

London EMC/Solaris SAN SOE

For Solaris SAN SOE Stack 2.5

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1 Introduction

This document is written to provide reader with the necessary information to successfully connect a Wintel machine to the SAN infrastructure. Please direct any questions, comments and feedback to <mailto:Colin.N.Bradley@citigroup.com>

2 Scope

This document covers in as much detail as is necessary the process for attaching a Solaris server to the SAN.

3 Audience

The document is targeted at Unix System Administrators and Storage Administrators. A good knowledge of Solaris and SANs is expected.

4 Supported Platforms

Host System	Operating System	Host Bus	Host Bus Adapter	Topology	Storage Array	Microcode	Veritas VxVM/VxFS	PowerPath
Sun E6800, E6500, E4500, E4000, V1280, V880, V480, V440, E420R, E280R, E250, V240 Sun Fire 15K	Sun Solaris 2.8 ¹ P6	PCI	Emulex LP9002 ² , LP9002DC ²	FC-SW	EMC Symmetrix 8000 Series DMX Series	8000 series 5567.5330, 5568.5622 DMX Series 5670.2628	VxVm 4.0, VxFS 4.0	4.1

- EMC required Sun patches for Solaris 8:
 - 108528-27 SunOS 5.8: kernel update patch.
 - 108974-37 SunOS 5.8: data, uata, dad, sd, and scsi patch.
- Current SOE levels of Emulex driver are:
 - Driver 5.02c.
 - Firmware 3.92a2.

5 Solaris/EMC SAN Environment

5.1 Overview

The following section details the steps required to properly attach and configure a Sun Solaris server for SAN connectivity. Specifically it deals with the attaching a server that has not previously been SAN attached. The software, driver and firmware releases mentioned are all current SOE release.

5.2 New Installation

5.2.1 Emulex Driver Installation

The device drivers for the Emulex LP9002 HBA's can be found in the software repository on lonsoe. To install the Emulex PCI driver.

```
#cd /net/lonsoe/export/opt/repository/Vendor/EMC/Emulex/package (this  
is a symlink to the current version 5.0.2c)
```

```
#pkgadd -d.
```

The following packages are available:

```
1  lpfc      Emulex LightPulse FC SCSI/IP Host Bus Adapter driver  
      (sun4u) 5.02C
```

```
Select package(s) you wish to process (or 'all' to process  
all packages). (default: all) [?,??,q]:1
```

```
Emulex LightPulse FC SCSI/IP Host Bus Adapter driver  
(sun4u) 5.02C
```

```
lpfc (FCP) / lpfn (IP) combo driver
```

```
Copyright (c) 2003, Emulex Corporation  
3535 Harbor Boulevard, Costa Mesa, CA 92626
```

```
Rebuild manual pages database for section 7d [y,n,?] y
```

```
## Verifying package dependencies.
```

```
WARNING:
```

```
The <HBainfo> package "" is a prerequisite package and  
should be installed.
```

```
Do you want to continue with the installation of <lpfc> [y,n,?] y
```

```
Do you want to install these conflicting files [y,n,?,q] y
```

```
## Checking for setuid/setgid programs.
```

```
This package contains scripts which will be executed with super-user  
permission during the process of installing this package.
```

```
Do you want to continue with the installation of <lpfc> [y,n,?] y
```

```
Installing Emulex LightPulse FC SCSI/IP Host Bus Adapter driver as  
<lpfc>
```

```
*** IMPORTANT NOTICE ***
```

```
This machine must now be rebooted in order to ensure  
sane operation. Execute  
shutdown -y -i6 -g0  
and wait for the "Console Login:" prompt.
```

****NOTE**

Do Not Use This Command to Reboot the Server. A reboot command will be issued at the end of section

Make a backup copy of the original driver configuration files and then copy the template configuration file from lonsoe as below.

```
#cd /kernel/drv
#cp lpfc.conf lpfc.conf_orig
#cp /net/lonsoe/export/opt/repository/Vendor/EMC/Emulex/
kernel-drv/lpfc.conf.example502c lpfc.conf
```

Edit /etc/system and add the following lines to the end of the file: also useful to include details with regard to the settings.

```
* EMC default SCSI parameters
set sd:sd_max_throttle=20
set sd:sd_io_time=0x78

* EMC end
```

The modification to the parameter sd_max_throttle is required specifically for Fibre Channel. The sd_io_time modification prevents a host from issuing warning messages when non-disruptive operations are performed on the Symmetrix.

```
#uname -a **Verify you are on the correct host**
#reboot -- -r
```

5.2.2 Emulex Firmware Update

After the reboot the firmware may need to be upgraded. This can be determined from /var/adm/messages.

```
#pg /var/adm/messages | grep Firmware

NOTICE: lpfc0: Firmware Rev 3.91a3
NOTICE: lpfc1: Firmware Rev 3.91a3
```

Be sure and check both lpfc0 and lpfc1.

The current supported firmware for Emulex LP9002 HBA's is Rev 3.92a2. If your HBA's are at the current supported level then no further action is required and you can skip to section **Post Zoning Configuration**.

If your HBAs are not at the current supported levels please complete the following steps in full:

1. The server should now be rebooted into single user mode.
#uname -a **Verify you are on the correct host**
#reboot -- -s
2. Once the server has rebooted to single user mode, you will only be able to access the server via console. To do this run
/home/sa/admin/bin/console <servername>.
3. #cd /usr/sbin/lpfc
4. #./lputil

MAIN MENU

1. List Adapters
2. Adapter Information
3. Firmware Maintenance
4. Reset Adapter
5. Persistent Bindings

0. Exit

Enter choice => 3

FIRMWARE MAINTENANCE MENU

1. Load Firmware Image
2. Display AWC File Contents
3. Display Flash Load List

```
4. Display RAM Load List
5. Load PCI Configuration File
6. Boot BIOS Maintenance

0. Return to Main Menu

Enter choice => 1
0. lpfc0
1. lpfc1

Select an adapter (0-1) => 0

Enter Image Filename => cd392a2.awc

Opening File...
Reading Header...
Validating Checksum...
Initializing Host Adapter...
Erasing Flash ROM Sectors...
100% complete
Loading Image...
100% complete
Updating Wakeup Parameters...
Resetting Host Adapter...
Image Successfully Downloaded...
```

5. Once you have downloaded the firmware for 1 card you need to perform the same procedure for the second card. Type "0" to come up one menu then follow the instructions for downloading firmware again.

!! Caution.

Before a firmware upgrade is attempted **Appendix A additional notes on /etc/path_to_inst** should be read & the implications of the firmware upgrade on instance numbers understood before you proceed with the upgrade. **Failure to follow the procedures below may result in your server becoming unusable.**

6. After the firmware has been downloaded we need to rebuild the entries for any fibre attached disks in the path_to_inst file. Please follow workaround outlined in **Appendix A Additional notes on /etc/path_to_inst**. **Failure to follow the procedures below may result in your server becoming unusable.**
7. **Have you followed workaround in Appendix A?** If the answer is YES continue with reboot.
8. `#uname -a **Verify you are on the correct host**`
9. `#reboot -- -r`

5.2.3 Post Emulex Driver/Firmware Installation Checks

1. After the server has rebooted check that the firmware upgrade was successful. See below:

```
#pg /var/adm/messages | grep Firmware

NOTICE: lpfc0: Firmware Rev 3.92a2
NOTICE: lpfc1: Firmware Rev 3.92a2
```

Be sure and check both lpfc0 and lpfc1.

2. Contact the [*GT UK San Support Group](#) so that they can check that your server is logged into the fabric. (failure to do so may prevent them from being able to zone your server during the next available "Green Zone").
3. For ease of support the following physical hardware standard is enforced within the SAN Environment. The lowest instance of an HBA i.e. lpfc0 should be attached to the Red Fabric & the 2nd HBA should be connected to the Blue Fabric. The SAN Support Group will inform you if this is not the case. If the cabling is incorrect complete step 4. If everything is okay go to the next section.

4. If the cabling is found to be incorrect raise a GPMS ticket for the Oliver Cabling Team who will remediate the cabling. Swapping the WWN's / HBA instance numbers in lpfc.conf is **NOT Recommended**.

5.2.4 Configuration Files Update

The SAN Support Team will provide you with the following information, once they have completed assigned the server to a FA pair and allocated LUNS : -

1. The WWPNs of the FA Ports that your server is zoned to. (An FA Port is a Fibre Interface on the EMC Symmetrix behind which your disks are presented).
2. The target that has been assigned to the pair of FA's that your storage has been allocated behind on the Symm (For ease of management this will typically be Target 10 for lpfc0 and Target 20 for lpfc1).
3. The LUN numbers for the disks that have been allocated to your host(the default sd.conf should contain LUNs 0-255 for each target bound on lpfc0 and lpfc1).

Once you have been given this information continue with the following steps:

4. Edit lpfc.conf and insert correct FA WWN's (look for "**** CHANGE HERE ****")

```
# -----
# lpfc0t8 = instance lpfc0 and target 8
# lpfc1t8 = instance lpfc1 and target 8
# 500604843e0c50c2 = Symm FA
# -----
#
# ***** CHANGE HERE *****
fcplib-WWPN="500604843e0c01cb:lpfc0t10",
          "500604843e0c01d4:lpfc1t20"; ← Remember to
finish the last binding with a semi-colon.
```

In the example above fcplib-WWPN="500604843e0c01cb:lpfc0t10", A Symmetrix FA port with a WWPN 500604843e0c01cb is assigned to the first HBA lpfc0t10 (Instance 0) and has been assigned target 10.

5. Make a backup copy of the original sd driver configuration file and then copy the template configuration file from lonsoe as below.

```
#cd /kernel/drv
#cp sd.conf sd.conf_orig
#cp
/net/lonsoe1/export/opt/repository/Vendor/EMC/Emulex/kernel-
drv/sd.conf.example sd.conf
```

Now that the HBA's have been bound to the FA ports entries need to be added to sd.conf for all LUNS that have been mapped to the host. The SAN Support Team should provide you with this information. ** Note the LUN number is in decimal and is the LUN address behind the FA port & not the Symmetrix Device number.

```
# EXAMPLE CHANGES REQUIRED HERE.
# In this case LUN 240 & 241 has been added to target 10
# and LUNs 240 & 241 have been added to target 20
name="sd" parent="lpfc" target=10 lun=240;
name="sd" parent="lpfc" target=10 lun=241;
name="sd" parent="lpfc" target=20 lun=240;
name="sd" parent="lpfc" target=20 lun=241;
```

6. After the required changes have been made to sd.conf a reconfiguration reboot of your system is required to configure the LUNS.

```
#uname -a **Verify you are on the correct host**
#reboot -- -r
```

5.2.5 Labelling the Disk

After the server has rebooted use format to check that you can see two paths to all disks that are configured in sd.conf. These are highlighted in **bold** below.

```
0. c0t0d0 <Seagate Medalist 34342A cyl 8892 alt 2 hd 15 sec 63>
   /pci@1f,0/pci@1,1/ide@3/dad@0,0
1. c1t13d0 <EMC-SYMMETRIX-5567 cyl 14 alt 2 hd 15 sec 64>
   /pci@1f,0/pci@1/fibre-channel@3/sd@d,0
2. c1t13d103 <EMC-SYMMETRIX-5567 cyl 20797 alt 2 hd 15 sec 64>
   /pci@1f,0/pci@1/fibre-channel@3/sd@d,67
3. c1t13d104 <EMC-SYMMETRIX-5567 cyl 20797 alt 2 hd 15 sec 64>
   /pci@1f,0/pci@1/fibre-channel@3/sd@d,68
4. c2t13d0 <EMC-SYMMETRIX-5567 cyl 14 alt 2 hd 15 sec 64>
   /pci@1f,0/pci@1/fibre-channel@4/sd@d,0
5. c2t13d103 <EMC-SYMMETRIX-5567 cyl 20797 alt 2 hd 15 sec 64>
   /pci@1f,0/pci@1/fibre-channel@4/sd@d,67
6. c2t13d104 <EMC-SYMMETRIX-5567 cyl 20797 alt 2 hd 15 sec 64>
   /pci@1f,0/pci@1/fibre-channel@4/sd@d,68
```

If any disks are missing recheck the configuration of lpfc.conf & sd.conf & if the problem cannot be resolved contact the *GT UK SAN Support Group for assistance.

The following errors may have been seen during the boot or when format was run

```
WARNING: /pci@1f,4000/scsi@3/sd@0,0 (sd0):
corrupt label - wrong magic number
```

This is because the EMC disks are not labelled and need to be labelled using format. A quick way to do this is as follows (assuming controller 1 and target 8 for example):

```
cd /dev/dsk
for dsk in c1t8*s2
do
echo "la\ny" | format $dsk\
done
```

5.2.6 PowerPath Installation

PowerPath enables multiple fibre channel paths to be established between a host and a Symmetrix device configured for the host. These paths can be used simultaneously for data I/O to the device. If a failure occurs on any path, PowerPath automatically redirects data over the other path(s) without disrupting I/O.

In addition, PowerPath dynamically balances the distribution of I/O load to improve performance.

The current SOE supported version of PowerPath is v4.1 this can be found in the software repository on lonsoe. To install the PowerPath package complete the following steps in full:

```
1. cd /net/lonsoe/export/opt/repository/Vendor/EMC/PowerPath/4.1
2. pkgadd -d .
```

/export/opt should be used as the base directory (unless you have unconfigured the automounter for auto_opt).

The following packages are available:

```
1  EMCpower      EMC PowerPath
      (all) 4.1.0_b155
```

```
Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]: 1
```

```
Processing package instance <EMCpower> from
</net/lonsoe/export/opt/repository/Vendor/EMC/PowerPath/4.1>
```

```
EMC PowerPath
(all) 4.1.0_b155
```

EMC

```
Enter package base directory (default:/export/opt/emc): /export/opt
Enter directory for logging (default:/export/opt/EMCpower/log): ← just use
the default location <enter>
```

```
Using </export/opt> as the package base directory.
## Processing package information.
## Processing system information.
   5 package pathnames are already properly installed.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.
```

This package contains scripts which will be executed with super-user permission during the process of installing this package.

Do you want to continue with the installation of <EMCpower> [y,n,?] **y**

Installing EMC PowerPath as <EMCpower>

```
## Executing preinstall script.
## Installing part 1 of 1.
/etc/S87powervxvm
/etc/cgmt
/etc/emc/bin/emcp_discover <symbolic link>
.....
.....
/usr/man/man1/powermt.1
[ verifying class <none> ]
## Executing postinstall script.
```

```
Adding emcp driver...
Adding forceload to /etc/system
setting emcp:bPxEnableInit to 1
setting lwp_default_stksize to 0x6000
setting rpcmod:svc_default_stksize to 0x6000
setting semsys:seminfo_semmns to 0x381
setting semsys:seminfo_semmni to 0x402
setting semsys:seminfo_semmsl to 0x81
setting semsys:seminfo_semmap to 0x381
setting semsys:seminfo_semmnu to 0x381
```

```
-----
* EMCpower Installation:
*
* Installation is successful.
*
* If you have a license key card, register now. Then REBOOT the host to
* complete the remaining steps of the installation. Refer to the PowerPath
* for UNIX Installation and Administration Guide for more information.
```

After the package has been installed a license key needs to be created. A license key is added using the emcpreg command.

```
#/etc/emcpreg -install
```

The license key is BUP7-DB47-AFQW-Q27L-MH9L-9N7E & should be entered at the prompt. You will then need to hit <enter> again to exit.

```
===== EMC PowerPath Registration =====
Do you have a new registration key or keys to enter?[n] y
Enter the registration keys(s) for your product(s),
one per line, pressing Enter after each key.
After typing all keys, press Enter again.
```

Key (Enter if done):

```
1 key(s) successfully added.
Key successfully installed.
```

A reconfiguration reboot is required to load the emcp driver & to configure the PowerPath devices.

```
#uname -a **verify you are on the correct host**
#reboot -- -r
```

**** Note as part of the install of Powerpath the following changes are made to /etc/system**

```
lwp_default_stksize to 0x6000
svc_default_stksize to 0x6000
```

****CAUTION**

Other changes may have been made to the values of lwp_default_stksize & svc_default_stksize products such as VXFS for example may increase these values. Ensure that an appropriate value is set in the system file.

5.2.7 Post installation checks

- Once the server has been rebooted you need to check that PowerPath is managing both paths to your disk. Both paths should be displayed as “Optimal”. Complete the following steps:

```
#/etc/powermt display
```

```
Symmetrix logical device count=2
=====
----- Host Bus Adapters ----- I/O Paths ----- Stats ----
### HW Path Summary Total Dead IO/Sec Q-IOs
Errors
=====
0 pci@1f,0/pci@1/fibre-channel@3 optimal 2 0 - 0 0
1 pci@1f,0/pci@1/fibre-channel@4 optimal 2 0 - 0 0
```

- To view in more detail the configured emcpower devices:

```
#/etc/powermt display dev=all
```

```
root@santest02<428>./powermt display dev=all
Pseudo name=emcpower1a
Symmetrix ID=000284700428
Logical device ID=014F
state=alive; policy= SymmOpt; priority=0; queued-IOs=0
=====
----- Host ----- - Stor - -- I/O Path - -- Stats -
### HW Path I/O Paths Interf. Mode State Q-IOs
Errors
=====
0 pci@1f,0/pci@1/fibre-channel@3 c1t3d20s0 FA 13aA active alive 0 0
1 pci@1f,0/pci@1/fibre-channel@4 c2t3d20s0 FA 4bA active alive 0 0

Pseudo name=emcpower2a
Symmetrix ID=000284700428
Logical device ID=0150
state=alive; policy= SymmOpt; priority=0; queued-IOs=0
=====
----- Host ----- - Stor - -- I/O Path - -- Stats -
### HW Path I/O Paths Interf. Mode State Q-IOs
Errors
=====
0 pci@1f,0/pci@1/fibre-channel@3 c1t3d21s0 FA 13aA active alive 0 0
1 pci@1f,0/pci@1/fibre-channel@4 c2t3d21s0 FA 4bA active alive 0 0
```

- Additional entries for the emcpower devices should also be seen under “format”. Below is an extract showing these devices.

```
#format
20. emcpower1a <EMC-SYMMETRIX-5566 cyl 31998 alt 2 hd 15 sec 64>
    /pseudo/emcp@1
21. emcpower2a <EMC-SYMMETRIX-5566 cyl 31998 alt 2 hd 15 sec 64>
    /pseudo/emcp@2
```

4. The following commands should be run from roots crontab to periodically check the status of PowerPath.

```
15 * * * * /bin/sh -c 'if [ "`/etc/powermt display | grep optimal | wc
-l`" -ne "2" ] ; then echo "PowerPath does not have 2 optimal paths to
Symmetrix on `/bin/uname -n` - please check" | /usr/ucb/mail -s
"PowerPath error" root,gtukdatastorgrp@imceu | /usr/ucb/logger -p
local1.err "PowerPath does not have 2 optimal paths to Symmetrix" ;
fi'
```

5. If for any reason the policy parameter highlighted in the output of step 2 is not **SymmOpt**, then please turn to Appendix B for remediation procedure.

5.2.8 Veritas Volume Manager Configuration

There have been a lot of changes in the new release of Veritas Storage Foundation 4.0. It is not the purpose of this document to discuss these changes, but a more detailed look at these can be found in the following document http://ue.ny.smb.com/current/RN1.0-VRTS_SF_4.0.pdf.

To initialise the volume run the “vxinstall” utility.

```
# vxinstall
```

```
VxVM uses license keys to control access.  If you have a SPARCstorage
Array (SSA) controller or a Sun Enterprise Network Array (SENA) controller
attached to your system, then VxVM will grant you a limited use license
automatically.  The SSA and/or SENA license grants you unrestricted use
of disks attached to an SSA or SENA controller, but disallows striping,
RAID-5, and DMP on non-SSA and non-SENA disks.  If you are not running an
SSA or SENA controller, then you must obtain a license key to operate.
```

```
Licensing information:
  System host ID: 809c75c8
  Host type: SUNW,Ultra-5_10
  SPARCstorage Array or Sun Enterprise Network Array: No arrays found
```

```
Some licenses are already installed.  Do you wish to review them
[y,n,q] (default: y) n
```

```
Do you wish to enter another license key [y,n,q] (default: n) n
```

```
Do you want to use enclosure based names for all disks ?
[y,n,q,?] (default: n) n
```

```
Starting the cache daemon, vxcached.
```

```
Do you want to setup a system wide default disk group?
[y,n,q,?] (default: y) n
```

```
The installation is successfully completed.
```

6 Adding Storage To Existing Installation

6.1 Overview

This section explains in as much detail as is necessary the steps a System Administrator needs to fulfil in order to configure additional SAN Storage to an existing installation.

New measures have been implemented so that disruption to service is kept to a minimum i.e. the inclusion of 256 LUNs in the sd.conf for each Emulex card configured. This does not take into account if the storage being allocated is on a different FA pairing or if the server does not have all the LUNs configured.

6.2 Configuration Files Update

Please adhere to the following steps to ensure that the additional SAN Storage is added correctly to your server. Not all the steps may be applicable, but these will be highlighted and vetoed.

The assumption has been made that the storage has been requested from the *GT UK SAN Support Group, and that this storage is now in place.

1. Contact the *GT UK SA Support Group, for information relating to the additional storage:
 - LUN numbers for the new devices.
 - New WWPN binding information (if applicable¹).
2. If your sd.conf contains all 256 LUN entries for each SAN disk target and all binding information is unchanged please go to step 7.
3. If new binding information is supplied the lpfc.conf will need to be updated to reflect this.

The new binding information is as follows is indicated in **bold type**:

```
# BEGIN: LPUTIL-managed Persistent Bindings
fcplib-bind-wwpn="500604843e0bc30c:lpfc0t3", # Symm 0428 FA 13Aa
               "500604843e0bc313:lpfc1t3", # Symm 0428 FA 4Ba
               "5006048449ae4a92:lpfc0t15", # DMX 0422 FA 3Ba
               "5006048449ae4a8d:lpfc1t15"; # DMX 0422 FA 14Aa
```

4. With the new LUN numbers update the sd.conf accordingly. In the following example the SAN Support Group has allocated two LUNs.

The new LUNs are 133 & 134. The update to the sd.conf is indicated in **bold type**:

```
# EXAMPLE CHANGES REQUIRED HERE.

name="sd" parent="lpfc" target=5 lun=240;
name="sd" parent="lpfc" target=13 lun=103;
name="sd" parent="lpfc" target=13 lun=104;
name="sd" parent="lpfc" target=15 lun=133;
name="sd" parent="lpfc" target=15 lun=134;
```

5. Once the new LUNs have been added to the sd.conf and the binding information updated (when applicable) a reconfiguration reboot is required.

```
#uname -a **Verify you are on the correct host**
#reboot -- -r
```

6. Once the reboot has been completed the new devices are viewable under format, see the extract below:

```
#format
```

```
7. c1t13d133 <EMC-SYMMETRIX-5567 cyl 20797 alt 2 hd 15 sec 64>
```

¹ If the additional storage being assigned is on a separate set of FA's or a separate Symmetrix/DMX, then there will be binding information to update in the lpfc.conf. The San Support Group should inform you if this is the case.

```
      /pci@1f,0/pci@1/fibre-channel@3/sd@d,67
8.  c1t13d134 <EMC-SYMMETRIX-5567 cyl 20797 alt 2 hd 15 sec 64>
      /pci@1f,0/pci@1/fibre-channel@3/sd@d,68
9.  c2t13d133 <EMC-SYMMETRIX-5567 cyl 20797 alt 2 hd 15 sec 64>
      /pci@1f,0/pci@1/fibre-channel@4/sd@d,67
10. c2t13d134 <EMC-SYMMETRIX-5567 cyl 20797 alt 2 hd 15 sec 64>
      /pci@1f,0/pci@1/fibre-channel@4/sd@d,68
```

7. If it was not necessary to update any configuration files, you will only need to run the following command to build the device tree for your new devices:

```
#devfsadm -Cv
```

8. If you have run the “devfsadm” command and find that the additional devices have not been found you will need perform a reconfigure reboot on the system to see the new LUNS. So return to step 5.
9. Once the command completes it may be necessary to update your Powerpath configuration to include the new devices, see below:

```
#powercf -q
```

10. Once your new devices are visible under format and the Powerpath configuration has been completed, you will need to run format again and write a label to the new devices to prevent the “Wrong Magic Number” from appearing in the messages file. For more information on this refer to section 5.2.5.

7 Upgrading Driver, Firmware and Software

7.1 Overview

This section deals with the upgrading of existing levels of HBA driver and firmware as well as the upgrading of Powerpath. It is important to note that when upgrading it should be done in the following steps.

1. Emulex Driver.
2. Emulex Firmware.
3. Powerpath

7.2 Upgrading Emulex Driver

The following steps need to be completed to upgrade the Emulex “lpfc” device driver on a system that is already attached to the SAN.

1. Determine the current level of Emulex driver installed on the system

```
#pkginfo -l lpfc
```

```
PKGINST:  lpfc
NAME:      Emulex LightPulse FC SCSI/IP Host Bus Adapter driver
CATEGORY:  system
ARCH:      sun4u
VERSION:    Release 5.01a
BASEDIR:    /
PSTAMP:     ultrapci20020829171220
INSTDATE:   Sep 14 2004 10:40
STATUS:     completely installed
FILES:      40 installed pathnames
             13 shared pathnames
             12 directories
             11 executables
             7286 blocks used (approx)
```

2. The current SOE Emulex driver is 5.02c so we need to perform the upgrade. Before performing the upgrade make a backup copy of your current configuration files.

```
#cp /kernel/drv/lpfc.conf /kernel/drv/lpfc.conf.bak
#cp /kernel/drv/sd.conf /kernel/drv/sd.conf.bak
```

3. Now remove the old driver. By removing the old driver you are not negating the servers ability to issue IO to the storage.

```
#pkgrm lpfc
```

```
The following package is currently installed:
lpfc      Emulex LightPulse FC SCSI/IP Host Bus Adapter driver
          (sun4u) Release 5.01a
```

```
Do you want to remove this package? Y
## Removing installed package instance <lpfc>
```

```
This package contains scripts which will be executed with super-user
permission during the process of removing this package.
```

```
Do you want to continue with the removal of this package [y,n,?,q] y
```

4. Now install the latest Emulex driver from Lonsoe.

```
#cd /net/lonsoe/export/opt/repository/Vendor/EMC/Emulex/package
#pkgadd -d .
```

```
The following packages are available:
1  lpfc      Emulex LightPulse FC SCSI/IP Host Bus Adapter driver
              (sun4u) 5.02C

Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]: y
Rebuild manual pages database for section 7d [y,n,?] y
WARNING:
  The <HBAinfo> package "" is a prerequisite package and
  should be installed.

Do you want to continue with the installation of <lpfc> [y,n,?] y
Do you want to install these conflicting files [y,n,?,q] y
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <lpfc> [y,n,?] y
```

5. Copy back the configuration files you backed up in step 2.

```
#cp /kernel/drv/lpfc.conf.bak /kernel/drv/lpfc.conf
#cp /kernel/drv/sd.conf.bak /kernel/drv/sd.conf
```

6. Now reboot the server.

```
#uname -a
#reboot -- -r
```

7.3 Upgrading Emulex Firmware

Before upgrading the Emulex Firmware it is important to follow the additional notes on the “/etc/path_to_inst” in the Appendix A.

1. Verify that the latest firmware file exists in the lpfc directory.

```
#ls -al | grep cd392a2.awc
```

2. Reboot the system into single user mode.

```
#uname -a
#reboot -- -s
```

3. Run the Emulex configuration utility “lputil”.

```
#cd /usr/sbin/lpfc
#./lputil
```

MAIN MENU

1. List Adapters
2. Adapter Information
3. Firmware Maintenance
4. Reset Adapter
5. Persistent Bindings
0. Exit

Enter choice =>3

0. lpfc0

```
1. lpfc1

Select an adapter (0-1) => 0

FIRMWARE MAINTENANCE MENU

1. Load Firmware Image
2. Display AWC File Contents
3. Display Flash Load List
4. Display RAM Load List
5. Load PCI Configuration File
6. Boot BIOS Maintenance

0. Return to Main Menu

Enter choice =>1
Enter Image Filename => cd392a2.awc
Opening File...
Reading Header...
Validating Checksum...
Initializing Host Adapter...
Erasing Flash ROM Sectors...
100% complete
Loading Image...
100% complete
Updating Wakeup Parameters...
Resetting Host Adapter...
Image Successfully Downloaded...
```

4. Return to the main menu and follow the same procedure for the second HBA i.e. lpfc1.
5. After the firmware has been downloaded we need to rebuild the entries for any fibre attached disks in the path to inst file. Please follow workaround outlined in **Appendix A Additional notes on /etc/path to inst**. **Failure to follow the procedures below may result in your server becoming unusable.**
6. **Have you followed workaround in Appendix A?** If the answer is YES continue with reboot.
7. `#uname -a **Verify you are on the correct host**`
8. `#reboot -- -r`

7.4 Upgrading Powerpath

The easiest way to upgrade Powerpath is to first remove the old version and then package add the latest version. This removes the install of interim levels for people upgrading from earlier levels of Powerpath.

The upgrade path is intrusive so please plan this for a period when the server can be rebooted.

1. Please remove the current installed level of powerpath.

```
# pkgrm EMCpower

The following package is currently installed:
EMCpower          EMC PowerPath
                  (all) 3.0.3_b030

Do you want to remove this package? y

## Removing installed package instance <EMCpower>

This package contains scripts which will be executed with super-user
permission during the process of removing this package.

Do you want to continue with the removal of this package [y,n,?,q] y
```

2. Remove the following files from the from the server.

```
.  
  
#rm /etc/emcp_registration.saved  
#rm /etc/powermt.custom.saved
```

3. A clean reboot should be done at this point.

```
#uname -a  
#reboot -- -r
```

4. Once the reboot has been completed add the new level of Powerpath.

```
#cd /net/lonsoe/export/opt/repository/Vendor/EMC/PowerPath/4.1  
#pkgadd -d .
```

```
The following packages are available:  
1  EMCpower          EMC PowerPath  
                        (all) 4.1.0_b155
```

```
Select package(s) you wish to process (or 'all' to process  
all packages). (default: all) [?,??,q]: 1
```

```
Processing package instance <EMCpower> from  
</net/lonsoe/export/opt/repository/Vendor/EMC/PowerPath/4.1>
```

```
EMC PowerPath  
(all) 4.1.0_b155  
EMC
```

```
Enter package base directory (default:/export/opt/emc): <Accept the default>
```

5. Once PowerPath 4.1 has been successfully installed please update the license key.

```
#/etc/emcpreg -list
```

If there is an existing license please remove this

```
#/etc/emcpreg -remove
```

Install the new License key

```
#/etc/emcpreg -install
```

```
===== EMC PowerPath Registration =====  
Do you have a new registration key or keys to enter?[n]Y  
Enter the registration keys(s) for your product(s),  
one per line, pressing Enter after each key.  
After typing all keys, press Enter again.
```

```
Key (Enter if done): BUP7-DB47-AFQW-Q27L-MH9L-9N7E
```

6. Once the new license key has been added, perform a reboot.

```
#uname -a  
  
#reboot -- -r
```

7. Once the boot has completed Powerpath should have automatically configured any devices.
You can check this by doing the following.

```
#/etc/powermt display  
  
Symmetrix logical device count=3
```

```
CLARiiON logical device count=0
=====
----- Host Bus Adapters ----- I/O Paths ----- Stats -----
### HW Path                      Summary   Total    Dead   IO/Sec Q-IOs Errors
=====
2304 pci@1f/pci@1/lpfc@3          optimal      3        0      -    0      0
2305 pci@1f/pci@1/lpfc@4          optimal      3        0      -    0      0
```

Appendix A – Additional notes on path_to_inst

Upgrading the firmware on some HBA's with previously configured devices has been known to cause some inconsistent results. The firmware cd391a3.awc once installed will disable the Boot BIOS on the card. This causes the logical path (CxDxDx) to the physical devices to be represented in the following format.

```
devices/pci@1f,4000/fibre-channel@4/sd@2,0
```

However when the Boot BIOS is enabled on the card the logical devices are represented as follows
devices/pci@1f,4000/lpfc@4/sd@2,0

Since all hardware device information is stored in the /etc/path_to_inst file upon configuration, disabling the Boot BIOS will have the following effect on the system.

Re-maps the logical devices (CxDxDx) to point to [devices/pci@1f,4000/fibre-channel@4/sd@2,0](#).
Changes the instance number of the HBA's in the /etc/path_to_inst file.

Since persistent binding is a SAN standard at Citigroup devices may not be visible to the host after the Boot BIOS is disabled on a configured system. This is because lpfc0/1 will be remapped to lpfc2/3 and will not match the entries in the configuration file.

The workaround is as follows:

After the upgrading of the firmware on the LP9002 which will disable the boot bios, make a backup copy of the "/etc/path_to_inst" file and remove all existing entries for "fibre-channel" and/or "lpfc". Reboot reconfigure the host and allow the system to rediscover the fibre channel devices with the correct instance numbers.

First make a backup copy of the /etc/path_to_inst file.

```
cp /etc/path_to_inst /etc/path_to_inst.orig
```

We then need to remove any entries for "lpfc" or "fibre-channel" from /etc/path_to_inst.

```
egrep -v "lpfc|fibre-channel" /etc/path_to_inst >  
/etc/path_to_inst.edit
```

Copy the edited path_to_inst file in place of the original

```
cp /etc/path_to_inst.edit /etc/path_to_inst
```

Next remove all devices **except the boot device** in /dev/dsk and /dev/rdisk.

If c0t0d0 is your boot device, then

```
cd /dev/dsk  
rm c1* c2* c3* c4*  
cd /dev/rdisk  
rm c1* c2* c3* c4*
```

A reconfiguration reboot is now required to configure /etc/path_to_inst & rebuild the entries in /dev/dsk & /dev/rdisk.

Appendix B – Setting SymmOpt Policy

To set the policy to SymmOpt on a running server using the `/etc/powermt set policy` command.

```
#/etc/powermt set policy=so
```

Use `/etc/powermt display dev=all` to check the policy has been set correctly.

```
/etc/powermt display dev=all
Pseudo name=emcpower1a
Symmetrix ID=000284701227
Logical device ID=01A2
state=alive; policy=SymmOpt; priority=0; queued-IOS=0
=====
----- Host ----- - Stor - -- I/O Path - -- Stats -
### HW Path          I/O Paths  Interf.  Mode   State  Q-IOS
Errors
=====
  0 pci@1f,0/pci@1/fibre-channel@3 c1t13d103s0 FA  5aA   active alive    0
  1 pci@1f,0/pci@1/fibre-channel@4 c2t13d103s0 FA 12bA   active alive    0

Pseudo name=emcpower2a
Symmetrix ID=000284701227
Logical device ID=01A3
state=alive; policy=SymmOpt; priority=0; queued-IOS=0
=====
----- Host ----- - Stor - -- I/O Path - -- Stats -
### HW Path          I/O Paths  Interf.  Mode   State  Q-IOS
Errors
=====
  0 pci@1f,0/pci@1/fibre-channel@3 c1t13d104s0 FA  5aA   active alive    0
  1 pci@1f,0/pci@1/fibre-channel@4 c2t13d104s0 FA 12bA   active alive    0
```

To save the configuration so that it is persistent across reboots (although not reconfiguration reboots).
Use `/etc/powermt save`

```
#/etc/powermt save
```

This will update the `/etc/powermt.custom` file.