

# **LSI Fusion-MPT™ FCode User's Guide**

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## Release History

Version	Date	New Features
V14	12/16/2000	Original Release
V15	12/16/1000	Added Persistent Naming
V16	06/06/2001	Added Interrupt Coalescing
V16	06/06/2001	Added Interrupt Coalescing
V17	08/11/2001	Added Manual Selection of Topology
V18	10/22/2001	Added SCSI Section
V19	03/01/2002	Added IM/IR Information

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## Introduction

LSI Fusion-MPT host bus adapters optionally include FCode resident in Flash, allowing operation under the Sun Sparc openboot console as well as other Open Boot compatible environments. All basic functionality is available at openboot, including ability to display devices connected to the adapter, and selective boot from devices attached to the adapter. Additional functionality, such as updating the adapter firmware from the openboot console is also supported. See the LSI web site for additional information, current versions and utilities.

A summary of commands available on Fusion-MPT adapters is provided below.

## FusionMPT™ FCode Commands

Due to the portability and binary compatibility of Fusion-MPT, one FCode driver runs both SCSI and Fibre Channel Fusion-MPT devices. Due to the similarity of the configuration of SCSI and Fibre Channel devices, many commands are identical. This document is separated into SCSI and Fibre Channel for convenience, therefore examples may occur twice for the same command. Refer to the appropriate section for your adapter.

### *Identifying the FusionMPT™ Adapter*

To identify the disk adapter in your system, use the show-disks command at the openboot. This will identify all adapters that the system has identified as disk class. If this command fails to see your adapter, the adapter is either not correctly installed, or is malfunctioning.

#### **show-disks**

**ok show-disks**

```
a) /pci@1f,0/pci@1/pci@1/pci@e/IntraServer-Ultra2,scsi@4,1/disk
b) /pci@1f,0/pci@1/pci@1/pci@e/IntraServer-Ultra2,scsi@4/disk
c) /pci@1f,0/pci@1/pci@1/scsi@d,1/disk
d) /pci@1f,0/pci@1/pci@1/scsi@d/disk
e) /pci@1f,0/pci@1/pci@1/LSILogic,scsi@c,1/disk
f) /pci@1f,0/pci@1/pci@1/LSILogic,scsi@c/disk
g) /pci@1f,0/pci@1/pci@1/IntraServer,fc@b,1/disk
h) /pci@1f,0/pci@1/pci@1/IntraServer,fc@b/disk
m) MORE SELECTIONS
q) NO SELECTION
Enter Selection, q to quit: q
```

---

Note that devices 'a' through 'f' are SCSI adapters, 'g' and 'h' are Fibre Channel. The notation scsi@ is used for SCSI devices, and fc@ identifies Fibre Channel.

## **FusionMPT™ FCode SCSI Commands**

### **Identifying the SCSI disks**

The probe-scsi-all command is used to identify all disks on your FusionMPT™ adapters, and other disk class adapters in the system.

To show all disks available from the openboot prompt, use the probe-scsi-all command. Note that this command is used regardless of if the disks are Fibre Channel or SCSI. All disks available on all FusionMPT™ devices will be displayed.

---

## ***probe-scsi-all***

**ok probe-scsi-all**

```
/pci@1f,0/pci@1/pci@1/scsi@d,1
Target 2
  Unit 0 Disk SGI QUANTUM XP32150W589C
/pci@1f,0/pci@1/pci@1/scsi@d
Target 0
  Unit 0 Disk SGI QUANTUM XP32150W589C
/pci@1f,0/pci@1/pci@1/LSILogic,scsi@c,1
MPT Version 1.02, Firmware Version 0.00.00
Target 0
  Unit 0 Disk QUANTUM ATLAS IV 9 WLS 0B0B 17942584 Blocks, 8971 MB
Target 1
  Unit 0 Disk QUANTUM ATLAS IV 9 WLS 0B0B 17942584 Blocks, 8971 MB
Target 2
  Unit 0 Disk QUANTUM ATLAS IV 9 WLS 0B0B 17942584 Blocks, 8971 MB
Target 3
  Unit 0 Disk QUANTUM ATLAS IV 9 WLS 0B0B 17942584 Blocks, 8971 MB
/pci@1f,0/pci@1/pci@1/LSILogic,scsi@c
MPT Version 1.02, Firmware Version 0.00.00
/pci@8,700000/IntraServer-Ultra160,scsi@3,1

/pci@8,700000/IntraServer-Ultra160,scsi@3
Target 0
  Unit 0 Disk IBM DDRS-34560D DC1B

/pci@8,700000/IntraServer,fc@2

MPT Version 1.00, Firmware Version 1.02.00
Link is ready, port is online
WWN 100000a0b8040353 Port ID ef

Target 0
  Unit 0 Disk SEAGATE ST39173FC 6615
  WWN 2100002037109d76 Port ID d9
Target 1
  Unit 0 Disk SEAGATE ST39173FC 6615
  WWN 210000203710565a Port ID 17

/pci@8,700000/scsi@6
Target 6
  Unit 0 Removable Read Only device PLEXTOR CD-ROM PX-20TS
```

---

If the SCSI Channel disks on your LSI Fusion-MPT™ adapter are not identified by your system, check the following:

1. Is the disk enclosure powered ON?
2. Do LEDs on the adapter indicate LVD operation? Refer to the manual for the specific adapter to identify the correct operation of the LED indicators.
3. Is the SCSI bus terminated at both ends (and only at the ends) with LVD/SE terminators?
4. Does each SCSI disk have a unique SCSI ID, which is different from the host's ID (host ID defaults to 7, more information found in "setting scsi-initiator-id" section of this guide.
5. Are all the disks on the bus LVD? An HVD device on the bus will cause no disks to show up, and will cause the LVD LED on the Fusion-MPT™ adapter to blink.

If the Fibre Channel disks on your LSI Fusion-MPT™ adapter are not identified by your system, check the following:

1. Is the disk enclosure powered ON?
2. Does the LED on the adapter indicate LINK? (note that LINK will only be valid after the device is probed)
3. Does the LED on the switch or remote enclosure indicate LINK?
4. Does the LINK-SPEED parameter selected by the adapter match that of the bus (1G, 2G or Auto)

If you do not see disks, the following additional debug information may help to identify the problem.



---

## Verifying Correct Installation

Use this procedure to verify installation of your FusionMPT™ adapter in the system.

- 1 Power on the system.
- 2 When the banner is displayed, press the Stop-A keys to interrupt the boot process and stop at the **ok** prompt.
- 3 Use the **show-devs** command to list the system devices. You should see an output similar to the following:

### **show-devs**

```
ok show-devs
/SUNW,UltraSPARC-III@0,0
/virtual-memory
/memory@m0,0
/aliases
/options
/openprom
/chosen
/packages
/upa@8,480000/SUNW,ffb@0,0
...
/pci@1f,0/pci@1/pci@1/LSILogic,scsi@c,1
/pci@1f,0/pci@1/pci@1/LSILogic,scsi@c...
/pci@1f,0/pci@1/pci@1/LSILogic,scsi@c,1/disk
/pci@1f,0/pci@1/pci@1/LSILogic,scsi@c,1/tape
/pci@1f,0/pci@1/pci@1/LSILogic,scsi@c/disk
/pci@1f,0/pci@1/pci@1/LSILogic,scsi@c/tape
ok
```

- /pci@1f,0/pci@1/pci@1/LSILogic,scsi@c  
identifies the FIRST Ultra320 SCSI interface on an LSI 1030 based adapter
- /pci@1f,0/pci@1/pci@1/LSILogic,scsi@c,1  
identifies the SECOND Ultra320 SCSI interface on an LSI 1030 based adapter
- An LSI 1020 Ultra320 SCSI adapter will show only one such SCSI device

**Note:** *The above are examples. The output of show-devs may vary depending on your system and configuration. Use the corresponding entries on your system, not the ones given here.*

If your SCSI devices are not listed, check that the adapter is correctly installed, and re-seat the adapter if necessary.

---

## SCSI Adapter Specific Settings

In certain circumstances, the advanced user may want to change settings for an individual adapter or port, without affecting the other adapters in the system. Specific examples of such settings are SCSI initiator ID and Interrupt Coalescing.

To select a specific FusionMPT adapter as the current adapter, use the select command. Selecting a port or adapter will bring the port online, and will allow you to show or set certain adapter specific parameters.

You should use caution while issuing the following commands, as certain commands could render the bus unusable (such as forcing the SCSI initiator ID to one that conflicts with another device on the bus).

### ***select***

Use the select openboot command to select the adapter entry, this will open the port to bring the port online:

```
ok select /pci@1f,0/pci@1/pci@1/LSILogic,scsi@c
```

***Note: Certain versions of SUN's OpenBoot console do not implement the select command. The following syntax should be used if the select command is not supported. Be certain to include the space after each quotation mark:***

```
ok “ /pci@1f,0/pci@1/pci@1/LSILogic,scsi@c” select-dev
```

---

## **.properties**

Use .properties to show the adapter properties

### **ok .properties**

```
firmware-version      1.00.00
mpt-version           1.02
scsi-initiator-id     0000000f
assigned-addresses    81036010 00000000 00001300 00000000 00000100
                      83036014 00000000 001a0000 00000000 00020000
                      8303601c 00000000 00180000 00000000 00010000
                      82036030 00000000 00400000 00000000 00100000
compatible            pci13e9,30
                      pci1000,30
model                 LSI,1030
reg                   00036000 00000000 00000000 00000000 00000000
                      01036010 00000000 00000000 00000000 00000100
                      03036014 00000000 00000000 00000000 00020000
                      0303601c 00000000 00000000 00000000 00010000
                      02036030 00000000 00000000 00000000 00100000
version               1.00.21
device_type           scsi-2
name                  LSILogic,scsi
fcode-rom-offset      0000e800
66mhz-capable
devsel-speed          00000001
class-code            00010000
interrupts            00000001
max-latency           00000006
min-grant             00000010
subsystem-id          00001000
subsystem-vendor-id   00001000
revision-id           00000000
device-id             00000030
vendor-id             00001000
```

---

## ***show-children***

While you have the adapter or port selected, to display the devices currently connected to this adapter, use the show-children command:

Select the port or adapter shown (use the port name your system assigns):

```
ok select /pci@1f,0/pci@1/pci@1/LSILogic,scsi@c
```

```
ok show-children
```

```
MPT Version 1.02, Firmware Version 1.00.00
```

```
Target 0
```

```
Unit 0 Disk QUANTUM ATLAS IV 9 WLS 0B0B 17942584 Blocks,  
8971 MB
```

```
Target 1
```

```
Unit 0 Disk QUANTUM ATLAS IV 9 WLS 0B0B 17942584 Blocks,  
8971 MB
```

```
Target 2
```

```
Unit 0 Disk QUANTUM ATLAS IV 9 WLS 0B0B 17942584 Blocks,  
8971 MB
```

```
Target 3
```

```
Unit 0 Disk QUANTUM ATLAS IV 9 WLS 0B0B 17942584 Blocks,  
8971 MB
```

## **Interrupt Coalescing**

Interrupt coalescing allows the firmware on the FusionMPT device to group I/Os together for the purpose of minimizing the overhead to the host system. This feature can result in significant performance benefits when I/Os are coming into the adapter in a rapid manner, such as is the case while performing small sequential reads from a disk.

LSI has performed significant testing under multiple I/O conditions, and has determined that the interrupt coalescence values that are beneficial over a wide range of I/O conditions are a depth of 4, with a timeout of 160 microseconds. What this means is that the host will be interrupted only once for 4 I/Os processed by the chip unless a time of 160 microseconds has passed since the host was last interrupted.

Although we have determined that these settings are optimal for a wide variety of situations, your own I/O load may benefit from a deeper queue, or a longer timeout. LSI provides a mechanism to modify these values and write them to the non-volatile eeprom on the adapter.

---

Select the port or adapter shown (use the port name your system assigns):

```
ok select /pci@1f,0/pci@1/pci@1/LSILogic,scsi@c
```

**ok show-interrupt-coalescing**

Interrupt coalescing timeout is a0 (160 decimal) microseconds  
Interrupt coalescing depth is 4 (4 decimal)

**ok set-interrupt-coalescing** <- command with no arguments prints help  
usage is <timeout> <depth> set-interrupt-coalescing

**ok 100 8 set-interrupt-coalescing**

Interrupt coalescing timeout selected is 100 (256 decimal) microseconds  
Interrupt coalescing depth selected is 8 (8 decimal)  
Interrupt coalescing has been set  
Change will take effect after system reset

**Note:** *The system must be power cycled for the changes to in effect. It is not sufficient to execute the reset-all command*

## Setting SCSI Initiator ID

Each device on a SCSI bus must be given a unique ID, in the range of 0 – 15. The default setting for SCSI host adapters in a SUN Solaris environment is 7. Typically it is not necessary to change the initiator ID, unless the host adapter is being used in a cluster environment where there is more than one SCSI initiator on the same physical SCSI bus.

There are three places the SCSI initiator ID can be changed. Each has a different effect on the SCSI configuration. It is important to understand the effect of each of the methods for setting SCSI initiator ID before changing from the default behavior:

Setting	Location	Default Value	Scope	Notes
scsi-initiator-id	OpenBoot Environment Variable  /	7	System (All SCSI Ports)	Lowest precedence will be overridden if port specific value is set. Provides system wide default. Use printenv to display value, setenv to change.
scsi-initiator-id	Itmpt driver configuration file  /kernel/drv/itmpt.conf	7	All FusionMPT ports OR any individual port	Use <b>man pci</b> command for more information on using pci .conf files. This value will override openboot environment variable scsi-initiator-id for all specified ports.
scsi-initiator-id	Port specific OpenBoot node  <u>/pci@1f,0/pci@1/pci@1/LSILogic,scsi@c</u>  Note: Your node name will vary depending on system configuration	UNSET	Specific port	Highest precedence. Defaults to unset. If set, even to 7, will override any other setting for initiator ID.

---

The following is an example of how to set the port specific openboot scsi-initiator-id using the FusionMPT FCode. Refer to your platform openboot code for the system wide scsi-initiator-id, and your Solaris driver documentation for setting the itmpt.conf scsi-initiator-id. It is highly recommended that you chose the appropriate location for setting scsi-initiator-id, and not try to change it in multiple places.

```
ok select /pci@1f,0/pci@1/pci@1/LSILogic,scsi@c
```

```
ok show-initiator-id
```

```
Initiator ID has not been set; the default value is in effect  
Initiator ID is 7
```

```
ok 8 set-initiator-id
```

```
Initiator ID has been set  
Change will take effect immediately
```

```
ok show-initiator-id
```

```
Initiator ID is 8
```

```
ok unset-initiator-id
```

```
Initiator ID has been unset; the default value is in effect  
Change will take effect immediately
```

```
ok show-initiator-id
```

```
Initiator ID has not been set; the default value is in effect  
Initiator ID is 7
```

---

# FusionMPT™ FCode Fibre Channel Commands

## Identifying the Fibre Channel disks

The probe-scsi-all command is used to identify the Fibre Channel devices on your FusionMPT™ adapter.

To show all disks available from the openboot prompt, use the probe-scsi-all command. Note that this command is used regardless of if the disks are Fibre Channel or SCSI. All disks available on all FusionMPT™ devices will be displayed.

### ***probe-scsi-all***

```
ok probe-scsi-all
```

```
/pci@8,600000/SUNW,qlc@4
```

```
LiD HA LUN --- Port WWN --- ----- Disk description -----
```

```
1 1 0 2100002037e4d65b SEAGATE ST318304FSUN18G 0726
```

```
/pci@8,700000/IntraServer-Ultra160,scsi@3,1
```

```
/pci@8,700000/IntraServer-Ultra160,scsi@3
```

```
Target 0
```

```
Unit 0 Disk IBM DDRS-34560D DC1B
```

```
/pci@8,700000/IntraServer,fc@2
```

```
MPT Version 1.00, Firmware Version 1.02.00
```

```
Link is ready, port is online
```

```
WWN 100000a0b8040353 Port ID ef
```

```
Target 0
```

```
Unit 0 Disk SEAGATE ST39173FC 6615
```

```
WWN 2100002037109d76 Port ID d9
```

```
Target 1
```

```
Unit 0 Disk SEAGATE ST39173FC 6615
```

```
WWN 210000203710565a Port ID 17
```

```
Target 2
```

```
Unit 0 Disk SEAGATE ST39173FC 6615
```

```
WWN 2100002037105212 Port ID 1
```

```
pci@8,700000/scsi@6
```

```
Target 6
```

```
Unit 0 Removable Read Only device PLEXTOR CD-ROM PX-20TS
```

---

If the Fibre Channel disks on your LSI/IntraServer adapter are not identified by your system, check the following:

5. Is the Fibre Channel enclosure powered ON?
6. Does the LED on the adapter indicate LINK? (note that LINK will only be valid after the device is probed)
7. Does the LED on the switch or remote enclosure indicate LINK?
8. Does the LINK-SPEED parameter selected by the adapter match that of the bus (1G, 2G or Auto)

If you do not see disks, the following additional debug information may help to identify the problem.

### Verifying Correct Installation

Use this procedure to verify installation of your FusionMPT™ adapter in the system.

4. Power on the system.
5. When the banner is displayed, press the Stop-A keys to interrupt the boot process and stop at the **ok** prompt.
6. Use the **show-devs** command to list the system devices. You should see an output similar to the following:

#### **show-devs**

```
ok show-devs
/SUNW,UltraSPARC-III@0,0
/virtual-memory
/memory@m0,0
/aliases
/options
/openprom
/chosen
/packages
/upa@8,480000/SUNW,ffb@0,0
...
/pci@8,700000/IntraServer,fc@2
/pci@8,700000/IntraServer,fc@1,1
/pci@8,700000/IntraServer,fc@1
...
/pci@8,700000/IntraServer,fc@2/disk
/pci@8,700000/IntraServer,fc@2/tape
/pci@8,700000/IntraServer,fc@1,1/disk
/pci@8,700000/IntraServer,fc@1,1/tape
/pci@8,700000/IntraServer,fc@1/disk
/pci@8,700000/IntraServer,fc@1/tape
```



---

```
/pci@8,700000/scsi@6,1/tape
/pci@8,700000/scsi@6,1/disk
ok
```

- /pci@8,700000/IntraServer,fc@1  
identifies the FIRST Fibre Channel interface on an LSI 929 based adapter
- /pci@8,700000/IntraServer,fc@1,1  
identifies the SECOND Fibre Channel interface on an LSI 929 based adapter
- An LSI 909 based Fibre Channel adapter will show only one such Fibre Channel device

**Note:** *The above are examples. The output of show-devs may vary depending on your system and configuration. Use the corresponding entries on your system, not the ones given here.*

If these devices are not listed, check that the adapter is correctly installed, and re-seat the adapter if necessary.

### Adapter Specific Settings

In certain circumstances, the advanced user may want to change settings for an individual adapter or port, without affecting the other adapters in the system. Specific examples of such settings are Fibre Channel bus speed, host adapter ID (SCSI only Not Applicable to Fibre Channel) and Interrupt Coalescing.

To select a specific FusionMPT adapter as the current adapter, use the select command. Selecting a port or adapter will bring the port online, and will allow you to show or set certain adapter specific parameters.

You should use caution while issuing the following commands, as certain commands could render the bus unusable (such as forcing 1G operation on a 2G Fibre Channel loop).

#### **select**

Use the select openboot command to select the adapter entry, this will open the port to bring the port online:

```
ok select /pci@8,700000/IntraServer,fc@1
```

#### **.properties**

Use .properties to show the adapter properties

---

**ok .properties**

firmware-version	1.02.00
mpt-version	1.00
scsi-initiator-id	00 00 00 0f
assigned-addresses	81001010 00000000 00000700 00000000 00000100 83001014 00000000 001a0000 00000000 00020000 8300101c 00000000 00190000 00000000 00010000 82001030 00000000 02000000 00000000 00100000
compatible	70 63 69 31 33 65 39 2c 36 32 31 00 70 63 69 31
model	LSI,909
reg	00001000 00000000 00000000 00000000 00000000 01001010 00000000 00000000 00000000 00000100 03001014 00000000 00000000 00000000 00020000 0300101c 00000000 00000000 00000000 00010000 02001030 00000000 00000000 00000000 00100000
version	1.00.16
device_type	scsi-2
name	IntraServer,fc
fcode-rom-offset	00000000
66mhz-capable	
devsel-speed	00000001
class-code	00010000
interrupts	00000001
latency-timer	00000040
cache-line-size	00000010
max-latency	00000008
min-grant	0000001e
subsystem-id	00000621
subsystem-vendor-id	000013e9
revision-id	00000001
device-id	00000621
vendor-id	00001000

---

## ***show-children***

While you have the adapter or port selected, to display the devices currently connected to this adapter, use the show-children command:

Select the port or adapter shown (use the port name your system assigns):

```
ok select /pci@8,700000/IntraServer,fc@1

ok show-children

MPT Version 1.00, Firmware Version 1.02.00

Link is ready, port is online
WWN 100000a0b8040353 Port ID ef

Target 0
Unit 0 Disk SEAGATE ST39173FC 6615
WWN 2100002037109d76 Port ID d9
Target 1
Unit 0 Disk SEAGATE ST39173FC 6615
WWN 210000203710565a Port ID 17
Target 2
Unit 0 Disk SEAGATE ST39173FC 6615
WWN 2100002037105212 Port ID 1
Target 3
Unit 0 Disk SEAGATE ST39173FC 6615
WWN 2100002037103da8 Port ID 26
Target 4
Unit 0 Disk SEAGATE ST39173FC 6615
WWN 210000203710324a Port ID 73
```

---

## Interrupt Coalescing

Interrupt coalescing allows the firmware on the FusionMPT device to group I/Os together for the purpose of minimizing the overhead to the host system. This feature can result in significant performance benefits when I/Os are coming into the adapter in a rapid manner, such as is the case while performing small sequential reads from a disk.

LSI has performed significant testing under multiple I/O conditions, and has determined that the interrupt coalescence values that are beneficial over a wide range of I/O conditions are a depth of 4, with a timeout of 160 microseconds. What this means is that the host will be interrupted only once for 4 I/Os processed by the chip unless a time of 160 microseconds has passed since the host was last interrupted.

Although we have determined that these settings are optimal for a wide variety of situations, your own I/O load may benefit from a deeper queue, or a longer timeout. LSI provides a mechanism to modify these values and write them to the non-volatile eeprom on the adapter.

Select the port or adapter shown (use the port name your system assigns):

```
ok select /pci@8,700000/IntraServer,fc@1
```

### **ok show-interrupt-coalescing**

Interrupt coalescing timeout is a0 (160 decimal) microseconds

Interrupt coalescing depth is 4 (4 decimal)

**ok set-interrupt-coalescing** <- command with no arguments prints help  
usage is <timeout> <depth> set-interrupt-coalescing

### **ok 100 8 set-interrupt-coalescing**

Interrupt coalescing timeout selected is 100 (256 decimal) microseconds

Interrupt coalescing depth selected is 8 (8 decimal)

Interrupt coalescing has been set

Change will take effect after system reset

**Note:** *The system must be power cycled for the changes to in effect. It is not sufficient to execute the reset-all command*

---

## Setting Fibre Channel Link Speed

There are two modes of operation for Fibre Channel, 1Gb/sec and 2Gb/sec. It is important to match the speed of the port with the speed of the loop or fabric the port is attached to.

LSI has implemented auto-negotiation on the 2Gb capable FusionMPT™ devices. If you are experiencing difficulty with the auto negotiate algorithm on your fabric or loop, or you wish to manually set or show the link speed for the adapter, use the following procedure:

Select the port or adapter shown (use the port name your system assigns):

```
ok select /pci@8,700000/IntraServer,fc@1
```

```
ok show-link-speed
```

```
Link speed selected is 1 Gbaud
```

```
Current link speed is 1 Gbaud
```

```
ok set-link-speed    <- command with no arguments prints help  
usage is <link-speed> set-link-speed
```

```
link-speed = 1    1 Gbaud
```

```
link-speed = 2    2 Gbaud
```

```
link-speed = a    autobaud
```

```
ok a set-link-speed
```

```
Link speed selected is autobaud
```

```
Link speed has been set
```

```
Change will take effect after system power cycle
```

```
ok show-link-speed
```

```
Link speed selected is autobaud
```

```
Current link speed is 1 Gbaud
```

**Note:** *The system must be power cycled for the changes to in effect. It is not sufficient to execute the reset-all command*

---

## Persistent Device Naming

Under certain configurations, such as when the Fibre Channel disk is the boot device of a system, it may be preferable to lock a target disk to a unit number. LSI/IntraServer fcode allows the system administrator to write a non-volatile map of IDs to the Fibre Channel controller.

The following is an example of how to map devices in the persistent device table. Select the controller you want to modify, as follows:

```
ok show-disks

a) /pci@1f,0/pci@1/IntraServer,fc@2/disk
b) /pci@1f,0/pci@1/IntraServer,Ultra2-scsi@1/disk
c) /pci@1f,0/pci@1,1/ide@3/cdrom
d) /pci@1f,0/pci@1,1/ide@3/disk
e) /pci@1f,0/pci@1,1/ebus@1/fdthree@14,3203f0
q) NO SELECTION

Enter Selection, q to quit: a
/pci@1f,0/pci@1/IntraServer,fc@2/disk has been selected.

Type ^Y ( Control-Y ) to insert it in the command line.
e.g. ok nvalias mydev ^Y for creating devalias mydev for
/pci@1f,0/pci@1/IntraServer,fc@2/disk

ok select /pci@1f,0/pci@1/IntraServer,fc@2
ok show-children

MPT Firmware Version 1.00

Target 0
Unit 0 Disk SEAGATE ST39173FC 6615
WWN 200000203710c4e8 PortID a3

ok set-persistent <- command with no arguments prints help
usage is <current-target-id> <persistent-target-id> set-persistent

ok 0 0 set-persistent

ok show-persistent
Entry 1 WWN 200000203710c4e8 Target 0
```

To clear an entry in the persistent device map, use the clear-persistent command:

```
ok 1 clear-persistent
Entry 1 has been cleared

ok show-persistent

ok
```

Entry 1 has been deleted from the table, and the table is now empty.

---

## Manual Selection of Fibre Channel Topology

Under certain configurations, it may be desired to force the selection of Fibre Channel topology, and disable the auto detect mechanism in the Fibre Channel adapter. This can be done on a port by port basis, by using the following procedure. Note that it should not be necessary to change from auto detect of topology, and that firmware version 1.00.03 is the minimum revision to support this functionality.

The following is an example of how select a manual topology N\_Port or NL\_Port on a selected Fibre Channel port.

Select the controller you want to modify, as follows:

### **ok show-disks**

- a) /pci@1f,0/pci@1/IntraServer,fc@2/disk
- b) /pci@1f,0/pci@1/IntraServer,Ultra2-scsi@1/disk
- c) /pci@1f,0/pci@1,1/ide@3/cdrom
- d) /pci@1f,0/pci@1,1/ide@3/disk
- e) /pci@1f,0/pci@1,1/ebus@1/fdthree@14,3203f0
- q) NO SELECTION

Enter Selection, q to quit: a

/pci@1f,0/pci@1/IntraServer,fc@2/disk has been selected.

Type ^Y ( Control-Y ) to insert it in the command line.

e.g. ok nvalias mydev ^Y for creating devalias mydev for

/pci@1f,0/pci@1/IntraServer,fc@2/disk

### **ok select /pci@1f,0/pci@1/IntraServer,fc@2**

### **ok show-topology**

Topology selected is auto

Current topology is unknown (no link)

### **ok set-topology <-Command with no options provides help**

usage is <topology> set-topology

topology = 1 NL\_Port

topology = 2 N\_Port

topology = a auto

### **ok 1 set-topology**

Topology selected is NL\_Port

Topology has been set

Change will take effect after system power cycle

### **ok 2 set-topology**

---

Topology selected is N\_Port  
Topology has been set

Change will take effect after system power cycle

**ok a set-topology**

Topology selected is auto  
Topology has been set

Change will take effect after system power cycle

***Note: The system must be power cycled for the changes to in effect. It is not sufficient to execute the reset-all command***



---

## FusionMPT™ Special Features

### *FCode interface to FusionMPT™ Advanced Features*

LSI's FusionMPT™ Architecture defines several special features, that can be implemented in the controller chip. These features include Integrated Mirroring (IM), Integrated Striping (IS), and Integrated RAID (IR). If your LSI Host Bus Adapter implements one of the special features, use the information below to access the advanced functionality.

Note that not all advanced features are implemented on every host bus adapter, and therefore it is necessary to check with LSI to determine which Host Bus Adapters implement which of the advanced features.

### **Integrated Mirroring**

Disk mirroring, also known as RAID 1, is a storage configuration in which two physical disks are paired, or “mirrored”, with each other into a set such that writes to either physical disk are duplicated to the other disk. The principle advantage to disk mirroring is ability of the disk set to survive the failure of a physical disk drive. In the case a mirrored disk fails, the FusionMPT™ system will instantly switch to the other disk without any loss of data or service.

In order to configure and use the Integrated Mirroring feature, it is necessary to become familiar with the terminology used for a mirrored disk sets.

	<b>Meaning</b>	<b>Related FCode Commands</b>	<b>Notes</b>
<b>Physical Disk</b>	A physical disk drive.	<b>show-disks</b> <b>show-children</b>	OpenBoot will present volumes as disks at the show-disks command. Use the <b>select</b> command first, to make the desired device active before using the <b>show-children</b> command
<b>Volume</b>	Two physical disks presented to the system as a single virtual disk	<b>show-volumes</b>	Use the <b>select</b> command first, to make the desired device active
<b>Member</b>	One of the physical disks currently in a mirrored volume	<b>show-volumes</b> <b>show-children</b>	Use the <b>select</b> command first, to make the desired device active
<b>Optimal</b>	The mirrored volume		This is the normal run-time

---

	is fully functional, the primary and secondary are synchronized	state of a mirrored volume
<b>Degraded</b>	One of the members of the set is unavailable	Service must be performed on the set in order to bring the mirrored volume back to Optimal state
<b>Re-Synchronizing</b>	The data from the primary member is being copied to the secondary member	This state is non-optimal, but is normal. Then the data copy is complete, the set will transition to the optimal state without manual intervention.
<b>Failed</b>	The volume set is no longer available to the system	Service must be performed on the set to return it to operation

---

## Setting up a SCSI or Fibre Channel Mirrored Volume

After determining that the adapter is correctly functioning in your system, but reading the appropriate section of this guide, you are ready to create a mirrored set. Start by using the select OpenBoot command to make the adapter controlling the two physical disks current. Note that a SCSI device is used in the following examples, and the Fibre Channel syntax and commands are identical.

### ***show-disks***

Use the **show-disks** openboot command to determine the name of the adapter with the disks you intend to include in a mirrored volume:

```
ok show-disks
a) /pci@1f,0/pci@1/pci@1/IntraServer,fc@f,1/disk
b) /pci@1f,0/pci@1/pci@1/IntraServer,fc@f/disk
c) /pci@1f,0/pci@1/pci@1/LSILogic,scsi@b/disk
d) /pci@1f,0/pci@1,1/scsi@2/disk
e) /pci@1f,0/pci@1,1/ebus@1/fdthree@14,3203f0
q) NO SELECTION
Enter Selection, q to quit: c
/pci@1f,0/pci@1/pci@1/LSILogic,scsi@b/disk has been selected.
Type ^Y ( Control-Y ) to insert it in the command line.
e.g. ok nvalias mydev ^Y
      for creating devalias mydev for
/pci@1f,0/pci@1/pci@1/LSILogic,scsi@b/disk
```

---

### ***select***

Use the select openboot command to select the adapter entry, this will open the adapter,

```
ok select /pci@1f,0/pci@1/pci@1/LSILogic,scsi@b
```

and bring the port online:

### ***.properties***

Use .properties to show the adapter properties. In order to use Integrated Mirroring, you must be using FCode version at least V1.00.23, V1.00.24 is recommend.

```
ok .properties

firmware-version    0.00.09.00
mpt-version         1.02
assigned-addresses  81035810 00000000 00001100 00000000 00000100
                   83035814 00000000 00110000 00000000 00010000
                   8303581c 00000000 00120000 00000000 00010000
                   82035830 00000000 00200000 00000000 00100000
compatible          pci13e9,30
                   pci1000,30
model               LSI,1030
reg                 00035800 00000000 00000000 00000000 00000000
                   01035810 00000000 00000000 00000000 00000100
                   03035814 00000000 00000000 00000000 00010000
                   0303581c 00000000 00000000 00000000 00010000
                   02035830 00000000 00000000 00000000 00100000
version             1.00.24      ← FCode Version
device_type         scsi-2
name                LSILogic,scsi
fcode-rom-offset    0000f800
66mhz-capable
devsel-speed        00000001
class-code          00010000
interrupts          00000001
max-latency         00000006
min-grant           00000010
subsystem-id        00001000
subsystem-vendor-id 00001000
revision-id         00000001
device-id           00000030
vendor-id           00001000
```

---

## ***show-children***

While you have the adapter or port selected, to display the devices currently connected to this adapter, use the `show-children` command. Note that IM Volumes are considered children of the adapter port, and therefore this command is used to show physical disks or volume sets:

```
ok show-children
```

```
MPT Version 1.02, Firmware Version 0.00.09.00
```

```
Initiator ID is 7
```

```
Target 1
```

```
Unit 0 Disk SEAGATE ST336737LC 5040 71132960 Blocks, 36 GB
```

```
Target 2
```

```
Unit 0 Disk SEAGATE ST336737LC 5040 71132960 Blocks, 36 GB
```

## ***show-volumes***

The **`show-volumes`** OpenBoot command is used to display the currently configured volumes. If no volumes have been configured, you will get an indication that there are no volumes.

```
ok show-volumes
```

```
No volumes to show
```

---

## **create-volume**

The **create-volume** OpenBoot is used to create an IM volume from two physical disks. After the command completes, the new IM Volume will be displayed by the show-children command. In order to see the members of a set, use the **show-volumes** command.

```
ok 0 1 2 create-volume
Target 1 size is 71132960 Blocks, 36 GB
Target 2 size is 71132960 Blocks, 36 GB
The volume can be any size from 1 MB to 36420 MB
What size do you want? [36420]
Volume 0 size will be 71132960 Blocks, 36 GB
PhysDisk 0 has been created for target 1
PhysDisk 1 has been created for target 2
Volume 0 has been created
```

The syntax for the **create-volume** command is as follows:

```
[volume ID] [first member] [second member] create-volume
```

Note that the IDs of the first and second member will no longer be presented to the system. Note also that you must give a volume ID that will not conflict with an ID that will remain on the bus once the volume is created.

```
ok show-volumes

Volume 0 Enabled Resync In Progress Degraded Mode 71132960 Blocks, 36 GB
Disk 0 Primary
  Channel 0 Target 1 SEAGATE ST336737LC 5040
Disk 1 Secondary Out Of Sync
  Channel 0 Target 2 SEAGATE ST336737LC 5040
```

---

Subsequent show-children commands will show only the resultant volume, and the remaining non-member disks, if any.

```
ok show-children
```

```
MPT Version 1.02, Firmware Version 0.00.09.00
```

```
Initiator ID is 7
```

```
Volume 0
```

```
Unit 0 Disk LSILOGIC1030 IM 1000 71132960 Blocks, 36 GB
```

At this point the IM set is created, and is in the re-synchronizing state. The volume is usable at this point, but until it reaches the optimal state, it will perform at lower performance and does not have the benefit of redundancy.

It is not required to wait for the disk to reach the optimal state at this point, and in fact the optimal state will be reached more quickly under the operating system driver, once Solaris is booted, because the runtime driver uses the performance features of the FusionMPT architecture.

Check the file /var/adm/messages for messages regarding state changes for the volume set as it progresses from the re-synchronizing state to the optimal state.

### **Integrated Striping**

Disk striping, also known as RAID 0, pairs two drives together into a volume set, but unlike mirroring, which is done for the reliability of being able to survive the failure of a physical disk, is done for performance reasons.

For a striped disk set, reads and writes are issued to the two physical members as a joined volume. This method has the advantage of doubling the data rate for reads from the physical platters, in the case where the physical limitations of a single disk is the limiting performance factor.

Integrated Striping will be available on LSI's 1030 based Ultra320 SCSI controllers in the future, and will be documented here when available.

### **Integrated RAID**

Integrated Redundant Array of Independent Disk (RAID) technology will be available in future versions of LSI's FusionMPT devices, starting with the 1035 device. When this functionality is available, it will be documented here.