
README.PDF

This file presents general information about the LSI Fusion-MPT (TM) (Message Passing Technology) device drivers for Linux(TM). It also describes the features and use of the device drivers for the Linux operating system environment.

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1. Introduction

The mpt2sas drivers are free software and are supported in source form. These drivers are distributed in the hope that they will be useful, but without any warranty and without even the implied warranty of merchantability or fitness for a particular purpose. You can redistribute them and/or modify them under the terms of version 2 or later of the GNU Public License as

published by the Free Software Foundation. You should have received a copy of this license with your Linux kernel source tree (/usr/src/linux/COPYING). For detailed information on the GNU Public License, contact the Free Software Foundation, Inc at 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 or at URL <http://www.gnu.org/copyleft/gpl.html>.

1.1 Features

- o SAS/SATA flexibility, supporting 1.5 Gb/s, 3.0 Gb/s, 6.0 Gb/s and 12 Gb/s devices
- o PCI Express host interfaces
- o Supporting MSI-X Interrupt Routing
- o Fusion-MPT Architecture and common software interface
- o Embedded CPU in ASIC performs RAID operations
- o Integrated RAID available on certain boards
- o Supported RAID levels are (0, 1, 1E, 10)

1.2 LSI Devices Supported

SAS2004, SAS2008, SAS2108, and SAS2116

2 Fusion-MPT Linux Drivers

The mpt2sas drivers are provided in binary and source form to provide the greatest flexibility to LSI customers. The binaries are suitably formatted for use as installation diskettes or postinstall binary upgrades. The source may be added to an existing kernel for custom kernel builds.

NOTE: THERE ARE TWO DRIVERS!!

- o mpt2sas.ko is for Red Hat (RHEL5/ RHEL6), and SuSE (SLES10/SLES11), OEL (OEL5/OEL6), OVM(OVM3.0.2, OVM3.0.3), Citrix (Citrix5/ Citrix6), Ubuntu (Ubuntu 10.4, Ubuntu 11.10, Ubuntu12.04) Centos (Centos 6.3), Fedora (Fedora17), Debian (Debian 6.0.5)
- o mpt2sasbtm.ko is for Red Hat (RHEL4), and SuSE (SLES9)

The following sections refer to the mpt2sas.ko driver only.

2.1 Installing to a Fusion-MPT Controller

LSI provides images that are suitably formatted to use as driver update disks for those installations where there is no bundled driver or when it's necessary to complete the install with the latest driver :

- Citrix : Citrix5, Citrix6 (i386)
- OEL : OEL5, OEL6 (i686, x86_64)
- OVM : OVM3 .0 (x86_64)
- Red Hat : RHEL5/ RHEL6 (i686, x86_64, ppc)
- SuSE : SLES10, SLES11 (i586, x86_64, ppc)
- Centos : Centos6.3(i686, x86_64)

Here are some examples creating a driver update disk. In this example the driver version is (13.255.04.00-1). Here is the procedure:

Extract the packaging from Linux system:

```
# tar -zxvf mpt2sas-release.tar.gz
```

i) For Citrix5 Update5, architecture = i386

```
# cd citrix5/disks-1
```

```
# dd if= mpt2sas-13.255.04.00-2.6.18-128.1.6.el5.xs5.5.0.505.1024-CitrixXen5.5.iso  
of=/dev/fd0
```

ii) For Citrix5 Update6, architecture = i386

```
# cd citrix5/disks-1
```

```
# dd if= mpt2sas-13.255.04.00-2.6.27.42-0.1.1.xs5.6.0.44.111158.iso of=/dev/fd0
```

iii) For Citrix6.0 , architecture = x86_64

```
# cd citrix6/disks-1
```

```
# dd if= mpt2sas-13.255.04.00_CitrixXen6.0-1.iso of=/dev/fd0
```

iv) For OEL5 Update 7, architecture = x86_64

```
# cd oel5/disks-1
```

```
# gunzip mpt2sas-13.255.04.00-1-oel5.7.x86_64.iso.gz
```

```
# dd if= mpt2sas-13.255.04.00-1-oel5.7.x86_64.iso of=/dev/fd0
```

v) For OEL6 Update2, architecture = x86_64

```
# cd oel6/disks-1
```

```
# gunzip mpt2sas-13.255.04.00_oel6.2-1.x86_64.iso.gz
```

```
# dd if= mpt2sas-13.255.04.00_oel6.2-1.x86_64.iso of=/dev/fd0
```

vi) For OVM3.0 Update 3, architecture = x86_64

```
# cd ovm/disks-1
```

```
# gunzip mpt2sas-13.255.04.00-1-ovm3.0.3.x86_64.iso.gz
```

```
# dd if= mpt2sas-13.255.04.00-1-ovm3.0.3.x86_64.iso of=/dev/fd0
```

vii) For RHEL5 Update 3, architecture = x86_64

```
# cd rhel5/disks-1
```

```
# gunzip mpt2sas-13.255.04.00-1-rhel5.3.x86_64.iso.gz
```

```
# dd if=mpt2sas-13.255.04.00-1-rhel5.3.x86_64.iso of=/dev/fd0
```

viii) For RHEL6 Update2, architecture = x86_64

```
# cd rhel6/disks-1
```

```
# gunzip mpt2sas-13.255.04.00_rhel6.2-1.x86_64.iso.gz
```

```
# dd if=mpt2sas-13.255.04.00-1-rhel5.3.x86_64.iso of=/dev/fd0
```

```
ix) For SLES10 Service Pack 4, architecture = x86_64

# cd sles10/disks-1

# gunzip mpt2sas-13.255.04.00-1-sles10sp4.x86_64.iso.gz

# dd if=mpt2sas-13.255.04.00-1-sles10sp4.x86_64.iso of=/dev/fd0
```

```
x) For SLES11, architecture = x86_64

# cd sles11/disks-1

# gunzip mpt2sas-13.255.04.00-1-sles11sp2.x86_64.iso.gz

# dd if=mpt2sas-13.255.04.00-1-sles11sp2.x86_64.iso of=/dev/fd0
```

```
xi) For Centos6 Update3, architecture = x86_64

# cd centos6/disks-1

# gunzip mpt2sas-13.255.01.00_centos6.3-01.x86_64.iso.gz

# dd if= mpt2sas-13.255.01.00_centos6.3-01.x86_64.iso of=/dev/fd0
```

The driver disk image can be transferred to floppy disk / USB disk with the rawrite tool from dos, or the ddutility in Linux. Here is the URL for rawrite:

<http://www.tux.org/pub/dos/rawrite>.

2.2 Adding Pre-Compiled Binaries to an Existing Installation

RPMs should be used to upgrade the driver post-install. The RPMs contain binaries for the install kernel and the released updates from Red Hat or OEL or OVM or Citrix or service packs from SuSE at the time the RPM was created. The packaging provides three forms of RPMs; they are called SuSE KMP, DKMS(Dynamic Kernel Module Support), and Generic. Source RPMs are provided for the SuSE KMP and Generic RPMs. This allows one to generate binary RPM

themselves for errata kernels that are released in between the normal release cycle. See the release notes file for a listing of the kernels supported by the RPM. The driver update disks should be used for architectures not supported by RPM.

The rpms are supported for

- Citrix : Citrix5, Citrix6 (i386)
- OEL : OEL5, OEL6 (i686, x86_64)
- OVM : OVM3 .0 (x86_64)
- Red Hat : RHEL5/ RHEL6 (i686, x86_64, ppc)
- SuSE : SLES10, SLES11 (i586, x86_64, ppc)
- Ubuntu : Ubuntu10.4, Ubuntu11.10, Ubuntu12.04(i386, amd64)
- Centos : Centos6.3(i686, x86_64)
- Debian : Debian6.0.5(i386, amd64)
- Fedora : Fedora 17(i686, x86_64)

Generic RPMs

Here is an example installing the generic RPMs: In this example the driver version is (13.255.04.00-1).

Here is the procedure:

Extract the packaging from Linux system:

```
# tar -zxvf mpt2sas-release.tar.gz
```

i) For Citrix 5 (Update 5), architecture = i386

```
# cd citrix5/rpms-1
```

```
# rpm -ivh mpt2sas-modules-kdump-2.6.18-128.1.6.el5.xs5.5.0.505.1024-13.255.04.00-1.i386.rpm
```

ii) For Citrix 5 (Update 6), architecture = i386

```
# cd citrix5/rpms-1
```

```
# rpm -ivh mpt2sas-modules-kdump-2.6.27.42-0.1.1.xs5.6.0.44.111158-13.255.04.00-1.i386.rpm
```

iii) For Citrix 6, architecture = i386

```
# cd citrix6/rpms-1
```

```
# rpm -ivh mpt2sas-debuginfo-13.255.04.00-1.i386.rpm
```

iv) For OEL5 (Update 7), architecture = x86_64

```
# cd oel5/rpms-1
```

```
# rpm -ivh kmod-mpt2sas-13.255.04.00-1-oel5.7.x86_64.rpm
```

v) For OEL5 (Update 7) UEK, architecture = x86_64

```
# cd oel5/rpms-1
```

```
# rpm -ivh kmod-mpt2sas-13.255.04.00-1-oel5.7_UEK.x86_64.rpm
```

vi) For OEL6 (Update 2), architecture = x86_64

```
# cd oel6/rpms-1
```

```
# rpm -ivh kmod-mpt2sas-13.255.04.00_oel6.2-1.x86_64.rpm
```

vii) For OEL6 (Update 2), UEK architecture = x86_64

```
# cd oel6/rpms-1
```

```
# rpm -ivh kmod-mpt2sas-13.255.04.00_oel6.2_UEK-1.x86_64.rpm
```

viii) For RHEL5 (Update 8), architecture = x86_64

```
# cd rhel5/rpms-1
```

```
# rpm -ivh kmod-mpt2sas-13.255.04.00-1-rhel5.8.x86_64.rpm
```

ix) For RHEL6 (Update 2), architecture = x86_64

```
# cd rhel5/rpms-1
```

```
# rpm -ivh kmod-mpt2sas-13.255.04.00_rhel6.2-1.x86_64.rpm
```

x) For SLES10 (Service Pack 4) architecture = x86_64 flavor = debug

```
# cd sles10/rpms-1
```

```
# rpm -ivh lsi-mpt2sas-kmp-debug-13.255.04.00_sles10sp4-1.x86_64.rpm
```

xi) For SLES11 (Service Pack 2), architecture = x86_64 flavor = default

```
# cd sles11/rpms-1
```

```
# rpm -ivh lsi-mpt2sas-kmp-default-13.255.04.00_sles11sp2-1.x86_64.rpm
```

xii) For Ubuntu10 (Update 10.4), architecture = amd64

```
# cd ubuntu/rpms-1
```

```
# dpkg -i mpt2sas-13.255.04.00-1_Ubuntu10.04.amd64.deb
```

xiii) For Ubuntu11 (Update 11.10), architecture = amd64

```
# cd ubuntu/rpms-1
```

```
# dpkg -i mpt2sas-13.255.04.00-1_Ubuntu11.10.amd64.deb
```

xiv) For Ubuntu12 (Update 12.04), architecture = amd64

```
# cd ubuntu/rpms-1
```

```
# dpkg -i mpt2sas-13.255.04.00-1_Ubuntu12.04.amd64.deb
```

xv) For Centos6 (Update 3), architecture = x86_64

```
# cd centos6\rpms-01
```

```
# rpm -ivh kmod-mpt2sas-13.255.01.00_centos6.3-01.x86_64.rpm
```

xvi) For Debian (Update 6.0.5), architecture = amd64

```
# cd debian\rpms-01
```

```
# dpkg -i mpt2sas-13.255.01.00-01_Debian6.0.5.amd64.deb
```

xvii) For Fedora (Update 17), architecture = x86_64

```
# cd fedora17\rpms-01
```

```
# rpm -ivh kmod-mpt2sas-14.255.01.00-01-fc17.x86_64.rpm
```

you will need to reboot for the driver to be loaded with newer version

```
# reboot
```

DKMS RPM

Here is an example installing the DKMS RPMs: In this example the driver version is (13.255.04.00-1). Here is the procedure:

Extract the packaging from Linux system:

```
# tar -zxvf mpt2sas-release.tar.gz
```

```
# cd dkms-1
```

```
# tar -zxvf mpt2sas-13.255.04.00-1.dkms.tar.gz
```

install DKMS framework

```
# rpm -ivh dkms-2.0.21.1-1.noarch.rpm
```

install DKMS rpm

```
# rpm -ivh mpt2sas-13.255.04.00-1dkms.noarch.rpm
```

you will need to reboot for the driver to be loaded with newer version

```
# reboot
```

NOTE: The DKMS packaging is providing only for RHEL5(x86 and x86_64), and SLES10(x86_64), and SLES11(x86_64) pre-compiled binaries.

Uninstalling RPM

Here is an example of un-installing the RPM:

```
# rpm -qa | grep mpt2sas
```

look for the string having mpt2sas, and copy

```
# rpm -e mpt2sas-13.255.04.00-1-rhel5
```

```
# reboot
```

Source RPM

Here is an example building the Generic Binary RPM from the source RPM. In this example the driver version is (13.255.04.00-1).

Here is the procedure:

Extract the packaging from Linux system:

```
# tar -zxvf mpt2sas-release.tar.gz
```

i) For OEL5, any update

```
# cd oel5/rpm-1
```

```
# rpm -ivh mpt2sas-kmod-13.255.04.00-1.src.rpm
```

build the binary

```
# cd /usr/src/redhat/SPECS
```

```
# rpmbuild -bb mpt2sas.spec
```

ii) For OEL6, Update 2

```
# cd oel6/rpm-1
```

```
# rpm -ivh mpt2sas-13.255.04.00_oel6.2-1.src.rpm
```

build the binary

```
#cd /root/rpmbuild /SPECS/
```

```
# rpmbuild -bb mpt2sas.spec
```

iii) For OEL6, Update 2, UEK

```
# cd oel6/rpm-1
```

```
# rpm -ivh mpt2sas-13.255.04.00_oel6.2_UEK-1.src.rpm
```

build the binary

```
#cd /root/rpmbuild /SPECS/
```

```
# rpmbuild -bb mpt2sas.spec
```

iv) For OVM 3, any update 2

```
# cd ovm3/rpm-1
```

```
# rpm -ivh mpt2sas-kmod-13.255.04.00-1.src.rpm
```

build the binary

```
#cd /usr/src/redhat/SPECS
```

```
# rpmbuild -bb mpt2sas.spec
```

v) For RHEL5, any update

```
# cd rhel5/rpm-1
```

```
# rpm -ivh mpt2sas-kmod-13.255.04.00-1.src.rpm
```

build the binary

```
# cd /usr/src/redhat/SPECS
```

```
# rpmbuild -bb mpt2sas.spec
```

vi) For RHEL6, Update2

```
# cd rhel6/rpm-1
```

```
# rpm -ivh mpt2sas-13.255.04.00_rhel6.2-1.src.rpm
```

build the binary

```
# cd /root/rpmbuild /SPECS/
```

```
# rpmbuild -bb mpt2sas.spec
```

vii) for SLES10 any update

```
cd sles10/rpm-1
```

```
rpm -ivh lsi-mpt2sas-13.255.04.00-1.src.rpm
```

```
# cd /usr/src/packages/SPECS
```

build the binary

```
# rpmbuild -bb mpt2sas.spec
```

viii) For SLES11

```
cd sles11/rpm-1
```

```
rpm -ivh lsi-mpt2sas-13.255.04.00-1.src.rpm
```

```
# cd /usr/src/packages/SPECS
```

build the binary

```
# rpmbuild -bb mpt2sas.spec
```

binary rpm located in this folder:

```
# cd ../RPMS/`uname -m`
```

LSI recommends that you save the original source:

```
# tar zcvf mpt2sas.orig.tar.gz /usr/src/linux/drivers/scsi/mpt2sas
```

Continue with the instructions in "Adding or Updating the Fusion-MPT Source to the Linux Kernel"

2.3 Adding or Updating the Fusion-MPT Source to the Linux Kernel

In the generic RPMs, the driver source will be placed in your installations RPM SOURCES

directory; for SuSE (/usr/src/packages/SOURCES), and for RHEL5 / OEL5 / OVM3 (/usr/src/redhat/SOURCES), for RHEL 6 (/root/rpmbuild /SOURCES) . It's also in the top folder of the packaging. In this example the driver version is (13.255.04.00-1). Here is the procedure:

Extract the packaging from Linux system:

```
# tar -zxvf mpt2sas-release.tar.gz
```

```
# tar -zxvf mpt2sas-13.255.04.00-src.tar.gz
```

copy driver source code to kernel tree

```
# mkdir -p /usr/src/linux/drivers/scsi/mpt2sas
```

```
# cp -fRv drivers/scsi/mpt2sas/* /usr/src/linux/drivers/scsi/mpt2sas
```

2.3.1 Driver Build Instructions

The following examples show how to configure and build the LSI Fusion-MPT driver(s) as kernel modules. In this example the driver version is (13.255.04.00-1). Here is the procedure to build the drivers out of kernel tree:

Extract the packaging from Linux system:

```
# tar -zxvf mpt2sas-release.tar.gz
```

```
# tar -zxvf mpt2sas-13.255.04.00-src.tar.gz
```

```
# cd mpt2sas
```

```
# ./compile.sh
```

```
# ./load.sh
```

Alternatively, here is the procedure to build driver in kernel tree

1. From the /usr/src/linux directory, ensure a clean kernel source tree by executing the following command:

```
# make mrproper
```

2. From the /usr/src/linux directory, run the normal kernel configuration routine:

```
# make oldconfig
```

make config

make menuconfig

make xconfig

3. Here are the directions for finding the entry in menuconfig ncurses display

Device Drivers --->

SCSI device support --->

SCSI low-level drivers --->

<M> LSI MPT Fusion SAS 2.0 Device Driver

(128) LSI MPT Fusion Max number of SG Entries (16 - 128) (NEW)

[*] LSI MPT Fusion logging facility

On the sub menu, select the "LSI MPT Fusion SAS 2.0 Device Driver" line,
and then enter "m" to configure for building this support as a module.

(Alternatively, you can enter "y" to have this support built
into the kernel.)

NOTES:

o CONFIG_SCSI_MPT2SAS_MAX_SGE: This option allows you to specify the maximum number of scatter-gather entries per I/O. The driver default is 128, which matches MAX_HW_SEGMENTS. However , it may decreased down to 16. Decreasing this parameter will reduce memory requirements on a per controller instance.

o CONFIG_SCSI_MPT2SAS_LOGGING: This turns on a logging facility.

4. Save the kernel configuration changes. Follow any post configuration instructions, and do everything needed on your platform to rebuild the kernel. This typically includes:

make dep

and:

make bzImage # varies on non-Intel platforms

5. Rebuild the kernel modules:

make modules

6. Optionally, (and potentially dangerous!), do everything needed on your platform to install a newly built kernel. (possibly temporarily, for sanity testing)

Be careful with this step, and be sure you know what you're doing!

It is easy to wipe out a good/stable kernel from this point forward in the procedure!

7. (Re)Install newly compiled kernel modules:

make modules_install

The output from the last step should look something like this:

Installing modules under /lib/modules/2.6.30/block

Installing modules under /lib/modules/2.6.30/net

Installing modules under /lib/modules/2.6.30/ipv4

Installing modules under /lib/modules/2.6.30/scsi

Installing modules under /lib/modules/2.6.30/fs

Installing modules under /lib/modules/2.6.30/fs

Installing modules under /lib/modules/2.6.30/cdrom

Installing modules under /lib/modules/2.6.30/video

Installing modules under /lib/modules/2.6.30/net

Installing modules under /lib/modules/2.6.30/misc

8. Update your /boot sector with the new System .map and bzImage, re-create your ramdisk image (refer to your vendor literature), and update your boot manager--i.e., lilo.conf, grub.conf. If you are using lilo, you must run lilo -v prior to reboot.

9. Shut down the system :

Example:

```
# shutdown -r now
```

and then reboot with the newly built Linux kernel.

2.4 Loading the Drivers As Modules

Follow the following step to load the driver binary:

Example: load the Fusion-MPT mpt2sas driver.

```
# insmod mpt2sas.ko
```

mpt2sas version 13.255.04.01 loaded

scsi4 : Fusion MPT SAS Host

ACPI: PCI Interrupt 0000:0b:00.0[A] -> GSI 16 (level, low) -> IRQ 177

PCI: Setting latency timer of device 0000:0b:00.0 to 64

mpt2sas0: 64 BIT PCI B US DMA ADDRESSING SUPPORTED, total mem (6092056 kB)

mpt2sas0: PCI-MSI-X enabled: IRQ 122

mpt2sas0: iomem(0xfc47c000), mapped(0xffffc20000058000), size(16384)

mpt2sas0: ioport(0xdc00), size(256)

mpt2sas0: Allocated physical memory: size(1028 kB)

mpt2sas0: Current Controller Queue Depth(435), Max Controller Queue Depth(942)

mpt2sas0: Scatter Gather Elements per IO(128)

mpt2sas0: LSISAS 2108: FWVersion(02.250.00.00), ChipRevision(0x03),

BiosVersion(00.00.00.00)

mpt2sas0: Protocol=(Initiator,Target), Capabilities=(TLR,EEDP,Snapshot Buffer, Diag Trace
Buffer, Task Set Full,NCQ)

mpt2sas0: sending port enable !!

mpt2sas0: port enable: SUCCESS

mpt2sas0: host_add: handle(0x0001), sas_addr(0x500605b0006b9310), phys(8)

3 Boot Setup Commands

3.1. Syntax

Setup commands can be passed to the SCSI host driver mpt2sas as a string variable using 'insmod'. The command line options can be found by typing the modinfo command.

Example:

```
# modinfo mpt2sas.ko
```

```
filename: mpt2sas.ko
```

```
version: 13.255.04.00
```

```
license: GPL
```

```
description: LSI MPT Fusion SAS 2.0 Device Driver
```

```
author: LSI Corporation <DL-MPTFusionLinux@lsi.com>
```

```
srcversion: 9D219379A3A703101318619
```

```
alias: pci:v00001000d00000065sv*sd*bc*sc*i*
```

```
alias: pci:v00001000d00000064sv*sd*bc*sc*i*
```

```
alias: pci:v00001000d00000077sv*sd*bc*sc*i*
```

```
alias: pci:v00001000d00000076sv*sd*bc*sc*i*
```

```
alias: pci:v00001000d00000074sv*sd*bc*sc*i*
```

```
alias: pci:v00001000d00000072sv*sd*bc*sc*i*
```

```
alias: pci:v00001000d00000070sv*sd*bc*sc*i*
```

```
depends: scsi_mod,scsi_transport_sas
```

```
vermagic: 2.6.16.60-0.21-debug SMP gcc-4.1
```

```
parm: logging_level: bits for enabling additional logging info (default=0)
```

```
parm: command_retr y_count: Device discovery TUR command retry count:
```

```
(default=144) (int)
```

parm: max_lun: max lun, default=16895 (int)

parm: max_queue_depth: max controller queue depth (int)

parm: max_sgl_entries: max sg entries (int)

parm: msix_disable: disable msix routed interrupts (default=0) (int)

3.2. Available Arguments

1. The following command enables additional info sent to the Linux system log which can be used for troubleshooting problems. The default is to pass the logging level in hex format. Each bit is bitwise setting. Please refer to in mpt2sas_debug.h where the logging levels are defined.

Example: this enables firmware events and reply with additional info

```
#insmod mpt2sas.ko logging_level=0x218
```

Example: this enables handshake and initialization logging

```
#insmod mpt2sas.ko logging_level=0x420
```

Example: this enables application using IOCTLs logging

```
#insmod mpt2sas.ko logging_level=0x8000
```

Example: this enables manufacture configuration logging

```
#insmod mpt2sas.ko logging_level=0x800
```

Example: this enables host reset and task management logging

```
#insmod mpt2sas.ko logging_level=0x2100
```

Example: this enables task set full logging

```
#insmod mpt2sas.ko logging_level=0x80000
```

NOTE: Many of the driver debug prints are using KERN_DEBUG and KERN_INFO logging

level. Red Hat and SuSE tend to set the default logging level set to a higher level, perhaps KERN_WARNING. When set to KERN_WARNING you will be missing most the debug info.

To turn on the additional logs, you will need to see the set klogd to KERN_DEBUG. In both

SuSE and Red Hat offer configuration of klogd from the file /etc/sysconfig/syslog. Please refer to the klogd manual page for more info.

2. The following command allows configuration of the `command_retry_count`. This tunable is for configuring the retry count for discovering devices. This is to handle some devices which report BUSY status for long duration of time.

Example: this sets the retry count to 300

```
#insmod mpt2sas.ko command_retry_count=300
```

3. The following command allows configuration max number of luns. The default is 511 luns. Please note that the scsi-mid layer global parameter is `max_report_luns` default is 511. You will need to modify `max_report_luns` parameter if you plan to use more than 511 luns in mpt2sas.

Example: this sets the max lun to 100

```
#insmod mpt2sas.ko max_lun=100
```

4. The following command allows configuration the controller queue depth. The default is 600. The maximum upper limit is set by controller firmware in facts->RequestCredit.

Example: this sets the max queue depth to 3000

```
#insmod mpt2sas.ko max_queue_depth=3000
```

5. The following command allows configuration the controller maximum scatter gather entries. This is maximum number of scatter-gather entries per I/O. The driver default is 128, which matches `MAX_HW_SEGMENTS`. However , it may be decreased down to 16. Decreasing this parameter will reduce memory requirements on a per controller instance.

Example: this sets the scatter gather limit to 32

```
#insmod mpt2sas.ko max_sgl_entries=32
```

4.Troubleshooting

1. Sense translation is built into the Linux kernel; providing SCSI-3 opcode string lookup and

a LARGE sorted table of 463 unique SCSI-3 Additional Sense Code & Qualifier (ASC/ASCQ)

strings, translated directly from a text file from the SCSI T10.org's ftp site:

<ftp://ftp.t10.org/t10/drafts/spc2/asc-num.txt>

Example enabling sense decoding

```
#sysctl -w dev.scsi.logging_level=0x1000
```

2. Additional debug logging for device discovery can be enabled in the Linux kernel:

Example:

```
#sysctl -w dev.scsi.logging_level=0x1C0
```

3. Several SCSI debug application tools are available; for example lsscsi, sdparm, SMP

tools for expanders, and a variety of sg tools. These can be obtained from this URL:

<http://sg.danny.cz/sg>

Typically these tools are provided by default in SuSE distributions.

For example, to obtain all the SAS address for your attached devices:

```
# lsscsi -t
```

```
[4:0:1:0] disk sas:0x5000c50000be5cf2 /dev/sdi
```

```
[4:0:2:0] disk sas:0x5000c50001263246 /dev/sdj
```

```
[4:0:3:0] disk sas:0x5000c500012632c2 /dev/sdk
```

```
[4:0:4:0] disk sas:0x5000c50005b04c8a /dev/sdl
```

```
[4:0:5:0] disk sas:0x5000c50005b06f0e /dev/sdm
```

```
[4:0:6:0] disk sas:0x5000c50005b04f3a /dev/sdn
```

```
[4:0:7:0] disk sas:0x5000c50005b04d4e /dev/sdo
```

```
[4:0:8:0] enclosu sas:0x500605b0ffff003d -
```

```
[4:0:9:0] disk sas:0x50010b900000337d /dev/sdp
```

```
[4:0:10:0] disk sas:0x50010b9000002579 /dev/sdq
```

```
[4:0:11:0] disk sas:0x50010b900004537f /dev/sdr
```

[4:0:12:0] disk sas:0x50010b9000029d72 /dev/sds

[4:0:13:0] disk sas:0x50010b900000272a /dev/sdt

[4:0:14:0] disk sas:0x50010b910003389e /dev/sdu

[4:0:15:0] disk sas:0x50010b91000338a6 /dev/sdv

[4:0:16:0] disk sas:0x50010b91000338ae /dev/sdw

4. Additional scripts in the sub folder scripts are provided with the driver source code, they can be useful in obtaining detailed info pertaining to your configuration.

Extract the packaging from Linux system:

```
# tar -zxvf mpt2sas-release.tar.gz
```

```
# tar -zxvf mpt2sas-13.255.04.00-src.tar.gz
```

```
# cd mpt2sas/scripts
```

The hba_properties provide configuration info pertaining the host controller; the controller firmware, bios, and driver versions.

Example:

```
# ./hba_properties
```

```
host4: ioc0: fw=02.250.00.00 bios=00.00.00.00 driver=13.255.04.00 mpi=200.0b
```

```
LSISAS2108: board_name=Eval Board assembly= tracer=
```

```
nvdata_persistent=00h nvdata_default=00h
```

```
io_delay=08 device_delay= 144
```

```
logging_level=00000000h
```

```
fw_queue_depth=942
```

```
sas_address=0x500605b0006b9310
```

Additional controller configuration info:

```
# ./shost_attributes
```

```
host4
```

board_assembly:
board_name:Eval Board
board_tracer:
cmd_per_lun:7
device_delay:144
fw_queue_depth:942
host_busy:0
host_sas_address:0x500605b0006b9310
io_delay:08
logging_level:00000000h
proc_name:mpt2sas
scan:cat: scan: Permission denied
sg_tablesize:128
state:running
uevent:cat: uevent: Permission denied
unchecked_isa_dma:0
unique_id:0
version_bios:00.00.00.00
version_fw:02.250.00.00
version_mpi:200.0b
version_nvdata_default:00h
version_nvdata_persistent:00h
version_product:LS ISAS2108
Expander configuration info
./expander_attribute

expander-4:0

component_id:547

component_revision_id:2

component_vendor_id:LSI

level:1

product_id:Bobcat

product_rev:B0

uevent:cat: uevent: Permission denied

vendor_id:LSI CORP

expander-4:1

component_id:547

component_revision_id:4

component_vendor_id:LSI

level:1

product_id:Bobcat

product_rev:0200

uevent:cat: uevent: Permission denied

vendor_id:LSI CORP

expander-4:2

component_id:531

component_revision_id:0

component_vendor_id:LSI

level:1

product_id:DE5300-SAS

product_rev:0216

uevent:cat: uevent: Permission denied

vendor_id:LSI

Device configuration info

./sdev_attributes

4:0:20:0

delete: device_blocked:0

iocounterbits:32

iodone_cnt:0x26

ioerr_cnt:0x0

iorequest_cnt:0x26

model:ST973402SS

queue_depth:254

queue_type:simple

rescan: retries:5

rev:MS00

sas_address:0x5000c5000f21798e

sas_device_handle:0x0020

scsi_level:6

state:running

timeout:60

type:0

uevent: vendor:SEAGATE

4:0:22:0

delete: device_blocked:0

iocounterbits:32

iodone_cnt:0x26

ioerr_cnt:0x0

iorequest_cnt:0x26

model:ST973402SS

queue_depth:254

queue_type:simple

rescan: retries:5

rev:MS00

sas_address:0x5000c5000f21783e

sas_device_handle:0x0022

scsi_level:6

state:running

timeout:60

type:0

uevent: vendor:SEAGATE

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