# 1 Hardware components

- Quantum LTO5 Tape Drive (external)
- "LTO5 External accessory Kit" containing:
  LSI SAS HBA (9212 4i4), SAS cable, LTO tapes

# 2 Installation of LSI SAS HBA

Power down the system, unplug all power cables and install the SAS HBA into a free PCIe slot.

# 3 Update the SAS HBA firmware

Quantum tape drives require a special firmware ('-IT': Initiator/Target enabled) for the SAS HBA. (See also the "HBA Firmware change Guide" from Quantum.)

In the boot screen of the the LSI SAS HBA check if the correct firmware is already installed:

```
Product Identifier: SAS2008-IT
Product Revision  : ≥ 8.00.00
```

If not you have to flash the correct firmware first before continuing with the installation.

For the firmware update following components are required:

- bootable DOS USB stick
- "sas2flsh.exe" flash utility
- firmware ("214i4et.bin") and BIOS (mpt2sas.rom) files

Copy all the files to the USB stick and boot into DOS.
Then run the following commands:

```
DOS   Erase the existing firmware from the controller:
      sas2flsh.exe -o -e 6

      !!! Do NOT reboot the system after the firmware has been
      erased, you have to flash the new firmware first!!!

      Flash the new firmware and BIOS to the controller:
      sas2flsh.exe -o -f 214i4et.bin -b mpt2sas.rom
```

(See also the entry from the LSI KnowledgeBase in Appendix A)

After the firmware update has been successfully completed you can connect the tape drive to the SAS HBA and reboot the system to the Linux operating system.

# 4   Install the driver module for the SAS HBA

Install the provided rpm packet according to the operating system:

```
CMD  For RedHat 5.3:
     #> rpm -ivh kmod-mpt2sas-x.x.x.x-rhel5.3.x86_64.rpm

     For RedHat 6.1:
     #> rpm -ivh kmod-mpt2sas-x.x.x.x-rhel6.1.x86_64.rpm
```

After the installation check if the driver loads correctly :

```
CMD  #> modprobe mpt2sas
```

# 5   Install LTFS package

Install the provided LTFS rpm packet:

```
CMD  #> rpm -ivh qtmltfs-1.2.0-2.x86_64.rpm
```

If there are any dependency errors during the installation you may have to install the required packages first (e.g. missing 'fuse' libraries).

The installation packages, sources and documentation are also directly available from Quantum:
_http://www.quantum.com/Products/TapeDrives/LTOUltrium/LTO-5/LTFS/Index.aspx_

# 6   Using LTFS

Insert an empty LTO5 tape into the tape drive.

```
CMD  Format a new tape with LTFS:
     #> mkltfs -d /dev/st0
```

```
CMD  Create an directory and mount the LTFS-tape:
     #> mkdir /mnt/ltfs
     #> ltfs /mnt/ltfs
```

For more information please see the "Quantum LTFS-UserGuide"

# 7  Appendix

# A. Flashing IT firmware over IR firmware for LSI SAS HBAs

http://kb.lsi.com/KnowledgebaseArticle16266.aspx

6 Gb/s SAS HBAs do not allow overriding a different firmware type (IT vs. IR), so the flash must be deleted. In order to do so, please follow the steps below:

Create a DOS bootable diskette. We recommend bootflashdos, an open source utility, for formatting thumb drives.

1) Copy the firmware image, BIOS image, and DOS version of sas2flash onto the bootable device.

2) Reboot your machine to boot to DOS. Note that you may need to adjust your motherboard boot list.

3) When the DOS prompt appears, enter the follow command: `sas2flsh -o -e 6`

4) DO NOT REBOOT.  If you do reboot, or if you attempt to flash the firmware and/or BIOS image and it does not flash correctly, you will have to RMA the controller.

5) After the flash has been deleted, run the flash command: `sas2flsh -o -f` <firmware_image> `-b` <BIOS_image>

   Note for multiple controllers:
   1. sas2flash `-listall` lists all controllers.
   2. To flash a particular controller, use the switch:
      e.g. `-c 1`

This process can only be done in DOS.

*Rebooting after deleting the flash will render your HBA useless. It is very important that you follow the instructions exactly as listed above.*