6.1.3.94.1.10.1.13	connUnitPortRevision	LEAF DisplayString
1.3.6.1.3.94.1.10.1.14	connUnitPortVendor	LEAF DisplayString
1.3.6.1.3.94.1.10.1.15	connUnitPortSpeed	LEAF INTEGER
1.3.6.1.3.94.1.10.1.16	connUnitPortControl	LEAF INTEGER
1.3.6.1.3.94.1.10.1.17	connUnitPortName	LEAF DisplayString
1.3.6.1.3.94.1.10.1.18	connUnitPortPhysicalNumber	LEAF INTEGER
1.3.6.1.3.94.1.10.1.19	connUnitPortStatObject	LEAF OBJECT IDENTIFIER
1.3.6.1.3.94.1.11	connUnitEventTable	NODE
1.3.6.1.3.94.1.11.1	connUnitEventEntry	NODE
1.3.6.1.3.94.1.11.1.1	connUnitEventUnitId	LEAF DisplayString
1.3.6.1.3.94.1.11.1.2	connUnitEventIndex	LEAF INTEGER
1.3.6.1.3.94.1.11.1.3	connUnitEventId	LEAF INTEGER
1.3.6.1.3.94.1.11.1.4	connUnitREventTime	LEAF DisplayString
1.3.6.1.3.94.1.11.1.5	connUnitSEventTime	LEAF TimeTicks
1.3.6.1.3.94.1.11.1.6	connUnitEventSeverity	LEAF FcEventSeverity
1.3.6.1.3.94.1.11.1.7	connUnitEventType	LEAF INTEGER
1.3.6.1.3.94.1.11.1.8	connUnitEventObject	LEAF OBJECT IDENTIFIER
1.3.6.1.3.94.1.11.1.9	connUnitEventDescr	LEAF DisplayString
1.3.6.1.3.94.1.12	connUnitLinkTable	NODE
1.3.6.1.3.94.1.12.1	connUnitLinkEntry	NODE
1.3.6.1.3.94.1.12.1.1	connUnitLinkUnitId	LEAF DisplayString
1.3.6.1.3.94.1.12.1.2	connUnitLinkIndex	LEAF INTEGER
1.3.6.1.3.94.1.12.1.3	connUnitLinkNodeIdX	LEAF DisplayString
1.3.6.1.3.94.1.12.1.4	connUnitLinkPortNumberX	LEAF INTEGER
1.3.6.1.3.94.1.12.1.5	connUnitLinkPortWwnX	LEAF DisplayString
1.3.6.1.3.94.1.12.1.6	connUnitLinkNodeIdY	LEAF DisplayString
1.3.6.1.3.94.1.12.1.7	connUnitLinkPortNumberY	LEAF INTEGER
1.3.6.1.3.94.1.12.1.8	connUnitLinkPortWwnY	LEAF DisplayString
1.3.6.1.3.94.1.12.1.9	connUnitLinkAgentAddressY	LEAF DisplayString
1.3.6.1.3.94.1.12.1.10	connUnitLinkAgentAddressTypeY	LEAF INTEGER
1.3.6.1.3.94.1.12.1.11	connUnitLinkAgentPortY	LEAF INTEGER
1.3.6.1.3.94.1.12.1.12	connUnitLinkUnitTypeY	LEAF FcUnitType
1.3.6.1.3.94.1.12.1.13	connUnitLinkConnIdY	LEAF DisplayString
1.3.6.1.3.94.2	trapReg	NODE
1.3.6.1.3.94.2.1	trapMaxClients	LEAF INTEGER
1.3.6.1.3.94.2.2	trapClientCount	LEAF INTEGER

Table 14. Fibre Alliance MIB 2.2 Elements (Continued)

1.3.6.1.3.94.2.3	trapRegTable	NODE
1.3.6.1.3.94.2.3.1	trapRegEntry	NODE
1.3.6.1.3.94.2.3.1.1	trapRegIpAddress	LEAF IpAddress
1.3.6.1.3.94.2.3.1.2	trapRegPort	LEAF INTEGER
1.3.6.1.3.94.2.3.1.3	trapRegFilter	LEAF FcEventSeverity
1.3.6.1.3.94.2.3.1.4	trapRegRowState	LEAF INTEGER
1.3.6.1.3.94.3	revisionNumber	LEAF DisplayString
1.3.6.1.3.94.4	statSet	NODE
1.3.6.1.3.94.4.1	connUnitPortStatHubTable	NODE
1.3.6.1.3.94.4.1.1	connUnitPortStatHubEntry	NODE
1.3.6.1.3.94.4.1.1.1	connUnitPortStatHubUnitId	LEAF DisplayString
1.3.6.1.3.94.4.1.1.2	connUnitPortStatHubIndex	LEAF INTEGER
1.3.6.1.3.94.4.1.1.3	connUnitPortStatHubCountError	LEAF DisplayString
1.3.6.1.3.94.4.1.1.4	connUnitPortStatHubCountTxFrame	LEAF DisplayString
1.3.6.1.3.94.4.1.1.5	connUnitPortStatHubCountRxFrame	LEAF DisplayString
1.3.6.1.3.94.4.1.1.6	connUnitPortStatHubCountTxOctets	LEAF DisplayString
1.3.6.1.3.94.4.1.1.7	connUnitPortStatHubCountRxOctets	LEAF DisplayString
1.3.6.1.3.94.4.2	connUnitPortStatFabricTable	NODE
1.3.6.1.3.94.4.2.1	connUnitPortStatFabricEntry	NODE
1.3.6.1.3.94.4.2.1.1	connUnitPortStatFabricUnitId	LEAF DisplayString
1.3.6.1.3.94.4.2.1.2	connUnitPortStatFabricIndex	LEAF INTEGER
1.3.6.1.3.94.4.2.1.3	connUnitPortStatFabricCountError	LEAF DisplayString
1.3.6.1.3.94.4.2.1.4	connUnitPortStatFabricCountTxFrame	LEAF DisplayString
1.3.6.1.3.94.4.2.1.5	connUnitPortStatFabricCountRxFrame	LEAF DisplayString
1.3.6.1.3.94.4.2.1.6	connUnitPortStatFabricCountTxOctets	LEAF DisplayString
1.3.6.1.3.94.4.2.1.7	connUnitPortStatFabricCountRxOctets	LEAF DisplayString
1.3.6.1.3.94.4.3	connUnitPortStatSCSITable	NODE
1.3.6.1.3.94.4.3.1	connUnitPortStatSCSIEntry	NODE
1.3.6.1.3.94.4.3.1.1	connUnitPortStatSCSIUnitId	LEAF DisplayString
1.3.6.1.3.94.4.3.1.2	connUnitPortStatSCSIIndex	LEAF INTEGER
1.3.6.1.3.94.4.3.1.3	connUnitPortStatSCSICountError	LEAF DisplayString
1.3.6.1.3.94.4.3.1.4	connUnitPortStatSCSICountTxIO	LEAF DisplayString
1.3.6.1.3.94.4.3.1.5	connUnitPortStatSCSICountRxIO	LEAF DisplayString
1.3.6.1.3.94.4.3.1.6	connUnitPortStatSCSICountTxBytes	LEAF DisplayString
1.3.6.1.3.94.4.3.1.7	connUnitPortStatSCSICountRxBytes	LEAF DisplayString
1.3.6.1.3.94.4.4	connUnitPortStatLANTable	NODE

Table 14. Fibre Alliance MIB 2.2 Elements (Continued)

1.3.6.1.3.94.4.4.1	connUnitPortStatLANEntry	NODE
1.3.6.1.3.94.4.4.1.1	connUnitPortStatLANUnitId	LEAF DisplayString
1.3.6.1.3.94.4.4.1.2	connUnitPortStatLANIndex	LEAF INTEGER
1.3.6.1.3.94.4.4.1.3	connUnitPortStatLANCountError	LEAF DisplayString
1.3.6.1.3.94.4.4.1.4	connUnitPortStatLANCountTxPacket	LEAF DisplayString
1.3.6.1.3.94.4.4.1.5	connUnitPortStatLANCountRxPacket	LEAF DisplayString
1.3.6.1.3.94.4.4.1.6	connUnitPortStatLANCountTxBytes	LEAF DisplayString
1.3.6.1.3.94.4.4.1.7	connUnitPortStatLANCountRxBytes	LEAF DisplayString
1.3.6.1.4	private	NODE
1.3.6.1.4.1	enterprises	NODE
1.3.6.1.5	security	NODE
1.3.6.1.6	snmpV2	NODE
1.3.6.1.6.1	snmpDomains	NODE
1.3.6.1.6.1.1	snmpUDPDomain	NODE
1.3.6.1.6.1.2	snmpCLNSDomain	NODE
1.3.6.1.6.1.3	snmpCONSDomain	NODE
1.3.6.1.6.1.4	snmpDDPDomain	NODE
1.3.6.1.6.1.5	snmpIPXDomain	NODE
1.3.6.1.6.2	snmpProxys	NODE
1.3.6.1.6.2.1	rfc1157Proxy	NODE
1.3.6.1.6.2.1.1	rfc1157Domain	NODE
1.3.6.1.6.3	snmpModules	NODE

Crossroads Enterprise MIB

The Crossroads Enterprise MIB can be accessed over Ethernet. The current implementation of the MIB supports Read-only functionality. Information is broken down into ‘config’, ‘topology’, and ‘utilities’ nodes. The config node provides information about the static configuration settings for the control module. The topology node provides information about all of the devices that are attached to the control module, the current map settings for these devices, and the maps used by initiators. The utilities node provides information about the current status of the control module, port and bus statistics, and various system logs that can be used for diagnostic purposes. For more information on accessing the Crossroads Enterprise MIB, contact a Sun/StorageTek service representative.

Crossroads Enterprise MIB Table

Table 15 contains all the elements within the Crossroads Enterprise MIB.

Table 15. Crossroads Enterprise MIB Elements

OID	Name	Type
0	ccitt	NODE
0.0	zeroDotZero	NODE
1	iso	NODE
1.3	org	NODE
1.3.6	dod	NODE
1.3.6.1	internet	NODE
1.3.6.1.1	directory	NODE
1.3.6.1.2	mgmt	NODE
1.3.6.1.2.1	mib-2	NODE
1.3.6.1.2.1.10	transmission	NODE
1.3.6.1.3	experimental	NODE
1.3.6.1.4	private	NODE
1.3.6.1.4.1	enterprises	NODE
1.3.6.1.4.1.2512	Crossroads	NODE
1.3.6.1.4.1.2512.1	router	NODE
1.3.6.1.4.1.2512.1.1	config	NODE
1.3.6.1.4.1.2512.1.1.1	physical	NODE
1.3.6.1.4.1.2512.1.1.1.1	clock	NODE
1.3.6.1.4.1.2512.1.1.1.1.1	second	LEAF Unsigned32

Table 15. Crossroads Enterprise MIB Elements (Continued)

1.3.6.1.4.1.2512.1.1.1.1.2	minute	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.1.3	hour	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.1.4	year	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.1.5	month	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.1.6	day	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.1.7	dayofweek	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.2	ethernet	NODE
1.3.6.1.4.1.2512.1.1.1.2.1	ipMacAddress	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.2.2	ipAddress	LEAF IpAddress
1.3.6.1.4.1.2512.1.1.1.2.3	ipSubnetMask	LEAF IpAddress
1.3.6.1.4.1.2512.1.1.1.2.4	ipGateway	LEAF IpAddress
1.3.6.1.4.1.2512.1.1.1.2.5	ipDHCP	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.2.6	ipEthernetMode	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.3	module	NODE
1.3.6.1.4.1.2512.1.1.1.3.1	moduleTable	NODE
1.3.6.1.4.1.2512.1.1.1.3.1.1	moduleEntry	NODE
1.3.6.1.4.1.2512.1.1.1.3.1.1.1	moduleNumber	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.3.1.1.2	moduleStatus	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.3.1.1.3	moduleProtocol	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.3.1.1.4	moduleNumPorts	LEAF Integer32
1.3.6.1.4.1.2512.1.1.1.3.1.1.5	moduleVendor	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.3.1.1.6	moduleHWID	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.3.1.1.7	modulePartSerialNumber	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.4	fc	NODE
1.3.6.1.4.1.2512.1.1.1.4.1	fcNodeName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.4.2	fcPortTable	NODE
1.3.6.1.4.1.2512.1.1.1.4.2.1	fcPortEntry	NODE
1.3.6.1.4.1.2512.1.1.1.4.2.1.1	fcPortModule	LEAF Integer32
1.3.6.1.4.1.2512.1.1.1.4.2.1.2	fcPortNumber	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.4.2.1.3	fcPortName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.4.2.1.4	fcLinkStatus	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.2.1.5	fcPortId	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.4.2.1.6	fcUseHardALPA	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.2.1.7	fcDiscoveryMode	LEAF INTEGER

Table 15. Crossroads Enterprise MIB Elements (Continued)

1.3.6.1.4.1.2512.1.1.1.4.2.1.8	fcBufferedTapeWrites	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.2.1.9	fcDefaultMap	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.2.1.10	fcPortMode	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.2.1.11	fcPortNegotiation	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5	scsi	NODE
1.3.6.1.4.1.2512.1.1.1.5.1	scsiPortTable	NODE
1.3.6.1.4.1.2512.1.1.1.5.1.1	scsiPortEntry	NODE
1.3.6.1.4.1.2512.1.1.1.5.1.1.1	scsiBusModule	LEAF Integer32
1.3.6.1.4.1.2512.1.1.1.5.1.1.2	scsiBusNumber	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.5.1.1.3	scsiInitiator	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.1.1.4	scsiInitiatorId	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.1.1.5	scsiSecInitiator	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.1.1.6	scsiSecInitiatorId	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.1.1.7	scsiDiscovery	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.1.1.8	scsiDiscoveryDelay	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.5.1.1.9	scsiBusResetOnBoot	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.1.1.10	scsiInternalTermination	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.1.1.11	scsiBufferedTapeWrites	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.1.1.12	scsiDefaultMap	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.2	scsiTargetTable	NODE
1.3.6.1.4.1.2512.1.1.1.5.2.1	scsiTargetEntry	NODE
1.3.6.1.4.1.2512.1.1.1.5.2.1.2	scsiTargetTargetId	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.5.3	scsiTargetOverrideTable	NODE
1.3.6.1.4.1.2512.1.1.1.5.3.1	scsiTargetOverrideEntry	NODE
1.3.6.1.4.1.2512.1.1.1.5.3.1.1	scsiTargetOverrideTargetId	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.3.1.2	scsiTargetOverrideCDBLengthOverride	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.3.1.3	scsiTargetOverrideCDBGroup6LengthDefaul t	LEAF Integer32
1.3.6.1.4.1.2512.1.1.1.5.3.1.4	scsiTargetOverrideCDBGroup7LengthDefaul t	LEAF Integer32
1.3.6.1.4.1.2512.1.1.1.5.3.1.5	scsiTargetOverrideWideNegotiation	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.3.1.6	scsiTargetOverrideSynchronousNegotia-tion	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.3.1.7	scsiTargetOverrideSynchronousParame-terOverride	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.3.1.8	scsiTargetOverrideSynchronousPeriod	LEAF Integer32

Table 15. Crossroads Enterprise MIB Elements (Continued)

1.3.6.1.4.1.2512.1.1.1.5.3.1.9	scsiTargetOverrideSynchronousOffset	LEAF Integer32
1.3.6.1.4.1.2512.1.1.1.5.3.1.10	scsiTargetOverrideScsiMode	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.2	logical	NODE
1.3.6.1.4.1.2512.1.1.2.2	snmp	NODE
1.3.6.1.4.1.2512.1.1.2.2.1	snmpTraps	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.2.2.2	snmpCommunityNameGet	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.2.2.3	snmpCommunityNameSet	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.2.2.4	snmpTrapManagerTable	NODE
1.3.6.1.4.1.2512.1.1.2.2.4.1	snmpTrapManagerEntry	NODE
1.3.6.1.4.1.2512.1.1.2.2.4.1.1	snmpTrapManagerIndex	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.2.2.4.1.2	snmpTrapManagerIpAddress	LEAF IpAddress
1.3.6.1.4.1.2512.1.1.2.2.4.1.3	snmpTrapManagerFilter	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.2.2.4.1.4	snmpTrapManagerRowState	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.2.3	af	NODE
1.3.6.1.4.1.2512.1.1.2.3.1	afServerFreeBackup	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.2.3.2	afControllerLUNs	LEAF INTEGER
1.3.6.1.4.1.2512.1.2	topology	NODE
1.3.6.1.4.1.2512.1.2.1	devices	NODE
1.3.6.1.4.1.2512.1.2.1.1	fcDeviceTable	NODE
1.3.6.1.4.1.2512.1.2.1.1.1	fcDeviceEntry	NODE
1.3.6.1.4.1.2512.1.2.1.1.1.1	fcDeviceIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.1.1.2	fcDeviceModule	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.1.1.3	fcDevicePort	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.1.1.4	fcDeviceNodeName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.1.1.1.5	fcDevicePortName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.1.1.1.6	fcDeviceLUN	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.1.1.7	fcDeviceType	LEAF INTEGER
1.3.6.1.4.1.2512.1.2.1.1.1.8	fcDeviceState	LEAF INTEGER
1.3.6.1.4.1.2512.1.2.1.1.1.9	fcDeviceMapCount	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.2	scsiDeviceTable	NODE
1.3.6.1.4.1.2512.1.2.1.2.1	scsiDeviceEntry	NODE
1.3.6.1.4.1.2512.1.2.1.2.1.1	scsiDeviceIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.2.1.2	scsiDeviceModule	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.2.1.3	scsiDeviceBus	LEAF Unsigned32

Table 15. Crossroads Enterprise MIB Elements (Continued)

1.3.6.1.4.1.2512.1.2.1.2.1.4	scsiDeviceTarget	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.2.1.5	scsiDeviceLUN	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.2.1.6	scsiDeviceType	LEAF INTEGER
1.3.6.1.4.1.2512.1.2.1.2.1.7	scsiDeviceState	LEAF INTEGER
1.3.6.1.4.1.2512.1.2.1.2.1.8	scsiDeviceMapCount	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.2	initiators	NODE
1.3.6.1.4.1.2512.1.2.2.1	fcInitiatorTable	NODE
1.3.6.1.4.1.2512.1.2.2.1.1	fcInitiatorEntry	NODE
1.3.6.1.4.1.2512.1.2.2.1.1.1	fcInitiatorIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.2.1.1.2	fcInitiatorName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.2.1.1.3	fcInitiatorModule	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.2.1.1.4	fcInitiatorPort	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.2.1.1.5	fcInitiatorId	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.2.1.1.6	fcInitiatorNodeName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.2.1.1.7	fcInitiatorPortName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.2.1.1.9	fcInitiatorCurMap	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.2.2	scsiInitiatorTable	NODE
1.3.6.1.4.1.2512.1.2.2.2.1	scsiInitiatorEntry	NODE
1.3.6.1.4.1.2512.1.2.2.2.1.1	scsiInitiatorIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.2.2.1.2	scsiInitiatorName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.2.2.1.3	scsiInitiatorModule	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.2.2.1.4	scsiInitiatorBus	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.2.2.1.5	scsiHostInitiatorId	LEAF INTEGER
1.3.6.1.4.1.2512.1.2.2.2.1.6	scsiInitiatorCurMap	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.3	maps	NODE
1.3.6.1.4.1.2512.1.2.3.1	fcScsiMapTable	NODE
1.3.6.1.4.1.2512.1.2.3.1.1	fcScsiMapEntry	NODE
1.3.6.1.4.1.2512.1.2.3.1.1.1	fcScsiMapIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.3.1.1.2	fcLUN	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.3.1.1.3	scsiMapDeviceOid	LEAF OBJECT IDEN-TIFIER
1.3.6.1.4.1.2512.1.2.3.1.1.4	fcScsiMapName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.3.2	scsiFcMapTable	NODE
1.3.6.1.4.1.2512.1.2.3.2.1	scsiFcMapEntry	NODE

Table 15. Crossroads Enterprise MIB Elements (Continued)

1.3.6.1.4.1.2512.1.2.3.2.1.1	scsiFcMapIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.3.2.1.2	scsiTargetId	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.3.2.1.3	scsiTargetLUN	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.3.2.1.4	fcMapDeviceOid	LEAF OBJECT IDEN-TIFIER
1.3.6.1.4.1.2512.1.2.3.2.1.5	scsiFcMapName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3	utilities	NODE
1.3.6.1.4.1.2512.1.3.1	status	NODE
1.3.6.1.4.1.2512.1.3.1.1	enclosure	NODE
1.3.6.1.4.1.2512.1.3.1.1.1	fanTable	NODE
1.3.6.1.4.1.2512.1.3.1.1.1.1	fanEntry	NODE
1.3.6.1.4.1.2512.1.3.1.1.1.1.2	fanActualRPM	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.1.1.1.4	fanNumber	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.1.2	voltageTable	NODE
1.3.6.1.4.1.2512.1.3.1.1.2.1	voltageEntry	NODE
1.3.6.1.4.1.2512.1.3.1.1.2.1.2	voltageActual	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.1.2.1.3	voltageNominal	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.1.2.1.4	voltageIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.1.3	powerTable	NODE
1.3.6.1.4.1.2512.1.3.1.1.3.1	powerEntry	NODE
1.3.6.1.4.1.2512.1.3.1.1.3.1.2	powerSupplyStatus	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.1.1.3.1.3	powerSupplyNumber	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.1.4	temperature	NODE
1.3.6.1.4.1.2512.1.3.1.1.4.1	celsius	LEAF Integer32
1.3.6.1.4.1.2512.1.3.1.1.4.2	fahrenheit	LEAF Integer32
1.3.6.1.4.1.2512.1.3.1.2	statistics	NODE
1.3.6.1.4.1.2512.1.3.1.2.1	fcStats	NODE
1.3.6.1.4.1.2512.1.3.1.2.1.1	fcStatsTable	NODE
1.3.6.1.4.1.2512.1.3.1.2.1.1.1	fcStatsEntry	NODE
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.1	fcStatsInDeviceDataSequences	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.2	fcStatsOutDeviceDataSequences	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.3	fcStatsInLinkDataSequences	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.4	fcStatsOutLinkDataSequences	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.5	fcStatsInPBSYFrames	LEAF Unsigned32

Table 15. Crossroads Enterprise MIB Elements (Continued)

1.3.6.1.4.1.2512.1.3.1.2.1.1.1.6	fcStatsOutPBSYFrames	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.7	fcStatsInFBSYFrames	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.8	fcStatsInPRJTFrames	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.9	fcStatsOutPRJTFrames	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.10	fcStatsLinkDown	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.11	fcStatsInAborts	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.12	fcStatsOutAborts	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.13	fcStatsLaserFaults	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.14	fcStatsLOS	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.15	fcStatsSync	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.16	fcStatsBadRxCharacters	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.17	fcStatsLinkFailures	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.18	fcStatsBadCRCs	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.19	fcStatsProtocolErrors	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.20	fcStatsBadSCSIFrames	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.21	fcStatsActiveLUN	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.2	scsiStats	NODE
1.3.6.1.4.1.2512.1.3.1.2.2.1	scsiBusStatsTable	NODE
1.3.6.1.4.1.2512.1.3.1.2.2.1.1	scsiBusStatsEntry	NODE
1.3.6.1.4.1.2512.1.3.1.2.2.1.1.1	scsiBusStatsMode	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.1.2.2.1.1.2	scsiBusStatsResets	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.2.2	scsiTgtStatsTable	NODE
1.3.6.1.4.1.2512.1.3.1.2.2.2.1	scsiTgtStatsEntry	NODE
1.3.6.1.4.1.2512.1.3.1.2.2.2.1.1	scsiTgtStatsParityErrs	LEAF Counter64
1.3.6.1.4.1.2512.1.3.1.2.2.2.1.2	scsiTgtStatsCheckConds	LEAF Counter64
1.3.6.1.4.1.2512.1.3.1.2.2.2.1.3	scsiTgtStatsTransIOs	LEAF Counter64
1.3.6.1.4.1.2512.1.3.1.2.2.2.1.4	scsiTgtStatsRecIOs	LEAF Counter64
1.3.6.1.4.1.2512.1.3.1.3	platform	NODE
1.3.6.1.4.1.2512.1.3.1.3.1	platformVendor	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.2	platformProduct	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.3	platformVersion	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.4	platformFirmwareLevel	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.5	platformBIOSVersion	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.6	platformBooterVersion	LEAF OCTET STRING

Table 15. Crossroads Enterprise MIB Elements (Continued)

1.3.6.1.4.1.2512.1.3.1.3.7	platformHWID	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.8	platformMCUPLDVersion	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.9	platformCPUPLDVersion	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.10	platformPartSerialNumber	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.3	traces	NODE
1.3.6.1.4.1.2512.1.3.3.1	traceGeneralErrors	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.2	traceFCPDriver	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.3	traceFCPTransport	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.4	traceFCPManagement	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.5	tracePSTransport	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.6	tracePSManagement	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.7	tracePSDriver	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.8	traceSGList	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.9	traceAF	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.10	traceInband	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.11	traceTiming	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.12	traceFCPRMI	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.13	traceCurrentTable	NODE
1.3.6.1.4.1.2512.1.3.3.13.1	traceCurrentEntry	NODE
1.3.6.1.4.1.2512.1.3.3.13.1.1	traceCurIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.3.13.1.2	traceCurTime	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.3.13.1.3	traceCurMsg	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.3.14	traceAssertTable	NODE
1.3.6.1.4.1.2512.1.3.3.14.1	traceAssertEntry	NODE
1.3.6.1.4.1.2512.1.3.3.14.1.1	traceAssertIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.3.14.1.2	traceAssertTime	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.3.14.1.3	traceAssertMsg	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.4	events	NODE
1.3.6.1.4.1.2512.1.3.4.1	logFilter	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.4.2	eventLogTable	NODE
1.3.6.1.4.1.2512.1.3.4.2.1	eventLogEntry	NODE
1.3.6.1.4.1.2512.1.3.4.2.1.1	eventLogIndex	LEAF Integer32
1.3.6.1.4.1.2512.1.3.4.2.1.2	eventLogDate	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.4.2.1.3	eventLogSysTime	LEAF OCTET STRING

Table 15. Crossroads Enterprise MIB Elements (Continued)

1.3.6.1.4.1.2512.1.3.4.2.1.4	eventLogSev	LEAF Integer32
1.3.6.1.4.1.2512.1.3.4.2.1.5	eventLogDesc	LEAF OCTET STRING
1.3.6.1.5	security	NODE
1.3.6.1.6	snmpV2	NODE
1.3.6.1.6.1	snmpDomains	NODE
1.3.6.1.6.1.1	snmpUDPDomain	NODE
1.3.6.1.6.1.2	snmpCLNSDomain	NODE
1.3.6.1.6.1.3	snmpCONSDomain	NODE
1.3.6.1.6.1.4	snmpDDPDomain	NODE
1.3.6.1.6.1.5	snmpIPXDomain	NODE
1.3.6.1.6.2	snmpProxys	NODE
1.3.6.1.6.2.1	rfc1157Proxy	NODE
1.3.6.1.6.2.1.1	rfc1157Domain	NODE
1.3.6.1.6.3	snmpModules	NODE

Enabling DHCP on the L1400M Interface Control Module

F

DHCP, or Dynamic Host Configuration Protocol, is an open industry standard that simplifies administering networks based on Transmission Control Protocol/Internet Protocol (TCP/IP). DHCP allows network resources to go farther by enabling a unique IP address to be assigned to a specific device (control module, client host, etc.) on a non-permanent, dynamic basis.

DHCP makes network administration easier—the larger the network, the greater the benefit. DHCP accommodates larger networks since it can assign temporary IP addresses for a specified time interval. DHCP frees network administrators from having to configure each control module or host manually.

Other benefits of a DHCP environment include:

- No additional address configuration is required for client hosts.
- IP addresses can be reused or leased for specific time periods.
- IP address assignment is better managed. For example, if the IP address for a control module in a network changes and 250 client computers have to be updated with the new address, you do not have to manually reconfigure every workstation.

Without DHCP, permanent IP address configuration is the only option. This means a network administrator is required to manually configure a permanent IP address for each individual control module or client host. Permanent IP addresses require more network resources, but are useful when dealing with smaller LAN environments. Without dynamic address assignment, control modules and hosts have to be configured manually one by one. IP addresses must be managed to avoid duplicate use, and changes must be applied to clients by hand. Configuration information is not centralized, and it is difficult to get a view of all control module or host configurations.

The use of TCP/IP and DHCP both contribute to networking and the growth of the Internet. TCP/IP uses open protocol standards that enable the forming of wide area networks (WANS). For each control module to identify itself on a TCP/IP network, it must be uniquely identified by the following information:

1. An IP address: a 32-bit field composed of four octets (8-bit numbers from 0 through 255). Each address has decimal notation to separate octet numbers, such as 208.24.132.184.

   Your DHCP server may allow you to set up a lease reservation for an IP address by providing the server with the Ethernet MAC address of the L1400M Interface Control Module (control module). This sets the DHCP server to always provide the same IP address to the control module. This setup can be useful for remote management of the control module via Telnet or Visual Manager. Because the method of setting up a lease reservation varies depending on the DHCP server being used, you should contact your Network Administrator for assistance.

2. A subnet mask: This indicates how the IP address is to be read. It also indicates how to separate the network identifying information from the control module identifying information so the IP address can be interpreted correctly. For example, if a subnet mask of 255.255.255.0 is applied for an address 10.85.189.24, it indicates that the unique control module address is 24, located on the 10.85.189 subnetwork.

3. A default gateway: This is used to specify the address for the nearest control module that is used by the host device to forward addressed packets on to the network.

   These previous three options (IP address, subnet mask, and gateway) are necessary for effective DHCP.

Note: For more information about DHCP, refer to documents RFC 2131 and RFC 2132.

Setting up DHCP over Control Module Interfaces

The control module uses three different interfaces which can be used to enable DHCP: Serial, Telnet, and HTTP. This following will describe how to enable and disable DHCP for each interface.

Note: Located on the control module, a MAC label displays the unit's Ethernet MAC Address. A network administrator can then use this MAC Address to set up a lease reservation on the DHCP server for the IP address of the control module. This effectively allows the control module to have a permanent IP address that is assigned by the DHCP server.

Serial and Telnet Interfaces

When the user turns on the control module, the system reboots and displays the following Main Menu on the hyperterminal window:

Figure 117. Main Menu

```
                L1400M Interface Control Module
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                     01/06/2003 08:56:22

1) Perform Configuration
2) System Utilities
3) Display Trace and Assertion History
4) Reboot
5) Download a New Revision of The Firmware

Command >
```

- Select 1. The following menu appears:

Figure 118. Configuration Menu

```
                      Configuration Menu
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                     01/06/2003 08:56:22

1) Baud Rate Configuration
2) Ethernet and SNMP Configuration
3) Fibre Channel Configuration
4) Parallel SCSI Configuration
5) Device Mapping
6) Trace and Event Settings Configuration
7) Real-Time Clock Configuration
8) Active Fabric Configuration

A) Save Configuration
B) Restore Last Saved Configuration
C) Reset and Save Configuration to Factory Defaults

X) Return to main menu
```

- Select: 2. The following menu appears:

Figure 119. Ethernet Configuration Menu

```
                  Ethernet Configuration Menu
          X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                     01/06/2003 08:56:22

IP Address                      : 1.1.1.1
Subnet Mask                     : 255.255.255.0
IP Gateway                      : 0.0.0.0
Ethernet Physical Address       : 08:06:07:05:03:09
Ethernet Mode                   : 10/100Mbps (Auto-Neg)
Hostname                        :
DHCP Configuration              : Disabled

1) Change IP Address
2) Change IP Subnet Mask
3) Change IP Gateway
4) Change Ethernet Physical Address
5) Toggle Ethernet Mode
6) Change Hostname
7) Toggle DHCP Configuration
8) Change SNMP Settings
9) Change Security Settings

X) Return to previous menu
```

For descriptions of selections 1 thru 8, refer to Chapter 5, “L1400M Interface Control Module Management.”

```
10Mps Only
100Mps (half duplex) Only
100Mps (full duplex) Only
10/100Mps (Auto-Neg.)
```

Select 7 to toggle the DHCP setting. When DHCP is enabled, this activates Dynamic Host Configuration Protocol and allows the control module to be assigned a dynamic IP address from a DHCP server located on the Ethernet network used by the control module.

Once DHCP is enabled, it is necessary to save the current configuration and reboot the control module before DHCP will operate.

Note: For the IP address, Subnet Mask, and IP Gateway address, it is okay to have null values prior to rebooting the control module. However, if these settings have null values after a reboot, then this indicates the DHCP Server was unable to acquire the information for that setting. See special note below for more information.

Use the following steps to save the current settings and reboot the system:

1. Select `X) Return to previous menu`
2. Select `A) Save Configuration`
3. Select `X) Return to previous menu`
4. Select `4) Reboot`

After the control module finishes rebooting, the Main Menu will appear. DHCP status can be verified from the Ethernet Configuration Menu where DHCP Configuration is indicated as “Enabled” if DHCP has been successfully activated. Note that the IP Address will also appear different than the former non-DHCP IP Address.

Notes: To use the DHCP feature, a DHCP server must be operational on the Ethernet network used by the control module. If the DHCP feature is used when there is no DHCP server, the standard for DHCP requires that the control module wait three minutes for a response from a DHCP server before timing out. During this period, the control module menus and functions will not be accessible.

Upon initial control module set-up (first time straight out of the box), the IP Address will be 1.1.1.1 (factory default setting). After initial set-up, all future IP address values will be retrieved from memory in the control module’s CPU as the result of a previous reboot.

Special Note Regarding Ethernet IP, Subnet Mask, and Gateway Addresses

Once DHCP is enabled, any “null” readings are acceptable for these 3 options *before reboot*. Also, the `Ethernet Configuration Menu` (Figure 120) will *not* allow for changing these 3 options (since they are automatically configured by DHCP). As a result, the `Ethernet Configuration Menu` will display *without* these options listed. Here’s an example of this “DHCP-enabled” menu, note how the following options are *not* displayed: 2) Change IP Address, 3) Change IP Subnet Mask, and 6) Change IP Gateway.

Figure 120. Ethernet Configuration Menu

```
                  Ethernet Configuration Menu
           X.XX.XX XXXXXX XXXXXX-XXX_XXXXXXXXXXXXXX
                      01/06/2003 08:56:22

IP Address                      : 1.1.1.1
Subnet Mask                     : 255.255.255.0
IP Gateway                      : 0.0.0.0
Ethernet Physical Address       : 08:06:07:05:03:09
Ethernet Mode                   : 10/100Mbps (Auto-Neg)
Hostname                        :
DHCP Configuration              : Enabled

1) Change IP Address
2) Change IP Subnet Mask
3) Change IP Gateway
4) Change Ethernet Physical Address
5) Toggle Ethernet Mode
6) Change Hostname
7) Toggle DHCP Configuration
8) Change SNMP Settings
9) Change Security Settings

X) Return to previous menu
```

Visual Manager

To access the control module using the Visual Manager interface, first look up the current IP address within the Ethernet Configuration Menu using the Serial interface. Next, type the IP address in the Web browser without using “www” or “/” or any other characters or symbols.

After entering the IP address, you should see the Visual Manager interface. For more information about using Visual Manager, see Chapter 6, “Using L1400M Visual Manager.”

Tips for Manipulating DHCP within Visual Manager

1. To change the current state of DHCP, change its status to enabled or disabled, submit the change and then reboot.
2. To reboot, click the “Reboot” link from the main menu, select `Yes` to the confirmation message, and then submit.
3. The Gateway address should have the same subnetwork (1st three bytes) as the IP address. For example, an IP address of 192.168.100.93 may have a Gateway of 192.168.100.1. However, an “unavailable” Gateway value appearing under the CURRENT section of the Configuration Menu means the DHCP server was unable to get the Gateway address. If this happens, contact the network administrator to make sure the DHCP server is providing this information, or manually change the Gateway address yourself.

Now the user should be able to access the new IP Address displayed within the Ethernet Configuration Menu using Visual Manager.

General Troubleshooting

What happens if the DHCP Server Cannot Be Contacted?

- *Serial Interface*: the following occurs over the serial line: the following text appears above the Main Menu within the hyperterminal window, “Attempting to contact DHCP server…”After about 3 minutes, the following message appears, “Can’t renew DHCP boot lease.”
- *Within Telnet*: the user will see only a blank Telnet window which is not accessible. Instead of an IP address value displaying in upper left heading of Telnet window, “(None)” appears instead. Within half a minute, Telnet will produce a warning message stating “Connect Failed!”
- *Within Visual Manager*: the user will be able to submit a new Web page and reboot (as is typically the case). However, since the DHCP isn’t contacted, a new IP address will not be generated after reboot. Therefore, Visual Manager will no longer be useful since no IP address is available. By the way, the previous non-DHCP won’t work either. Visual Manager will just time out and provide a warning message to user stating that “a connection with server could not be established.”
- *Within SNMP/MIB browser*: the user will get only “Abort” messages after attempting to contact any IP address using the Ethernet IPAddr leaf. “Remote SNMP agent not contacted” will also display in lower left corner of MIB browser.

In the above situations, check the following: 1) Check on the status of the DHCP server with your network administrator, 2) ensure the Ethernet good link light on the control module is green (and if not check that the Ethernet cable is securely connected to the control module), and 3) Check the configuration of the control module including the gateway address and assign values manually if needed. If these all appear to be in order but DHCP is still not working, then try resetting the control module to factory defaults (any current configuration settings will be reset), reboot the control module, and then reconfigure the control module as desired. In problems persist then consult Chapter 9, “Troubleshooting” for further assistance.

Glossary

A

adapter A printed circuit assembly that translates data between the FC host processor's internal bus and a different bus, such as SCSI.

address See SCSI Addressing.

addressing mode Used to create a mapping table that maps devices on the SCSI bus to Fibre Channel logical units.

AL_PA Arbitrated Loop Physical Address. A unique one-byte valid value, derived and used in an Arbitrated Loop Topology as defined in ANSI specification FC_AL ver 4.5.

arbitrated loop See Fibre Channel - Arbitrated Loop. (ANSI specification FC_AL ver 4.5)

area The second byte of the N_Port Identifier.

auto-assigned mapping A menu item. The auto-addressing option creates a mapping table using devices discovered upon powering up or resetting the SN3300, that is not otherwise retained by the SN3300.

B

baud A unit of signaling speed, expressed as the maximum number of times per second the signal can change the state of the transmission line or other medium (units of baud are sec^{-1}). Note: With Fibre Channel scheme, a signal event represents a single transmission bit.

bus A means of transferring data between modules and adapters or between an adapter and SCSI devices. For a SCSI bus definition, see SCSI Bus.

C

channel A general term for a path on which electronic signals travel.

clusters Two or more computers sharing the same resources on a communication link.

D

device See FC Device or SCSI Device.

differential An electrical signal configuration using a pair of lines for data transfer. The advantage of differential compared to single-ended configuration is a relative high tolerance for common-mode noise and crosstalk when used with twisted pair cables. In layman's terms, this means longer distance.

domain A FC term describing the most significant byte in the N_Port Identifier for the FC device. It is not used in the FC-SCSI hardware path ID. It is required to be the same for all SCSI targets logically connected to a FC adapter.

E

exchange A FC term for the basic mechanism used for managing an operation. An exchange identifies information transfers consisting of one or more related non

concurrent sequences that may flow in the same or opposite directions, but always in half duplex mode. An exchange is identified by an OX_ID and an RX_ID.

F

fabric An FC term that includes FC Arbitrated Loop, Switched Fabric, and Point-to-Point.

fault LED During power up and self test, the SN3300 Fault LED comes on. After self test, if this LED remains on or comes on, the SN3300 has a problem with one of its components. During normal operation, this LED should be off.

FC See Fibre Channel.

FC-AL See Fibre Channel - Arbitrated Loop.

FC adapter A printed circuit assembly that translates data between the FC host processor's internal bus and the FC link. This is also known as an HBA, or Host Bus Adapter.

FC device A device that uses Fibre Channel communications.

FC port An opening at the back of the SN3300 that provides a fiber optic connection between the FC adapter and the FC host.

FC-SCSI hardware path ID A FC term describing a list of values showing the physical hardware path of the FC host to the target device.

Format: Bus_Converter/ Adapter_Address.Protocol_Type.Area.Port. Bus.Target.LUN

Example: 8/4.8.0.0.2.4.0

fiber A fiber optic cable made from thin strands of glass through which data in the form of light pulses is transmitted (LASER, LED). It is often used for high-speed transmission over medium (200m) to long (10km) distances but it can be used for short distances (<200m).

fibre A generic FC term used to cover all transmission media types specified in the Fibre Channel Physical Layer standard (FC-PH), such as optical fiber, copper twisted pair, and copper coaxial cable.

fibre channel (FC) Logically, the Fibre Channel is a bidirectional, full-duplex, point-to-point, serial data channel structured for high performance data communication. Physically, the Fibre Channel is an interconnection of multiple communication ports, called N_Ports, interconnected by a switching network, called a fabric, a point-to-point link, or an arbitrated loop. Fibre Channel is a generalized transport mechanism that has no protocol of its own or native input/output command set, but can transport any existing Upper Level Protocols (ULPs) such as SCSI and IP.

fibre channel - arbitrated loop (FC-AL) One of three existing Fibre Channel topologies, in which 2 to 126 devices are interconnected serially in a single loop circuit. The arbitrated loop topology supports all classes of service and guarantees in order delivery of frames when the source and destination are on the same loop.

fibre channel protocol for SCSI (FCP) FCP defines a Fibre Channel mapping layer (FC-4) that uses FC-PH services to transmit SCSI command, data, and status information between a SCSI initiator and a SCSI target. Using FCP enables transmission and receipt of SCSI commands, data and status, across the Fibre Channel using the standard Fibre Channel frame and sequence formats.

frame The smallest, indivisible unit of information transfer used by Fibre Channel. Frames are used for transferring data associated with a sequence. Frame size depends on the hardware implementation

and is independent of the ULP or the application software.

ftp File Transfer Protocol

G

gigabit interface connector (GBIC) A physical component that manages the functions of the FC-0 layer, which is the physical characteristic of the media and interface, including drivers, transceivers, connectors, and cables. Mounts on a FC adapter card and connects the SN3300 to a FC host. Also referred to as a Physical Link Module (PLM).

H

hardware path See FC-SCSI Hardware Path ID.

host bus adapter (HBA) See FC Adapter.

HVD High Voltage Differential

I

ID Numerical identifier

indexed addressing A menu name. It allows for generic Fibre Channel host bus adapters to access SCSI devices attached to the SN3300 using a table which is indexed by sequential LUN values.

initiator A device (usually a host system) that requests an operation to be performed by another device known as a target (usually a peripheral).

initiator mode Configuration mode of the router in which a Fibre Channel initiator requests operations to be performed by a SCSI target device.

IP Internet protocol

L

link For Fibre Channel, it is a connection between two nodes, each having at least one N_Port (or the other end could be an F-Port), interconnected by a pair of optical or copper links, one inbound and one outbound.

longwave Lasers or LEDs that emit light with wave lengths around 1300 nm. When using single mode (9 nm) fibre, longwave lasers can be used to achieve lengths greater than 2 km.

loop address A FC term indicating the unique ID of a node in Fibre Channel loop topology, sometimes referred to as a Loop ID. Also a status type in the FC Status Menu, showing the FC Loop Address of the SN3300.

loop port (nl_port) A FC port that supports loops.

LUN Logical Unit Number or Logical Unit; a subdivision of a SCSI target. For SCSI-2, each SCSI target supports up to sixteen LUNs (LUN-0 to LUN-15). Using LUNs, the FC host can address multiple peripheral devices that may share a common controller.

LVD/SE Low Voltage Differential/Single-Ended

M

management information base (MIB) A structured set of data variables, called objects, in which each variable represents some resource to be managed. A related collection of resources to be managed.

mapping table A table which is indexed by sequential LUN values, indicating selected BUS:TARGET:LUN devices. It is used by the SN3300 to perform Fibre Channel-to-SCSI operations by default.

MB megabyte. (There are 8 bits in a byte.)

MIB See Management Information Base.

motherboard The main PCA of the SN3300 that provides a physical and logical connection between Fibre Channel and SCSI devices.

multiplexer A device that allows two or more signals to be transmitted simultaneously on a single channel.

N

N_port A FC term defining a “Node” port. A FC-defined hardware entity that performs data communication over the FC link. It is identifiable by a unique Worldwide Name. It can act as an originator or a responder.

N_port identifier A FC term indicating a unique address identifier by which an N_Port is uniquely known. It consists of a Domain (most significant byte), an Area, and a Port, each 1 byte long. The N_Port identifier is used in the Source Identifier (S_ID) and Destination Identifier (D_ID) fields of a FC frame.

node name A field value under the FC Status Menu. The unique FC identifier, a 64-bit value, the factory assigns to the SN3300.

O

offline Taking the SN3300 offline indicates that all SCSI and FC adapters in the SN3300 are offline.

Taking a SCSI adapter offline means ending inputs/outputs and suspending all transactions going from the SN3300 to the specified SCSI devices. The SCSI adapter is no longer active or available for access.

Taking a FC adapter offline means ending inputs/outputs and suspending all transactions going from the SN3300 to the specified FC device.

online For the SN3300, online indicates that at least one adapter in the SN3300 is active and available for access.

For a SCSI adapter, online indicates the SCSI adapter is active and available for access and input/output processing.

For a FC adapter, online indicates the FC adapter is active and available for access and input/output processing.

originator The Fibre Channel N_Port responsible for starting an exchange. A FC originator is comparable to a SCSI initiator.

P

point-to-point One of three existing FC topologies, in which two ports are directly connected by a link with no fabric, loop, or switching elements present. The SN3300 which uses FC-AL to support Point-to-Point configurations.

port name A field value under the FC Status Menu; the FC port identifier; a 64-bit value the factory assigns to each FC adapter.

post See Power On Self Test.

power on self test (POST) A group of tests run when the SN3300 is powered on.

processor Contains the arithmetic and logic, control, and internal memory units that control the SN3300.

R

reset SCSI For a specific SCSI bus, the host clears all inputs and outputs and then resets the bus and all the devices connected to it.

responder The logical function in an N_Port responsible for supporting the exchange initiated by the originator in another N_Port. A FC responder is

comparable to a SCSI target. The SN3300 is often the responder.

router An intelligent device within the SAN (storage area network) infrastructure that can handle multiple protocols, such as Fibre Channel and SCSI. The routing decision is based on paths between address mappings among dispersed initiators and targets.

router-to-router Configuration involving at least two routers where one router is in Initiator Mode and another in Target Mode.

S

SAN Storage Area Network

SCC addressing A menu item. SCSI-3 Controller Commands (SCC) addressing is used to address SCSI devices attached to the SN3300 using the SCC logical unit addressing method. In SCC addressing mode, the SN3300 will respond to FCP commands as a SCC controller device.

SCSI Small Computer System Interface. An industry standard for connecting peripheral devices and their controllers to an initiator.

SCSI adapter A 16-bit fast/wide SE or Differential or LVD or 8-bit narrow single-ended physical connection between the SN3300 and the SCSI devices. Each SCSI adapter supports up to sixteen (for fast/wide) or eight (for narrow) SCSI devices, including itself.

SCSI addressing A SCSI adapter supports up to 16 devices, including itself. Each device has its own unique SCSI address. The SCSI address of a device dictates the device's priority when arbitrating for the SCSI bus. SCSI address "7" has the highest priority. The next highest priority address is "6" followed by 5, 4, 3, 2, 1, 0, 15, 14, 13, 12, 11, 10, 9, 8, with "8" being the lowest priority address. The narrow SCSI adapter is factory set to address 7. A narrow SCSI adapter supports up to eight devices, including itself. SCSI address "7" has the highest priority followed by 6, 5, 4, 3, 2, 1, and 0.

SCSI bus The means of transferring SCSI data between SCSI devices. It is an 8-bit or 16-bit bus that supports up to eight or sixteen devices (including itself), in any mix of initiators and targets, with the limitation that at least one initiator and one target must be present.

SCSI device A single unit on the SCSI bus, identifiable by a unique SCSI address. A SCSI device can act as an initiator or target. For SCSI-3, each SCSI device supports up to sixteen LUNs.

SCSI port An opening at the back of the SN3300 providing connection between the SCSI adapter and the SCSI bus.

SCSI status A menu name used to show the number of SCSI devices on the bus.

small formfactor transceiver (SFF) A physical component that manages the functions of the FC-0 layer, which is the physical characteristic of the media and interface, including drivers, transceivers, connectors, and cables. Mounts on a FC adapter card and connects the SN3300 to a FC host.

shortwave Lasers or LEDs that emit light with wavelengths around 780 nm or 850 nm. When using multimode fibre (50 nm), shortwave lasers can be used with FC links less than 500m. To achieve longer lengths, single-mode fibre is required. The preferred fibre core size is 50 micron as this fibre has large bandwidth so that the distance is limited by the fibre attenuation. A 62.5 micron core size is also supported for compatibility with existing FDDI installations. Fibre of this type has smaller bandwidth and, in this case, the distance is limited by the fibre bandwidth.

SNMP Simple Network Management Protocol.

speed A status type in the FC Status Menu showing the speed (1063 Mbps) of the FC adapter.

switched fabric A FC term describing a switched topology, which is one of the three existing FC topologies. Fabric elements interconnect various N_Ports or NL_Ports and are responsible for frame routing.

T

TCP Transmission Control Protocol

target A device (usually a peripheral) that responds to an operation requested by an initiator (usually a host system). Peripherals are targets, but for some commands (for example, a SCSI COPY command), the peripheral may need to act temporarily as an initiator.

terminator block/termination An electrical connection at each end of the SCSI bus composed of a set of resistors (or possibly other components). Its function is to provide a pull-up for open collector drivers on the bus, and also impedance matching to prevent signal reflections at the ends of the cable.

The SCSI bus requires termination at both ends of the bus. One end of the SCSI bus is terminated by the SCSI adapter's internal termination. The other end should have a terminator placed on the SCSI connector on the last SCSI peripheral. If this device is not terminated, data errors may occur.

topology The physical or logical layout of nodes on a network. FC topologies include Point-to-Point, FC-AL, and Fabric.

trap In the context of SNMP, an unsolicited message sent by an agent to a management station. The purpose is to notify the management station of some unusual event.

V

view node name A status type in the FC Status Menu showing the identification of the node.

view port name A status type in the FC Status Menu showing the identification of the port.

W

world wide name (WWN) A Name_Identifier which is worldwide unique, and represented by a 64-bit unsigned binary value.

Index

A

Active Fabric configuration, serial/telnet interface, 158
addressing
    fibre channel arbitrated loop, 58
    fibre channel switched fabric, 58
    SCSI buses, 57
addressing, structures, and operation, 193
    auto assigned addressing option, 195
    indexed addressing option, 195
    SCC addressing option, 196
advanced features, 59
    library aggregation, 60
    library partitioning, 60
    slot licensing, 60
advertencia
    mensajes en el manual, 23
    peligro para los ojos a causa del láser, 28
    radiaciones láser, 28
advertencia, descripción, 23
autobaud feature, description, 51

B

basic verification, troubleshooting, 180
baud rate configuration, serial/telnet interface, 130

C

caution
    static electricity, 31
configuration
    fibre channel port, 57
    host device, 59
configuration procedures, 53
configuring control module using the serial/telnet interface, 130
connection
    Ethernet, 49
    SCSI, 46
    serial port, 50
connection, fibre channel, 44
control module
    fibre channel features, 42
    management features, 42
    operation indicators, 40
    specifications, 42
control module management, 63
    configuration methods, 63
        Ethernet, 64
        inband SCSI-3 commands, 66
        serial, 64
        SNMP, 66
        telnet, 65
        Visual Manager, 65
control module, external features, 39
current trace page, 114
customer support, troubleshooting, 184

D

DHCP, enabling, 219
DHCP, setting up, 220
DHCP, special note regarding Ethernet IP, subnet mask, and gateway addresses, 224
DHCP, tips for manipulating in Visual Manager, 225
DHCP, Visual Manager, 225
DHCP,troubleshooting, 226
diagnostics mode, serial/telnet interface, 167
discovery, 59
display trace and assertion history, serial/telnet interface, 169
download new firmware, serial/telnet interface, 171

E

enabling DHCP, 219
setting up, 220
special note regarding Ethernet IP, subnet mask, and gateway addresses, 224
tips for manipulating in Visual Manager, 225
Visual Manager, 225
ESD prevention, 31
Ethernet and SNMP configuration, serial/telnet interface, 131
Ethernet connection, 49
etiqueta de los productos de láser, 29
etiqueta, productos de láser, 29
event log, serial/telnet interface, 167

F

features, advanced, 59
library aggregation, 60
library partitioning, 60
slot licensing, 60
fibre channel arbitrated loop addressing, 58
hard addressing, 58
soft addressing, 58
fibre channel configuration, serial/telnet interface, 136
fibre channel connection, 44
fibre channel port configuration, 57
fibre channel switched fabric addressing, 58
FTP interface
backup/restore settings, 173
get copy of trace buffer, 175
update firmware, 176

G

get copy of trace buffer, FTP interface, 175
get copy of trace buffer, serial/telnet interface, 170
get update firmware, FTP interface, 176

H

host device configuration, 59

I

inband SCSI-3 commands, general, 188
indicators, troubleshooting, 178

L

label, laser product, 27
laser product label, 27
last assert page, 114
logical unit management, 61
login problems, troubleshooting, 180

M

management information bases, 201
Crossroads, 209
Fibre Alliance, 201
mensajes de alerta en el manual, 23

N

network configuration page, 73
notas, descripción, 23
nterfaces and connections, 43

O

operation indicators, 40

P

parallel SCSI configuration, serial/telnet interface, 141
personal safety, 27
pin assignments
RJ-11 to DB-9, 185
RJ-45 Ethernet, 186
power up messages, serial/telnet interface, 128
precaución
mensajes en el manual, 23
precaución, descripción, 23
previous trace page, 114
PRLI data, troubleshooting, 183
procedures, configuration, 53
product

handling, 31
precautions, 31

Q

quick setup
serial/telnet, 54
quick setup, Visual Manager, 53

R

real-time clock configuration, serial/telnet interface, 157
reboot, serial/telnet interface, 170
running diagnostics, troubleshooting, 183

S

safety
ESD prevention, 31
fiber optics, 27
laser product label, 27
SCSI bus addressing, 57
SCSI connection, 46
seguridad
etiqueta de los productos de láser, 29
fibras ópticas, 28
serial port communications, setting up, 51
serial port connection, 50
serial port problems, troubleshooting, 180
serial/telnet interface
Active Fabric configuration, 158
baud rate configuration, 130
control module configuration, 130
diagnostics mode, 167
display trace and assertion history, 169
download new firmware, 171
Ethernet and SNMP configuration, 131
event log, 167
fibre channel configuration, 136
get copy of trace buffer, 170
parallel SCSI configuration, 141
power up messages, 128
real-time clock configuration, 157
reboot, 170
SNMP configuration, 133
system statistics, 161
system utilities, 160
trace and event settings configuration, 155
trace configuration, 155
trap configuration, 135
using, 127
serial/telnet quick setup, 54
setup, serial port communications, 51
SNMP configuration page, 75
SNMP configuration, serial/telnet interface, 133
static electricity safety, 31
system page, 71
system statistics, serial/telnet interface, 161
system utilities, serial/telnet interface, 160

T

trace and even settings configuration, serial/telnet interface, 155
trace configuration, serial/telnet interface, 155
trap configuration, serial/telnet interface, 135
troubleshooting, 177
basic verification, 180
customer support, 184
login prblems, 180
PRLI data, 183
running diagnostics, 183
serial port prblems, 180
verify configuration, 182
verify devices, 182
verify fibre channel connection, 181
verify HBA device driver information, 183
verify host configuration, 182
verify mapping, 182
verify SCSI bus configuration, 180
verify SCSI devices in Windows NT, 181
indicators, 178
troubleshooting DHCP, 226

V

vendor-unique commands, 199
verify configuration, troubleshooting, 182
verify devices, troubleshooting, 182

verify fibre channel connection, troubleshooting, 181
verify HBA device driver information, troubleshooting, 183
verify host configuration, troubleshooting, 182
verify mapping, troubleshooting, 182
verify SCSI bus configuration, troubleshooting, 180
verify SCSI devices in Windows NT, troubleshooting, 181
Visual Manager
  Active Fabric configuration page
    Active Fabric configuration page, 78
  advanced software licensed features page
    advanced software licensed features page, 120
  clear event log page
    clear event log page, 119
  current traces, previous traces, last assert pages, 114
  discovery page
    discovery page, 93
  event log display page
    event log display page, 118
  event log settings page
    event log settings page, 117
  FC port configuration page
    FC port configuration page, 83
  FTP utility page
    FTP utility page, 110
  Main Menu, 71
  mapping page
    mapping page, 94
  network configuration page, 73
  partitioning page
    partitioning page, 101
  ports page
    ports page, 82
  real-time clock configuration page
    real-time clock configuration page, 80
  reboot page
    reboot page, 125
  report page
    report page, 124
  reset factory settings page
    reset factory settings page, 81
  SCSI bus configuration page
    SCSI bus configuration page, 89
  serial configuration page, 72
  slot balancing page
    slot balancing page, 98
  SNMP configuration page, 75
  statistics page
    statistics page, 108
  system page, 71
  trace settings configuration page
    trace settings configuration page, 112
  user configuration page
    user configuration page, 79
  utitlities page
    utilities page, 109
Visual Manager, quick setup, 53
Visual Manger
  accessing, 67
  making changes with, 68
  using, 67

W

warning
  eye hazard from laser, 27
  radiation from laser, 27
warnings
  personal safety, 27

NEED MORE INFORMATION?

www.storagetek.com

ABOUT STORAGETEK

Storage Technology Corporation (NYSE: STK) is a $2 billion global company that enables businesses, through its information lifecycle management strategy, to align the cost of storage with the value of information. The company's innovative storage solutions manage the complexity and growth of information, lower costs, improve efficiency and protect investments. For more information, visit www.storagetek.com, or call 1.800.275.4785 or 01.303.673.2800.

WORLD HEADQUARTERS

Storage Technology Corporation
One StorageTek Drive
Louisville, Colorado 80028 USA
1.800.525.0369

StorageTek equipment is manufactured from new parts, or new and used parts. In some cases, StorageTek equipment may not be new and may have been previously installed. Regardless, StorageTek's standard warranty terms apply, unless the equipment is specifically identified by StorageTek as "used" or "refurbished."

Replacement parts provided under warranty or any service offering may be either new or equivalent-to-new, at StorageTek's option. Specifications/features may change without notice.