3ware Software Suite User Guide for Linux

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3DM2 Installation

The 3ware software suite includes both Web-based (3dm2) and text based tools (tw_cli) to monitor and manage the disk array. The following controllers are supported:

- 3ware Escalade 9500S

- 3ware Escalade 9550SX/9550SXU

- 3ware Escalade 9590SE

- 3ware Escalade 9650SE

- 3ware Escalade 9690SA

- 3ware Escalade 9750

Since these applications are not included in standard Linux distributions, they must be installed manually after reinstalling the operating system. For convenience, ASL maintains a yum repository containing the utilities. To enable the yum repository follow the instructions in the following FAQ:

Enabling access to the ASL software repository [http://faq.aslab.com/index.php?action=artikel&cat=35&id=204&artlang=en]

After the repository has been enabled the 3ware software suite can be installed with the following command:

```
# yum install 3ware-3dm*
```

Afterward, restart the server.

Running 3DM2

3dm2 runs as a secure web application. To access 3dm2, open Firefox on the storage server and enter the following url

https://localhost:888.

For remote access, replace localhost with the appropriate host name or IP address of the storage server.

> **Note**
>
> For security reasons, remote access to 3dm2 is disabled by default. To enable remote access, connect to 3dm2 locally on the storage server and enable the option 'Allow Remote Access' under 3dm2 Settings. Alternatively, edit `/etc/3dm2/3dm2.conf` on the storage server and change the value of 'RemoteAccess' from 0 to 1. Afterward, restart 3dm2 by running:

```
# /etc/rc.d/init.d/tdm2 restart
```

The default password for the 3dm2 Administrator account is '3ware'. For security purposes, it is important to change the default password immediately.

Under 3dm2 Settings, different user accounts can be created. Here the default listening port (888) can also be changed.

Detailed documentation on 3dm2 and tw_cli is provided on the 3ware CD.

Running tw_cli

To run the program, enter `tw_cli` on a text console.

Latent Lost Block Syndrome

Over the lifetime of the hard drive, bad sectors will develop on the disk. If a bad sector is encountered during a disk write, the drive firmware will remap the sector transparently.

If a bad sector is encountered during a read operation, the RAID controller will use "dynamic sector repair". Dynamic sector repair uses parity information from the array to rewrite the failed sector. This in turn forces the affected drive to remap the bad sector.

There is a situation in which dynamic sector repair will not work. If a degraded array is in the process of rebuilding when the read error occurs, there will be insufficient information to rewrite the bad sector. When this happens, the array reconstruction will fail.

This condition is known as the "latent lost block syndrome" in which a sector has gone bad but has yet to be read. Thus it is in a latent state. To avoid this phenomenon, it is important to schedule periodic verification on all the disk arrays. Verification will convert the latent bad blocks into known bad blocks which can then be repaired.

By default, the following 3dm2 parameters are configured at the factory:

• In the Controller Settings screen under Management, Auto Verify is enabled for all units.

• In the Scheduling screen under Management, Verification Task is scheduled to run every day at 12AM for 4 hours.

After receiving the server, the Verification Task should be customized for your environment.

Locating a disk in the enclosure

If the controller is connected to a backplane with enclosure services, tw_cli can be used to blink the location LED of a specific port. For example, the following command will locate the drive connected to port p23 on controller c6:

```
tw_cli /c6/p23 set identify=on

Setting port Identify on /c6/p23 to [on] ... Done.
```

To turn the LED off:

```
tw_cli /c6/p23 set identify=off

Setting port Identify on /c6/p23 to [off] ... Done.
```

If enclosure services are available, the output of tw_cli info will have entries in the Encl-Slot column.
For example:

```
# tw_cli info c6

Unit  UnitType  Status           %RCmpl  %V/I/M  Stripe  Size(GB)  Cache  AVrfy
------------------------------------------------------------------------------
u0    RAID-6    INITIALIZING     -       57%(A)  256K    24214.3   RiW    ON
u1    SPARE     OK               -       -       -       1863.01   -      OFF

VPort Status        Unit Size        Type  Phy Encl-Slot     Model
------------------------------------------------------------------------------
p8    OK            u0   1.82 TB      SATA  -   /c6/e0/slt0   WDC WD2000FYYZ-01UL
p9    OK            u0   1.82 TB      SATA  -   /c6/e0/slt1   WDC WD2000FYYZ-01UL
p10   OK            u0   1.82 TB      SATA  -   /c6/e0/slt2   WDC WD2000FYYZ-01UL
p11   OK            u0   1.82 TB      SATA  -   /c6/e0/slt3   WDC WD2000FYYZ-01UL
p12   OK            u0   1.82 TB      SATA  -   /c6/e0/slt4   WDC WD2000FYYZ-01UL
p13   OK            u0   1.82 TB      SATA  -   /c6/e0/slt5   WDC WD2000FYYZ-01UL
p14   OK            u0   1.82 TB      SATA  -   /c6/e0/slt6   WDC WD2000FYYZ-01UL
p15   OK            u0   1.82 TB      SATA  -   /c6/e0/slt7   WDC WD2000FYYZ-01UL
p16   OK            u0   1.82 TB      SATA  -   /c6/e0/slt8   WDC WD2000FYYZ-01UL
p17   OK            u0   1.82 TB      SATA  -   /c6/e0/slt9   WDC WD2000FYYZ-01UL
p18   OK            u0   1.82 TB      SATA  -   /c6/e0/slt10  WDC WD2000FYYZ-01UL
p19   OK            u0   1.82 TB      SATA  -   /c6/e0/slt11  WDC WD2000FYYZ-01UL
p20   OK            u0   1.82 TB      SATA  -   /c6/e0/slt12  WDC WD2000FYYZ-01UL
p21   OK            u0   1.82 TB      SATA  -   /c6/e0/slt13  WDC WD2000FYYZ-01UL
p22   OK            u0   1.82 TB      SATA  -   /c6/e0/slt14  WDC WD2000FYYZ-01UL
p23   OK            u1   1.82 TB      SATA  -   /c6/e0/slt15  WDC WD2000FYYZ-01UL
```

Partitions Greater Than 2TB

3ware storage servers with > 2TB of disk space have certain limitations under Linux. In particular, it is not currently possible to boot off of a partition which is > 2TB in size. This is due to the fact that Grub can only use MSDOS partition tables, which are limited to partitions no larger than 2TB.

This means that such systems cannot be configured as a single large array. There are several possible ways to work around this limit:

• Separate OS drive - The OS is installed to an independent disk. The remaining disks can then be made into a single large array. A GPT partition table can then be used to create one or more large file systems on the array. Each filesystem has it's own size limits. For example, EXT3 is limited to 8TB.

- Multiple RAID arrays - The disks can be configured into multiple RAID arrays. The only limitation is that the array that will be booted from must not exceed 2TB. The disadvantage to this approach is that more space is lost for parity information. For example, 2 RAID5 arrays will use 2 parity disks.

- Auto Carving (Multi-LUN support) - A single RAID array is created. The controller/driver then presents the array as multiple logical disks to the OS. Each disk is 2TB or less. For example, a 4TB array would show up as 2 2TB drives. This approach maximizes disk usage without needing a separate OS drive.

> **Note**
>
> Version 2.26.03.015fw or greater of the 3ware driver is required to support Auto Carving.

- Boot Volume - A single RAID array is created. The controller/driver then presents the array as two logical disks to the OS. The first logical disk is for operating system installation and can have a custom size up to 2TB. This approach allows optimimum usage of the entire array.

Filesystems Greater Than 8TB

The following table lists the maximum size of filesystems for various OS versions:

Table 1. Filesystem size limits

OS	Ext3	Ext4
Enterprise Linux 5.6	16TB	16TB
Enterprise Linux 6.0	16TB	16TB
Enterprise Linux 7	16TB	50TB
Fedora 11	16TB	16TB
Fedora 12	16TB	16TB
Fedora 13	16TB	16TB
Fedora 14	16TB	16TB
Fedora 15	16TB	16TB

To format an ext3 filesystem larger than 8TB, the -F flag may be necessary. For example:

```
# mkfs.ext3 -F /dev/sda1
```

Enterprise Linux versions prior to 5 support a maximum filesystem size of 8TB.

Linux Installation

Fedora

To reinstall the operating system, use the ASL customized Linux distribution media. Refer to the table below for supported configurations.

Table 2. Driver Support

Version	9550SX/9550SXU	9590SE	9650SE	9690SA	9750
Fedora 11	Supported	Supported	Supported	Supported	Unsupported

Version	9550SX/9550SXU	9590SE	9650SE	9690SA	9750
Fedora 12	Supported	Supported	Supported	Supported	Unsupported
Fedora 13 and higher	Supported	Supported	Supported	Supported	Supported

RHEL/CentOS

To reinstall Enterprise Linux 5, the ASL RHEL/CentOS driver CD may be necessary. This CD is only included for systems purchased with RHEL or CentOS. If necessary, the latest ASL RHEL/CentOS Device Driver CD can be downloaded here:

http://updates.aslab.com/isos/RHEL5/

Refer to the table below to determine driver disk requirements.

Table 3. Driver Disk Required

Version	9550SX/U,9590SE	9650SE	9690SA	9750
RHEL 5 Update 3, COS 5.3	No	No	No	Yes
RHEL 5 Update 4, COS 5.4	No	No	No	Yes
RHEL 5 Update 5, COS 5.5	No	No	No	Yes
RHEL 5 Update 6, COS 5.6 and higher	No	No	No	No
RHEL 6/COS 6 and above	No	No	No	No

Technical Support

Prior to contacting technical support, please visit the ASL online FAQ for quick answers to common hardware and software issues.The answers may be searched by keyword or browsed by category. These documents are maintained with up to date information.

FAQ [http://faq.aslab.com]

To request replacement of a defective part (except monitor) on systems under warranty, please send an E-mail to <techsupport@aslab.com> with the following information:

• Serial number or invoice number of the system

• Detailed description of the problem

• Shipping address

If the transaction involves multiple systems, ASL highly recommends creating one ticket per system. This will avoid any mixup when the RMA is processed.

Defective monitors will be handled directly by the manufacturer. Here is the contact information:

• Viewsonic: (800) 688-6688 (US and Canada)