release notes

HP StorageWorks Secure Path 3.0F Service Pack 1 for HP-UX 11i v1.0, 11i v2.0 and Secure Path 3.0F Service Pack 1 Workgroup Edition for HP-UX 11i v1.0, 11i v2.0

VERSION 3.0F SP1

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HP StorageWorks Secure Path 3.0F Service Pack 1 for HP-UX 11i v1.0, 11i v2.0 and Secure Path 3.0F Service Pack 1 Workgroup Edition for HP-UX 11i v1.0, 11i v2.0

About this document

This document summarizes the most recent product information about the HP StorageWorks Secure Path 3.0F Service Pack 1 (SP1) for HP-UX 11i v1.0, 11i v2.0 and Secure Path 3.0F Service Pack 1 Workgroup Edition for HP–UX 11i v1.0, 11i v2.0 systems, including:

- Release notes information
- Intended audience
- Accessing future product updates
- Other documentation

Release notes information

This release notes contain the following topics:

- Secure Path 3.0F SP1 kit contents
- Secure Path 3.0F SP1 for Active-Passive disk arrays
  - Differences between Secure Path for Active-Passive 3.0F and 3.0F SP1
  - Operating system support
  - Avoiding problem situations
  - Managing Event Monitoring Service (EMS)
  - Procedure for determining the standby path's hardware path
  - Secure Path driver for Active-Passive disk arrays
  - Secure Path Manager (spmgr)
  - Interoperability with Ignite-UX software
- Secure Path 3.0F SP1 for Active-Active disk arrays
  - Differences between Secure Path 3.0F and 3.0F SP1 for Active-Active disk arrays
  - Operating system support
  - Avoiding problem situations
- Secure Path 3.0F SP1 Workgroup Edition for Virtual Array (VA) and Modular Smart Array (MSA)1500 disk arrays
  - Differences between Secure Path 3.0F and 3.0F SP1 for Workgroup Edition
  - Operating system support
  - Avoiding problem situations
- Secure Path device path representation and usage
  - Device path representation of Secure Path for Active-Passive disk arrays
  - Device path representation of Secure Path for Active-Active disk arrays
  - Differences between Secure Path for Active-Active disk arrays and LVM PVLINKS
  - HP recommends

Intended audience

This document is intended for customers who have purchased the HP StorageWorks Secure Path 3.0F SP1 for HP-UX 11i v1.0, 11i v2.0 on Active-Passive and Active-Active disk arrays and Secure Path 3.0F SP1 Workgroup Edition for HP-UX 11i v1.0, 11i v2.0. The document can also be used by those customers who are responsible for installing, configuring, and maintaining this product in their HP-UX server environment.

Accessing future product updates

HP recommends that customers sign up online using the Subscriber's choice web site at http://www.hp.com/go/e-updates.

- Subscribing to this service provides you with email updates on product enhancements, newer versions of drivers, and firmware documentation updates, as well as instant access to other product resources.
- After signing up, you can quickly locate your products by selecting Business support and then Storage under Product Category.

Other documentation

Additional documentation that you may find helpful includes:

- *HP StorageWorks Secure Path 3.0F Service Pack 1 for HP-UX 11i v1.0, 11i v2.0 and Secure Path 3.0F Service Pack 1 Workgroup Edition for HP-UX 11i v1.0, 11i v2.0 installation and reference guide, part number AA-RR4VJ-TE*
- Whitepapers and best-practices documents, are available at: http://www.hp.com/country/us/eng/prodserv/storage.html.

Secure Path 3.0F SP1 kit contents

The Secure Path 3.0F SP1 for HP-UX kit includes:

- Secure Path 3.0F Service Pack 1 for HP-UX readme.txt document.
- *HP StorageWorks Secure Path 3.0F Service Pack1 for HP-UX 11i v1.0, 11i v2.0 and Secure Path 3.0F Service Pack 1 Workgroup Edition for HP-UX 11i v1.0, 11i v2.0 installation and reference guide*, part number AA-RR4VJ-TE.
- Secure Path 3.0F SP1for HP-UX 11i v1.0 and HP-UX 11i v2.0 CD-ROM.

The Secure Path 3.0F SP1 for HP-UX 11i v1.0 and 11i v2.0 web kit includes:

- Secure Path 3.0F Service Pack 1 for HP-UX readme.txt document.
- HP StorageWorks Secure Path 3.0F for HP-UX 11i v1.0, 2.0 compressed tar package, which includes the software and the release notes.

NOTE:

For Secure Path 3.0F SP1, `swlist` displays the version as A.3.0F.01F.00F.

Secure Path 3.0F SP1 release notes supersede all earlier versions of the release notes. Refer to your Secure Path 3.0F SP1 kit documentation for Secure Path operating details.

Secure Path 3.0F SP1 for Active-Passive disk arrays

This section contains the following information:

Differences between Secure Path for Active-Passive 3.0F and 3.0F SP1

This section contains the following information:

- Issues resolved in Secure Path 3.0F SP1
- Changes made in this release

Issues resolved in Secure Path 3.0F SP1

The following issues have been resolved in Secure Path 3.0F SP1 for Active-Passive disk arrays:

- The `spmgr add` command used to display an incorrect warning message in HP-UX 11.0 when there were no LUNs to add from the unattached list. This problem has been fixed and now the system displays an appropriate warning message when the issue occurs.
- The `spmgr delete` command used to display an incorrect message when it was not able to delete all the LUNs. This problem has been fixed and now the system displays an appropriate error message when the issue occurs.
- The `spmgr select` command used to display a warning message indicating that a LUN belongs to a LUN group, even though the selected LUN was not part of a LUN group. This issue has been fixed in this version of Secure Path.
- The issue in removing the depot files from `/tmp` directory after un-installation, has been resolved.
- Under certain scenarios, the `spmgr add` command used to corrupt the data structures and hanged the system after a subsequent issue of `ioscan` command. This issue has been fixed in this version of Secure Path.
- Now, Secure Path for Active-Passive disk array no longer logs and displays the incorrect message (`Configuration error.  Invalid or missing target/LUN WWID entry for 60001FE1000FE8600009105071230009 on array 50001FE1000FE860.`) when a new LUN is presented to the host and `ioscan` is run.

Changes made in this release

This release of Secure Path includes the following new feature:

- A new `spmgr refreshdisplay` command is available to update the serial numbers of all the available array controllers.

Operating system support

Table 1 lists the system features and requirements for Secure Path 3.0F SP1 for Active-Passive disk arrays. For additional support information, check the HP web site: http://www.hp.com/support.

Table 1 Secure Path 3.0F SP1 for Active-Passive disk arrays system feature and requirements

System feature	Requirement
Operating system versions	HP-UX 11i (v1.0, v2.0) 64-bit HP-UX 11i (v1.0) 32-bit
HP-UX server system types	A-class: rp24xx K-class (64-bit only): Kx60, Kx70, Kx80 L-class: rp54xx N-class: N4000, rp74xx V-class: V2200, V2250, V2500 V2600 rp3440, rp4440, rp7410, rp7420, rp8400 rx1600, rx2600, rx4640, rx5670, rx7650, rx8620 zx2000, zx6000 Superdome, Superdome Integrity
File systems	HFS (UFS) JFS (VxFS)
Controllers	Dual HSG60 controllers operating ACS 8.6L or later Dual HSG80 controllers operating ACS 8.6F or later Dual HSV100 controllers operating VCS 3.010 or later Dual HSV110 controllers operating VCS 3.010 or later
SCSI modes	SCSI-2 with or without CCL SCSI-3 with CCL
Volume managers	HP Logical Volume Manager
Clustering	HP MC/ServiceGuard 11.15 or later
Fibre Channel modes	Switched fabric

NOTE:

Secure Path 3.0F SP1 supports the Fibre Channel switches and firmware listed in the *HP StorageWorks SAN Design reference guide at:* http://h18006.www1.hp.com/products/storageworks/san/documentation.html.

Table 2 lists the supported devices and the driver requirements for this release, and earlier releases of Secure Path for Active-Passive disk arrays.

Table 2 Secure Path 3.0F SP1 for Active-Passive disk arrays supported devices and driver requirements

HP-UX version	Supported HBAs	Minimum revision drivers	Supported storage arrays
11i v1.0	A5158A A6795A A6685A A6826A	Fibre Channel B.11.11.01	RA8000/ESA12000 (HSG80) MA8000/EMA12000 (HSG80) MA6000 (HSG60) EMA16000 (HSG80) EVA3000 (HSV100) EVA5000 (HSV110)
11i v1.0	A6826A A9782A A9784A	Fibre Channel B.11.11.03	RA8000/ESA12000 (HSG80) MA8000/EMA12000 (HSG80) MA6000 (HSG60) EMA16000 (HSG80) EVA3000 (HSV100) EVA5000 (HSV110)
11i v2.0	A6795A A6826A A9782A A9784A	Fibre Channel B.11.23.01	RA8000/ESA12000 (HSG80) MA8000/EMA12000 (HSG80) MA6000 (HSG60) EMA16000 (HSG80) EVA3000 (HSV100) EVA5000 (HSV110)

Table 3 lists the patch revisions for this release and earlier releases of Secure Path for Active-Passive disk arrays.

Table 3 Patch revisions for Secure Path 3.0F SP1 for Active-Passive disk arrays

HP-UX version	Patch revisions (minimum)
11i v1.0	HWEnable11iB.11.11.0505 or later PHKL_33367 – (u)mount performance PHKL_27321 Early KRS PHKL_28569 WSIO Patch PHKL_33372 VM Patch PHKL_30257 – Fibre Channel Mass Storage Patch PHKL_30219 Dump Patch1 for EVA support PHKL_32090 SCSI IO Cumulative Patch PHKL_32457 – getmount_entry PHKL_30607 Dump Patch2 for EVA support PHKL_30607 PHKL_32854 PHKL_30622LVM cumulative Patch PHKL_30833 (VxFS cumulative) PHKL_32854 PHCO_27957 umount(1M) cumulative PHCO_33205 mountall cumulative PHCO_27959 umountall(1M)cumulative PHCO_30730 VxVM Enterprise Administrator Srvc patch PHCO_30731 VxVM Enterprise Administrator Patch PHCO_33327 mount(1M) cumulative PHCO_33533 libc cumulative patch PHCO_30698 PHKL_30511 PHCO_27120 PHKL_30622 PHCO_24402 PHKL_31918
11i v2.0	N/A

Table 4 lists the configuration limits for Secure Path 3.0F SP1 for Active-Passive disk arrays.

Table 4 Configuration limitations for Secure Path 3.0F SP1 for Active-Passive disk arrays

Parameter	Minimum	Max qualified	Max supported
Adapter support	1	8	Platform limit
Storage arrays per host	1	8	128 arrays
LUNs per storage array per host	1	256	Array limit

Avoiding problem situations

The following section lists problems that may arise during Secure Path operation and how to avoid those problems, including:

- General problems
- Problem with setboot command
- Re-configuring dump devices in the event of path failover
- Installing Secure path in vPars environment
- LUN collision

IMPORTANT:

For Secure Path device path representation and usage, refer to Secure Path device path representation and usage section.

General problems

This section describes the general problem situations that may arise during Secure Path operation and how to avoid the problems:

- When Secure Path is installed on HP-UX 11i v2.0, the following warning messages are displayed. You can ignore these messages.

```
ld:  (Warning) Ignoring .IA_64.unwind_hdr section in file
"/usr/conf/mod/hsx".
ld:  (Warning) Ignoring .IA_64.unwind_hdr section in file
"/usr/conf/mod/swsp".
ld:  (Warning) Ignoring .IA_64.unwind_hdr section in file
"/usr/conf/mod/swspBus" .  3 warnings.
```

- After adding new LUNs and executing `ioscan` a `syslog` message indicates that the `ioscan` operation aborted. If the newly added LUNs are owned by `sdisk` instead of hsx (Secure Path), run `rmsf - H h/w_addr` for that `sdisk` entry, and then run `ioscan` to enable ownership of the LUNs by Secure Path.
- Concurrent or overlapping `ioscans` can result in the first `ioscan` reporting the intermediate path states of the second `ioscan` while the second `ioscan` correctly reports the state of the paths. An application that performs `ioscan` comparisons could erroneously detect an error when overlapped by another `ioscan`.
- During an `ioscan`, `sdisk` drivers attach to `swsp` interface drivers instead of to the `fcparray (SCSI-3)` or `fcpdev (SCSI-2)`. Be careful with applications that use `ioscan` outputs that depend on the hardware tree, which existed prior to Secure Path installation.
- When a path to a device managed by LVM becomes unavailable because of a controller, path link, switch, or HBA failure, I/O requests can be delayed by up to one minute immediately after the failure. As a result, the responsiveness of mirrored logical volumes could be briefly affected.

  When a physical volume becomes unavailable, applications normally experience a delay while an I/O request to that physical volume times out. By default, this delay lasts 30 seconds, (although you can change the duration of the delay by using the `pvchange (1M)` command).

  - In the case of a read operation, LVM selects another mirror and tries again.
  - In the case of a write operation, LVM records the error and continues as long as the data has been successfully written to at least one mirror.

  In either case, with Secure Path installed, this initial timeout can last up to one minute. After the time-out, LVM keeps track of the physical volume status as “Unavailable”, and future I/O requests does not suffer the delay.

- Do not make any SAN configuration changes to the system during the upgrade or installation of Secure Path 3.0F SP1. For example, do not add new arrays or LUNs, or delete arrays or LUNs during upgrade or installation of Secure Path 3.0F SP1.
- Due to constraints imposed by the software distributor (SD) tools, the server's network must be configured prior to the installation of Secure Path.
- Stopping `spagent` using the `spinit stop` command, and then starting `spagent` using the `spinit start` command results in `stderr` messages. To avoid these messages from printing, start `spagent` in a new session and then exit that session.
- Do not use the HP system administration manager (SAM) to create or extend volume groups. Creating and extending volume groups must be done using HP-UX commands. When SAM scans for hardware, any HSGxx/HSV1xx LUNs created after the first LUN are not parsed correctly by SAM and cannot be selected to create a volume group. Use HP-UX commands to create or extend volume groups, and then use SAM to create and manage logical volumes.
- Ensure that 2-GB Fibre Channel switches have port speeds correctly set, and that they are not set to auto-negotiate.
- When creating snapshots or clones of a device that is managed by LVM, be careful not to misconfigure LVM. After creating a snapshot or clone of a physical volume, always run `vgchgid(1M)` to break the association between the volume group and the snapshot or clone. Otherwise, LVM assumes that the snapshot or clone is an alternate path to the original physical volume. This misconfiguation could lead to data corruption if the snapshot or clone was added later to the volume group by means of `vgextend(1M)`, `vgimport(1M)`, or `vgscan(1M)`.
- When replacing array controllers online, enable the path verification to update controller IDs in Secure Path data structures. If path verification is not enabled during controller replacement , use `spmgr refreshdisplay` command to update the serial numbers of the controller.

Problem with setboot command

The `setboot` command fails to set the alternate or high availability hardware path on HP-UX 11i v2.0 IA-64 platform for SAN boot disks on EVA Active-Passive disk arrays.

Follow the steps below to set the primary, alternate, and high availability hardware paths from the EFI shell, which requires a system reboot.

1. If Secure Path is not installed on your system, run `ioscan –fneC disk` and record the EFI path given for each bootable device along with its physical hardware path. If Secure Path is installed on your system, refer to the sub-section, "Identifying the EFI path of the physical hardware path on systems with Secure Path installed" later in this document.

```
Class I H/W Path Driver S/W State H/W Type Description

===============================================================

disk 2 0/0/2/1.3.0 sdisk CLAIMED DEVICE HP DVD-ROM 305
/dev/dsk/c1t3d0 /dev/rdsk/c1t3d0

Acpi(HWP0002,0)/Pci(2|1)/Scsi(Pun3,Lun0)/\EFI\HPUX\HPUX.EFI disk 0
0/1/1/0/1/1.0.0 sdisk CLAIMED DEVICE HP 36.4GST336753LC

/dev/dsk/c3t0d0 /dev/dsk/c3t0d0s2 /dev/rdsk/c3t0d0 /dev/rdsk/
c3t0d0s2

/dev/dsk/c3t0d0s1 /dev/dsk/c3t0d0s3 /dev/rdsk/c3t0d0s1
/dev/rdsk/c3t0d0s3

Acpi(HWP0002,0)/Pci(2|1)/Scsi(Pun3,Lun0)/\EFI\HPUX\HPUX.EFI disk 0
0/1/1/0/1/1.0.0 sdisk CLAIMED DEVICE HP 36.4GST336753LC

Acpi(HWP0002,100)/Pci(1|0)/Pci(1|1)/Scsi(Pun0,Lun0)/
HD(Part1,SigC44D04A0-0672-11D9-8002-D6217B60E588)/\EFI\HPUX\HPUX.EFI

disk 6 0/2/1/0.16.1.0.0.0.3 sdisk CLAIMED DEVICE COMPAQ HSV110
(C)COMPAQ

Acpi(HWP0002,200)/Pci(1|0)/Fibre(WWN5002B36C,Lun0)/
HD(Part1,SigC8FB3EDE-79D3-11D9-8002-D6217B60E588)/\EFI\HPUX\HPUX.EFI

disk 14 0/2/1/0.16.4.0.0.0.3 sdisk CLAIMED DEVICE COMPAQ HSV110
(C)COMPAQ
```

```
Acpi(HWP0002,200)/Pci(1|0)/Fibre(WWN5002B36D,Lun0)/
HD(Part1,SigC8FB3EDE-79D3-11D9-8002-D6217B60E588)/\EFI\HPUX\HPUX.EFI
disk 17 0/5/1/0.16.1.0.0.0.3 sdisk CLAIMED DEVICE COMPAQ HSV110
(C)COMPAQ
Acpi(HWP0002,500)/Pci(1|0)/Fibre(WWN5002B36C,Lun0)/
HD(Part1,SigC8FB3EDE-79D3-11D9-8002-D6217B60E588)/\EFI\HPUX\HPUX.EFI
disk 26 0/5/1/0.16.4.0.0.0.3 sdisk CLAIMED DEVICE COMPAQ HSV110
(C)COMPAQ
Acpi(HWP0002,500)/Pci(1|0)/Fibre(WWN5002B36D,Lun0)/
HD(Part1,SigC8FB3EDE-79D3-11D9-8002-D6217B60E588)/\EFI\HPUX\HPUX.EFI
```

2. During the system boot, interrupt the boot process at EFI boot manager

   ```
   EFI Boot Manager ver 1.10 [14.60] Firmware ver 2.21 [4306]
   Please select a boot option
   HP-UX Primary Boot:  0/5/1/0.16.4.0.0.0.3
   HP-UX HA Alternate Boot:  0/1/1/0/1/1.0.0
   HP-UX Alternate Boot:  0/1/1/0/1/1.2.0
   EFI Shell [Built-in]
   Boot option maintenance menu
   Security/Password Menu
   Use ^ and v to change option(s).  Use Enter to select an option
   ```

3. Select the Boot option maintenance menu

   ```
   Boot from a File
   Add a Boot Option
   Delete Boot Option(s)
   Change Boot Order
   Manage BootNext setting
   Set Auto Boot TimeOut
   Select Active Console Output Devices
   Select Active Console Input Devices
   Select Active Standard Error Devices
   Cold Reset
   Exit
   ```

4. Select Add a Boot Option

   ```
   IA64_EFI [Acpi(HWP0002,200)/Pci(1|0)/Fi-
   bre(WWN50001FE15002B36C,Lun4003000000000000)/HD(Part1,SigC8FB3EDE-
   79D3-11D9-800
   IA64_EFI [Acpi(HWP0002,200)/Pci(1|0)/Fi-
   bre(WWN50001FE15002B36C,Lun4003000000000000)/HD(Part3,SigC8FB3F38-
   79D3-11D9-800
   IA64_EFI [Acpi(HWP0002,200)/Pci(1|0)/Fi-
   bre(WWN50001FE15002B36D,Lun4003000000000000)/HD(Part1,SigC8FB3EDE-
   79D3-11D9-800
   IA64_EFI [Acpi(HWP0002,200)/Pci(1|0)/Fi-
   bre(WWN50001FE15002B36D,Lun4003000000000000)/HD(Part3,SigC8FB3F38-
   79D3-11D9-800
   IA64_EFI [Acpi(HWP0002,100)/Pci(1|0)/Pci(1|1)/Scsi(Pun2,Lun0)/
   HD(Part1,Sig8CC0A96A-6072-11D9-800
   IA64_EFI [Acpi(HWP0002,100)/Pci(1|0)/Pci(1|1)/Scsi(Pun2,Lun0)/
   HD(Part3,Sig8CC0A9BA-6072-11D9-800
   Removable Media Boot [Acpi(HWP0002,0)/Pci(2|1)/Scsi(Pun3,Lun0)]
   Load File [EFI Shell [Built-in]]
   ```

```
Load File [Acpi(HWP0002,100)/Pci(1|0)/Pci(4|0)/Mac(00306E495F6F)
Exit
```

NOTE:

To have the LUNs from other controller to be listed in the options, refer to sub-section Enumerating all Fibre Channel devices later in this document.

5. Select any of the Fibre options (as mentioned in step1). Select the boot partition Part1.

   Example:

   ```
   IA64_EFI
   [Acpi(HWP0002,200)/Pci(1|0)/Fibre(WWN50001FE15002B36D,Lun400300
   0000000000)/HD(Part1,SigC8FB3EDE-79D3-11D9-800
   02/08/05 08:18a <DIR> 4,096 EFI
   [Treat like Removable Media Boot]
   Exit
   ```

6. Next, select EFI directory

   ```
   02/08/05 08:18a <DIR> 4,096 .
   02/08/05 08:18a <DIR> 0 ..
   02/08/05 08:18a <DIR> 4,096 HPUX
   02/08/05 08:18a <DIR> 4,096 Intel_Firmware
   02/08/05 08:18a <DIR> 4,096 DIAG
   02/08/05 08:18a <DIR> 4,096 HP
   02/08/05 08:18a <DIR> 4,096 TOOLS
   Exit
   ```

7. Now, select HPUX directory

   ```
   02/08/05 08:18a <DIR> 4,096 .
   02/08/05 08:18a <DIR> 4,096 .  .
   02/08/05 08:33a <DIR> 521,494 HPUX.EFI
   02/08/05 08:33a <DIR> 24,576 NBP.EFI
   Exit
   ```

8. Next, select HPUX.EFI

   ```
   Filename:  \EFI\HPUX\HPUX.EFI
   DevicePath:  [Acpi(HWP0002,200)/Pci(1|0)/Fi-
   bre(WWN50001FE15002B36D,Lun4003000000000000)/HD(Part1,SigC8FB3EDE-
   79D3-11D9-8002-D6217B60E588)/\EFI\HPUX\HPUX.EFI]
   IA-64 EFI Application 02/08/05 08:33a 521,494 bytes
   Enter New Description:
   ```

NOTE:

If the display is `Edit Existing Boot Option` or `make a new entry [E-Edit N-New]:`, means the particular device is already existing in the boot option. Proceed further but do not save the changes to NVRAM, that is, proceed till step 10 and enter 'N' when prompted.

9. Enter a description that you want to display in the available boot options in the EFI boot manager.

   For example:

   ```
   Enter New Description:  0/2/1/0.16.4.0.0.0.3
   New BootOption Data.  ASCII/Unicode strings only, with max of 240
   characters
   ```

```
Enter BootOption Data Type [A-Ascii U-Unicode N-No BootOption] :
```

10. Enter 'N'

```
Enter BootOption Data Type [A-Ascii U-Unicode N-No BootOption] :
None
```

11. Enter 'Y'

```
Save changes to NVRAM [Y-Yes N-No]:
```

12. Select Exit to return to the Boot option maintenance menu as described in step 3. Select Change Boot Order.
13. Select the newly added boot option and using the keys 'U' or 'u' move it to the desired position in the boot order.
14. Select Save changes to NVRAM to use the newly added boot option in the chosen position in the EFI boot manager.

    Next, you need to identify the EFI path of the physical hardware path on systems that has the Secure Path installed.

15. Now, note down the active controller serial number using `spmgr display -dv <HSx boot device>`. In this example it is `P5849D5AAPN00W`.

    For example:

```
Server:  aphia3.india.hp.com Report Created:  Fri, Feb 25 18:33:19
2005

Command:  spmgr display -dv c24t0d2

Device:  c24t0d2

Status:  Operational [8 paths (4/0/4)]

Storage:  5000-1FE1-5002-B360

LUNID: 6005-08B4-0001-3680-0001-0000-0083-0000

Preferred Controller:  None

HBAs:  td0 td3

Item Device Controller HBA H/W_Path Instance

= = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =

0 c24t0d2 P5849D5AAPN00W td0 255/255/0/0.2 c4t0d3 WWPN: Unknown Path
State:  Active [P]

1 c24t0d2 P5849D5AAPN00W td0 255/255/0/0.2 c10t0d3 WWPN: Unknown
Path State:  Active

2 c24t0d2 P5849D5AAPU05E td0 255/255/0/0.2 c6t0d3 WWPN: Unknown Path
State:  Standby

3 c24t0d2 P5849D5AAPU05E td0 255/255/0/0.2 c8t0d3 WWPN: Unknown Path
State:  Standby
```

16. Note down the port `WWNs` of this active controller. You can obtain this by the Command View EVA. For this controller `P5849D5AAPN00W` the port WWNs are `50001FE15002B36C` and `50001FE15002B36D`.
17. To enumerate all fibre channel devices, select EFI Shell [Built-in] from the EFI boot manager as described in step 2.

```
Shell> drivers

V VERSION E G G #D #C DRIVER NAME IMAGE NAME

== ======== = = = == == ===================================

14 00000010 B - - 8 17 PCI Bus Driver PciBus

25 00000110 B X X 1 6 HP Tachyon XL2 Fibre Channel Mass S PciRom
Seg=00000000

27 00000140 D X X 1 - HP 2 Gb Fibre Channel Driver PciRom
Seg=00000000

28 00000140 D X X 1 - HP 2 Gb Fibre Channel Driver PciRom
Seg=00000000
```

```
2B 00000110 B X X 1 6 HP Tachyon XL2 Fibre Channel Mass S PciRom
Seg=00000000
Choose the fibre channel drivers of the system
Shell> drvcfg 25
Configurable Components Drv[25] Ctrl[26] Lang[eng]
Shell> drvcfg –s 25 26
Current policy:  Enumerate all Fibre Channel devices
Please select the desired enumeration policy:
0 :  Enumerate all Fibre Channel boot devices in the boot option
list
1 :  Enumerate all Fibre Channel devices
Q : exit with no change
Policy >
Choose 1.
Repeat the steps for the other driver instance too (in this example
2B)
Shell> reconnect –r
Shell> exit
```

Re-configuring dump devices in the event of path failover

In the event of a path failure to a device that is configured as a system dump device, a reconfiguration using an alternate active path to the device is automatically attempted.

Under certain extreme circumstances, dump reconfiguration using the new path may fail (for example, dump configuration through `crashconf(1M)` occurring in parallel to a path failover event and the event, timing out).

If this occurs, an error message is logged in `/var/adm/syslog/syslog.log`, with the device name for the failed automatic path reconfiguration.

Use the following procedure to recover from this situation:

1. Note the `ctd/volume` name of the device for which configuration has failed (based on information in the error message).
2. Ensure that this device is a dump device using the `crashconf(1M)` command.
3. Reconfigure this device as dump device using the `crashconf(1M)` command.

NOTE:

This section applies only to HP-UX 11i v1.0. Reconfiguration of dump devices in the event of a path failover is automatic in later versions of HP-UX.

Installing Secure path in vPars environment

This section provides information about the installation of Secure Path in vPars environment on an EVA boot LUN. Follow the steps below to have a flawless installment:

1. Install the HP-UX operating system on an EVA LUN.
2. Install Kernel Patch `PHKL_33581` (`s700_800 11.23 USB DVD Boot, EFI Device Path, HW Enablement`)

   NOTE:

   You must install the patch `PHKL_33581` on each partition.

3. Install the HP-UX Virtual Partitions software A.04.02.01 and above.
4. Create Virtual Partitions by running `vparcreate` command and then boot individual partitions.

   NOTE:

   Refer to *Installing and Managing HP-UX Virtual Partitions* for more information on vPars.

5. Install Secure Path 3.0F SP1 in each partition.

NOTE:

If you have installed Secure Path on an EVA boot LUN, you cannot install vPars on the same boot LUN.

LUN collision

If path verification is disabled and if a device is unpresented before deleting the device with the `spmgr delete` command, and a new device is added with the same virtual disk or unit number as the old device, the new device is bound to the `WWLUNID` of the old deleted device. This leaves the newly added device in an inconsistent state. Do not perform any operations until you perform the following recovery procedure:

1. Ensure that the old LUN is not in use (for example, suspend I/O).
2. Put the LUN in an inactive state:
   - If the LUN is mounted, unmount it.
   - If the LUN is part of LVM volume group, deactivate it.
3. When the LUN is in an inactive state, enter the following commands:

   ```
   spmgr delete old_device
   ioscan
   insf -e
   ```
4. Confirm that the new LUN is discovered by entering the `spmgr display` command.

NOTE:

Prevent the LUNs from being left in an inconsistent state by always deleting a device with `spmgr delete` command before unpresenting the device.

If path verification is enabled, the LUN collision is identified and an appropriate message is logged in the syslog. Follow the instructions in syslog to recover from this problem.

Managing Event Monitoring Service (EMS)

This section contains information about Secure Path's event monitoring services, including:

- High-availability EVA environment recommendations
- EVA
- HSG80 controller
- Disabling hardware monitoring

High-availability EVA environment recommendations

In high-availability environments with heavy I/O loads, you may experience I/O time-out conditions. If I/O timeouts occur, HP recommends that you use the `pvchange` command to increase the `IO_timeout` value from a default of 30 seconds to no more than 60 seconds for LUNs (virtual disks) on v2.0 of the Enterprise Virtual Array (EVA). Under heavy I/O load conditions, the increased

IO_timeout value allows for longer I/O completion times and for LUN access delays if a controller failover condition occurs.

NOTE:

Make sure that you have HP MC/ServiceGuard configured properly. Refer to your HP MC/ServiceGuard documentation for configuration information or go to the HP web site at: http://docs.hp.com.

EVA

Disable the Event Monitoring Service (EMS) for all of the devices or LUNs in an EVA.

HSG80 controller

EMS logs erroneous HSG80 LUN errors due to an incompatibility issue between EMS and the HSG80 controllers. The HSG80 devices do not have operating problems, and you can ignore the messages.

If these syslog events are objectionable, you can avoid the erroneous error message by disabling EMS monitoring of the HSG80 devices. Use the procedure mentioned in the Disabling hardware monitoring to disable the EMS hardware monitor for HSG80 devices.

Disabling hardware monitoring

This section describes how to disable the EMS hardware monitor. Use this procedure to prevent the EMS from logging erroneous HSG80 LUN errors, including:

- About the disabled_instances file
- Using the disabled_instances file to disable hardware monitoring

About the disabled_instances file

The startmon_client program reads the following disabled_instances file:

```
/var/stm/data/tools/monitor/disabled_instances
```

The startmon_client program reads the disabled_instances file before reading the *.sapcfg file. Therefore, there is no startup of the monitor for the specific instance listed in the disabled_instances file.

The disabled_instances file is a text file that lists each fully qualified instance, one instance per line. You can use wild cards in the instance names to specify more than one instance. For example, the following entry specifies all the instances associated with the default disk resource names:

```
/storage/events/disks/default/*
```

For those instances listed in the disabled_instances file, no monitoring requests shows in the display for the monconfig (C)heck monitors command.

NOTE:

This does not mean that the monitor stops polling the device. It means that not all the events are forwarded to the log files, based on information in the *.sapcfg files.

Using the disabled_instances file to disable hardware monitoring

The following steps describe using the disabled_instances file to disable an EMS hardware monitor for a single instance (enabled in IPR0009):

1. Run /etc/opt/resmon/lbin/monconfig at the monitoring request manager main menu.
2. Select (K)ill (disable) monitoring.

3. With an editor of your choice, add instances to the `disabled_instances` file in the following directory:

   ```
   /var/stm/data/tools/monitor/
   ```

4. Add the string located at the top of the EMS event message, similar to the following example:

   ```
   /storage/events/disks/default/0_0_254.0.0.5
   ```

5. Save the file.
6. Run `monconfig` again and select (E)nable monitoring.
7. Wait for monitoring to re-enable, and then select (C)heck monitors.

   The resource class that you had disabled should display in the list, with no monitoring requests.

Procedure for determining the standby path’s hardware path

The *HP StorageWorks Secure Path 3.0F Service Pack 1 for HP-UX 11i v1.0, 11i v2.0 and Secure Path 3.0F Service Pack 1 Workgroup Edition for HP-UX 11i v1.0, 11i v2.0 installation and reference guide*, section “Installing Secure Path on a SAN Boot Device” instructs you to determine the hardware path of a standby path by using the `spmgr display` and `ioscan` commands.

Use the following procedure to determine the hardware path of a standby path.

1. Enter the `spmgr display-dv boot device` command on the host. In the following example, the boot device is `/dev/dsk/c12t1d2`:

   ```
   spmgr display -dv c12t1d2
   ```

   The following output is displayed:

   ```
   Server:aphn1.india.hp.comReport Created:  Fri, Jan 30 18:44:42 2004
   Command:  spmgr display -dvc12t1d2

   Device:c12t1d2 Status:Operational[4 paths (1/0/2)] Storage:
   5000-1FE1-0015-0AE0 LUNID: 6005-08B4-0001-4920-0001-6000-04EA-0000
   Preferred Controller:  None HBAs:td4td6

   Item Device Controller HBA H/W_Path Instance

   = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =

   0 c12t1d2 P4889B49IM403L td4 255/255/0/2.3 c4t1d3 WWPN: N/A Path
   State:  Active

   1 c12t1d2 P4889B49IM403L td6 255/255/0/2.3 c8t1d3 WWPN: N/A Path
   State:  Available

   2 c12t1d2 P4889B49IM403A td4 255/255/0/2.3 c6t1d3 WWPN: N/A Path
   State:  Standby

   3 c12t1d2 P4889B49IM403A td6 255/255/0/2.3 c10t1d3 WWPN: N/A Path
   State:  Standby
   ```

   The output in this example shows four operation paths; one is in active path state, one is in available path state, and two are in standby path state. Select one of the standby instances to determine the hardware path, for example `c6t1d3`. Note the values of `c(6)`, `t(1)`, and `d(3)` in the instance.

2. Execute the `ioscan -kfnC ext_bus` command. Output similar to the following is displayed:

   ```
   # ioscan -kfnC ext_bus

   Class I H/W Path Driver S/W State H/W Type Description

   = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =

   ext_bus 0 0/0/1/0 c720 1 CLAIMED INTERFACE SCSI C896 Ultra Wide
   Single-Ended

   ext_bus 1 0/0/1/1 c720 CLAIMED INTERFACE SCSI C896 Ultra Wide
   Single-Ended

   ext_bus 2 0/0/1/1 c720 CLAIMED INTERFACE SCSI C87x Ultra Wide
   Single-Ended
   ```

```
ext_bus 3 0/0/1/1 c720 CLAIMED INTERFACE SCSI C87x Ultra Wide
Single-Ended
ext_bus 4 0/3/0/0.1.10.0.0 fcparray CLAIMED INTERFACE FCP Array
Interface
ext_bus 6 0/3/0/0.1.11.0.0 fcparray CLAIMED INTERFACE FCP Array
Interface
ext_bus 12 255/255/0 swsp CLAIMED VIRTBUS HSV110 (C)COMPAQ
0x50001FE1500049B0
```

Use the second (instance) and third (H/W path) fields of the output to help determine the hardware path. Find the `ext_bus` device that has the same instance number as the value of c in step 1. In this case, it is `ext_bus 6`.

```
ext_bus 6 0/3/0/0.1.11.0.0 fcparray CLAIMED INTERFACE FCP Array
Interface
```

3. Append the `t` and `d` values from step 1 `t(1)`, `d(3)` to the end of the hardware path determined in step 2 , to determine the hardware path of the standby path. In this case, the hardware path for the standby path `c6t1d3` is `0/3/0/0.1.11.0.0.1.3`.

Secure Path driver for Active-Passive disk arrays

Following are the problems that may arise for Secure Path driver for Active-Passive disk arrays:

- On HSG80-based systems, the `restart this_controller` and `restart other_controller` commands results in a change in the active controller. You may notice that there are no critical message reports that a failure has occurred or a different path has been selected. This is because the restart takes less time than required to validate a path failure.
- The rolling upgrade method, which upgrades ACS 8.7 to ACS 8.8 and is described in the *Maintenance and service guide of the solution software 8.8 for HP-UX*, fails if the server is running application I/O to the array being upgraded. You must quiesce all I/O to the array before starting the rolling upgrade procedure.
- On a server reboot, the active path comes up on the last path probed and not necessarily on the preferred path, regardless of the status of auto-restore or whether a preferred path has been selected. To restore the active paths to their preferred paths, enter the `spmgr restore` all command.
- After a LUN has been deleted using the `spmgr delete` command and the LUN is unpresented at the array, any re-presenting of that device and an `ioscan` results in the device showing in the `spmgr display –u` unattached list. The Secure Path driver keeps track of the device `WWLUNID` deleted status.
- Using the `spmgr select` and `spmgr restore` commands on LUNs that are part of a partitioned HSG80 LUN results in all LUNs of that partition being selected or restored. If the path being selected or restored is on the opposite controller from the currently active path, the operation causes the HSG80 to move control of the LUN to that controller. All LUNs that are partitions of that LUN also gets moved.

NOTE:

In a subsequent `spmgr display` , the LUN being operated on shows that the requested paths moved immediately. However, all the other LUNs of the partitioned HSG80 LUN must be polled either by path verification or by an I/O operation before `spmgr display` shows their movement.

- Do not make any SAN configuration changes to the system when upgrading or installing Secure Path. For example, do not add any new LUNs, or delete any arrays or LUNs.
- When the system is booting, do not execute any Secure Path commands until the Secure Path start-up services has started.
- If you configure some Secure Path devices under volume groups and reboot the system, the volume groups are not activated as part of the system’s volume group configuration during boot time. This situation occurs because the Secure Path persistence module is loaded (at

`init level 1`) only after the LVM configuration completes (before `init level 1`). The volume groups are activated by Secure Path's `init script` at `init level 2`.

- HSG80-based array settings for SCSI mode and operating system mode must be set properly for the array's version of ACS firmware, so that Secure Path 3.0F SP1 can work. The supported combinations of SCSI and operating system modes are shown in Table 5

Table 5 Supported SCSI and operating system modes

Secure Path version	ACS version	SCSI mode	Operating system mode
3.0F SP1	8.6 or later	SCSI-2	HP
3.0F SP1	8.7 or later	SCSI-3	HP_VSA

Table 6 shows unsupported version or mode combinations with resulting error conditions and problem solutions

Table 6 Unsupported SCSI and operating system modes

Secure Path version	ACS version	SCSI mode	Operating system mode	Error conditions and problem solution
3.0F SP1	8.6 or 8.7	SCSI-3	HP	There are 17 paths claimed for every real path and the LUNs are not accessible. To resolve this problem, set the SCSI mode to SCSI-2 and reboot.
3.0F SP1	8.7	SCSI-2	HP_VSA	No LUNs claimed by Secure Path. To resolve this problem, set the SCSI mode to SCSI-3 and run `ioscan`.

- Concurrent or overlapping `ioscans` can result in the first `ioscan` reporting intermediate path states of the second `ioscan`. The second `ioscan` correctly reports the state of the paths. An application that is doing `ioscan` compares could erroneously detect an error when another `ioscan` overlaps.
- During an `ioscan`, `sdisk` drivers attach to `swsp` interface drivers instead of `fcparray (SCSI-3)` or `fcpdev (SCSI-2)`. Be careful with applications that use `ioscan` outputs that depend on the hardware tree that existed prior to the installation of Secure Path.
- When a path to a device managed by LVM becomes unavailable because of a controller, path link, switch, or host bus adapter failure, you can delay the I/O requests by up to one minute immediately after the failure. As a result, the responsiveness of mirrored logical volumes could be briefly affected.

  When a physical volume becomes unavailable, applications normally experience a delay while an I/O request to that physical volume times out. By default, this delay is 30 seconds, but you can change the delay time using the `pvchange(1M)` command.

  - In the case of a read command, LVM selects another mirror and tries again.
  - In the case of a write command, LVM records the error and continues, as long as the data has been successfully written to at least one mirror.

  In either case, with Secure Path installed, this initial timeout could take up to one minute. Afterwards, LVM keeps track of the physical volume status as unavailable and future I/O requests do not suffer this delay.

NOTE:

Before deactivating the volume group, ensure that all the logical volumes of the volume group are unmounted. See Secure Path device path representation and usage for more details.

Secure Path Manager (spmgr)

Following are the problems that may arise in `spmgr` for Active-Passive disk arrays:

- If there are a large number of Secure Path devices configured to the system, the Secure Path startup service can take longer because device scanning is initiated to synchronize Secure Path persistence data.
- If a preferred path to a device is in the failed state and you run a `spmgr restore –d device` command, the command line responds with the prompt only. The path remains in a failed state and no path change is made. This is the expected response to the command.
- The `spmgr alias` command is use to refer a large cumbersome old name with a shorter or clearer alias name. Reversing the argument order in `spmgr alias` *alias_name old_name* results in the alias name replacing the old name. Henceforward, any command using the old name results in an error. You must delete the alias for the old name to work correctly.
- The `spmgr alias` command checks a table of reserved words to prevent you from using words in an alias name that would result in unexpected behavior. However, this list is not comprehensive. Be careful to avoid using special characters that could be misinterpreted by the shell, such as a leading "-" or "$." The current list of reserved words maintained by `spmgr` are listed below:

  ```
  add alias client delete display help log notify on off password
  prefer quiesce restart restore select set spmgr unalias unprefer
  ```
- The `spmgr restore –r 0000-0000-0000-0000` command should produce an error for an invalid `WWNN`, but instead it successfully restores all preferred paths on all attached arrays just like `spmgr restore all` command.
- If you enable auto-restore using the `spmgr set –a on` command, and select a new path using the `spmgr select -p path_instance` command, the user-selected path remains selected and will not be auto-restored. Auto-restore returns to the currently active path only if that path has failed and the failure has been repaired.
- The `spmgr add` *any_arg any_arg WWLUNID* command results in the following error message:

  ```
  Lun should be 0-7
  ```

  The error message should read:

  ```
  Unable to locate an unclaimed unit with that World Wide LUN ID.
  ```
- The `spmgr display –d device` command requires a device *(c#t#d#)* as an argument, but accepts a `WWLUNID` as the argument and responds with missing or incorrect data. Use only *device* with the `–d` option.
- The `spmgr select` and `spmgr restart` commands occasionally respond with the following error message:

  ```
  Error:  Invalid Argument
  ```

  However, the command completes correctly. If you see this error, verify command success with the `spmgr display` command.
- Notification event messages that contain fields for the adapter instance *(td#)*, array `WWNN`, or `LUN WWLUNID` sporadically report either DON'T CARE or "*" as the identifier. This reporting error has no impact on Secure Path operation and specific failure or change parameters can be viewed with the `spmgr display` command.
- Using `spmgr set -p on|off` *WWNN*, `spmgr set -a on|off` *WWNN* or `spmgr set -b on|off` *WWNN* without the `on|off` argument or using `spmgr set -f` *interval* without the *interval* argument always returns that parameter to the installation default values. That is, omitting the `on|off` argument returns path verification to on, auto-restore to off, load balancing to off, and the verification interval to 30 seconds.

Iteroperability with Ignite-UX software

Ignite-UX software does not support Secure Path 3.0F SP1 for the following reasons:

- When Secure Path 3.0F SP1 is installed on a system, the hardware addresses of all EVA disk LUNs change. During the recovery process, importing LVM volume groups existing on the EVA array may fail.
- If the boot disk resides on an EVA array, the system fails to boot due to an LVM configuration failure panic.
- Secure Path 3.0F SP1 is not included in the installation kernel and is not part of the core HP-UX operating system.

Secure Path 3.0F SP1 for Active-Active disk arrays

This section contains the following information:

- Differences between Secure Path 3.0F and 3.0F SP1 for Active-Active disk arrays
- Operating system support
- Avoiding problem situations

Differences between Secure Path 3.0F and 3.0F SP1 for Active-Active disk arrays

Listed below are the features supported in this version of Secure Path for Active-Active disk arrays:

- The Secure Path for Active-Active disk array now supports MSA1500, EVA3000 (HSV101), and EVA5000 (HSV111) disk arrays.
- The Secure Path Active-Active disk array now supports a new option (`-t`) for `autopath set` command that allows you to make unlimited number of retries for a failed I/O of an inaccessible LUN. You can also specify a time interval for performing the number of retries.
- This version of Secure Path for Active-Active disk array lets you exclude few LUN’s from Secure Path control.

Operating system support

Table 7 shows the system features and requirements for Secure Path 3.0F SP1 for Active-Active disk arrays. For additional support information, check the HP web site: http://www.hp.com/support.

Table 7 Secure Path 3.0F SP1 for Active-Active disk arrays system features and requirements

System feature	Requirement
Operating system versions	HP-UX 11i v1.0 (64 bit) HP-UX 11i v2.0
HP-UX server system types	A-class: rp24xx K-class (64-bit only): Kx60, Kx70, Kx80 L-class: rp54xx N-class: N4000, rp74xx V-class: V2200, V2250, V2500 V2600 rp7410, rp8400 rx1600, rx2600, rx5670, rx4640, rx7650, rx8620 zx2000, zx6000 Superdome, Superdome Integrity
File systems	HFs (UFS) JFS (VxFs)[1]
Fibre Channel adapters	HP A6826A HP A9782A HP A9784A HP A5158A HP A6795A HP A6685A (K-class server only)
Volume managers	HP Logical Volume Manager
Clusters	HP MC/Service Guard v A 11.15 or later
Fibre Channel modes	Switched Fabric and Arbitrated Loop

[1] Secure Path 3.0F SP1 for Active-Active disk array supports VxFS file system only on devices configured under LVM for EVA 3000 (HSV101), EVA 4000, EVA 5000 (HSV111), EVA 6000, and EVA 8000 disk arrays. For devices which are not under LVM, VxFS file system is not supported with Secure Path, for these arrays.

Table 8 lists the supported devices and minimum driver requirements for this release and earlier releases of Secure Path 3.0F SP1 for Active-Active disk arrays.

Table 8 Secure Path 3.0F SP1 for Active-Active disk arrays supported device and driver requirements

HP-UX version	Supported HBAs	Minimum revision drivers	Supported storage arrays
11i v1.0	A5158A A6795A A6685A	Fibre Channel B.11.11.01	EVA 3000 (HSV101) EVA 4000 EVA 5000 (HSV111) EVA 6000 EVA 8000 MSA 1500 VA 7100 VA 7110 VA 7400 VA 7410 XP 48 XP 128 XP 256 XP 512 XP 1024 XP 10000 XP 12000 HP OpenView Continuous Access Storage Appliance
11i v1.0	A6826A A9782A A9784A A6685A	Fibre Channel B.11.11.03	
11i v2.0	A6795A A6826A A9782A A9784A	Fibre Channel B.11.23.01	

NOTE:

The entire list of storage arrays is supported for each HP-UX version.

Table 9 lists the patch revisions for this release and earlier releases of Secure Path 3.0F SP1 for Active-Active disk arrays.

Table 9 Patch revisions for Secure Path 3.0F SP1 Active-Active disk arrays

HP-UX version	Patch revisions (minimum)
11i v1.0	Hardware Enablement Bundle June 2004 HWEnable11iB.11.11.0406.5 or later ULM-SERVICE B.11.11.01 SCSI Upper Layer Module Service PHKL_32670 1.0 SCSI Upper Layer Module Service Patch PHKL_30257 1.0Fibre Channel Mass Storage Patch
11i v2.0	Hardware Enablement Bundle May 2005 HWEnable11iB.11.23.0505 or later

Table 10 lists the configuration limits for Secure Path 3.0F SP1 Active-Active disk arrays.

Table 10 Configuration limitations for Secure Path 3.0F SP1 Active-Active disk arrays

Parameter	Minimum	Max qualified	Max supported
Adapter support	1	4	Platform limit
Storage arrays per host	1	4	Platform limit
LUNs per storage array per host	1	Array limit	Array limit
Paths per LUNs	1	32	N/A

Avoiding problem situations

Following are the problems that may arise during Secure Path operations:

- The status of a path is updated only when I/O is performed through that path.
- Only Fibre Channel connectivity is supported.
- When all paths to an end LUN fail in the case of non-LVM devices with VXFS file system, I/O to the LUN aborts. The system reacts the same whether or not Secure Path is used.
- When all paths to an end LUN fail in the case of I/O to non-LVM devices with HFS file system, or for async I/O to non-LVM devices, I/O to the LUN waits until the connectivity through these paths is restored. I/O starts only if the original path (the path on which I/O was started) comes back, and not if any of the alternate path comes back.
- Enter the `autopath discover` command before using newly added paths or devices. Secure Path does not recognize newly added paths or devices that are in use before the `autopath discover` command is executed.
- Discovery of New Paths / LUNs is effective only if `ioscan` and `insf -e` are executed prior to `autopath discover` command.
- If `ioscan` and `insf -e` are not run before running the `autopath discover` command, and if there are changes made in the SAN, `autopath discover` may take very long time to complete because of attempted retries by the lower level layers on the device paths.
- Secure Path 3.0F SP1 for Active-Active disk arrays does not support devices configured under Veritas Volume Manager.
- Secure Path 3.0F SP1 for Active-Active disk arrays does not support wild card characters. For example, you cannot use the question mark (?) along with a command to invoke the `help` command.
- If `HPswsp` is marked for uninstallation using `swremove` and if uninstallation is aborted, Load Balancing Policy settings defaults back to `NLB`.
- In a LUN collision scenario the new LUN is discovered through the paths used by the old LUN, provided the old LUN is not mounted or open. If the old LUN is mounted or open, the paths to the old LUN are marked failed since the LUN is unpresented. To recover the old LUN, assign the same `SCSI LUN ID` to the old LUN. To access the new LUN, present it at a different `SCSI LUN ID` or unmount or close the old LUN and run the `autopath discover` command.
- If the unattached list contains deleted LUN that you have configured under volume group, upon reboot the `autopath retrieve` command fails to retrieve the LUN back. As a workaround, deactivate the volume group till the retrieve functionality gets completed.

NOTE:

- Secure Path 3.0F SP1 for Active-Active disk array supports infinite retry only for VxFS file systems.
- If a device configured under HFS file system encounters an *All Paths Fail* condition, the I/O restarts only if the path on which original I/O is sent down by Secure Path is active.
- If the file system changes from VxFS to HFS, Secure Path 3.0F SP1 for Active-Active disk arrays does not automatically set the timeout value for a LUN as *infinite retry*.

IMPORTANT:

For Secure Path device path representation and usage, refer to Secure Path device path representation and usage section.

Secure Path 3.0F SP1 Workgroup Edition for Virtual Array (VA) and Modular Smart Array (MSA)1500 disk arrays

This section contains the following information:

- Differences between Secure Path 3.0F and 3.0F SP1 for Workgroup Edition
- Operating system support
- Avoiding problem situations

Differences between Secure Path 3.0F and 3.0F SP1 for Workgroup Edition

Listed below are the features supported in this version of Secure Path for Workgroup Edition disk arrays:

- The Secure Path for Workgroup Edition disk array now supports MSA1500, EVA3000 (HSV101), EVA5000 (HSV111) disk arrays.
- The Secure Path Workgroup Edition disk array now supports a new option (`-t`) for `autopath set` command that allows you to make unlimited number of retries for a failed I/O of an inaccessible LUN. You can also specify a time interval for performing the number of retries.
- This version of Secure Path for Workgroup Edition disk array lets you exclude LUN's from the Secure Path controls.

The following issues have been resolved in this release of Secure Path for Workgroup Edition VA disk arrays:

- The SST algorithm has been enhanced to sample the alternate paths periodically. This helps in avoiding scenarios where all the I/O are pumped to one device path of an end LUN for a long time without considering the alternate paths.
- The timing window issue due to race conditions between ioctls, device closure, and I/O has been resolved.
- The `Mode` value issue during an autopath device open from a character device, is now fixed.

Operating system support

Table 11 shows the system features and requirements for Secure Path 3.0F SP1 Workgroup Edition for VA and MSA1500 disk arrays. For more support information, check the HP web site: http://www.hp.com/support.

Table 11 Secure Path 3.0F SP1 Workgroup Edition for VA and MSA1500 system features and requirements

System feature	Requirement
Operating system versions	HP-UX 11i v1.0 (64 bit) HP-UX 11i v2.0
HP-UX server system types	A-class: rp24xx K-class (64-bit only): Kx60, Kx70, Kx80 L-class: rp54xx N-class: N4000, rp74xx V-class: V2200, V2250, V2500 V2600 rp7410, rp8400 rx1600, rx2600, rx5670, rx4640, rx7650, rx8620 zx2000, zx6000 Superdome, Superdome Integrity
File systems	HFs (UFS) JFS (VxFs)
Fibre Channel adapters	HP A6826A HP A9782A HP A9784A HP A5158A HP A6795A HP A6685A (K-class server only)
Volume managers	HP Logical Volume Manager
Clusters	HP MC/Service Guard v A 11.15 or later
Fibre Channel modes	Switched Fabric and Arbitrated Loop

Table 12 lists the supported devices and minimum driver requirements for this release and earlier releases of Secure Path 3.0F SP1 for Workgroup Edition for VA disk arrays. Notice that the entire list of storage arrays is supported for each HP-UX version

Table 12 Secure Path 3.0F SP1 for Workgroup Edition VA and MSA1500 disk arrays supported device and driver requirements

HP-UX version	Supported HBAs	Minimum revision drivers	Supported storage arrays
11i v1.0	A5158A A6795A A6685A	Fibre Channel B.11.11.01	MSA 1500 VA 7100 VA 7110 VA 7400 VA 7410
11i v1.0	A6826A A9782A A9784A A6685A	Fibre Channel B.11.11.03	
11i v2.0	A6795A A6826A A9782A A9784A	Fibre Channel B.11.23.01	

Table 13 lists the patch revisions for this release and earlier releases of Secure Path 3.0F SP1 Workgroup Edition for VA and MSA1500 disk arrays.

Table 13 Patch revisions for Secure Path 3.0F SP1 Workgroup Edition for VA and MSA1500 disk arrays

HP-UX version	Patch revisions (minimum)
11i v1.0	Hardware Enablement Bundle june 2004 HWEnable11iB.11.11.0406.5 or later ULM-SERVICE B.11.11.01 SCSI Upper Layer Module Service PHKL_32670 1.0 SCSI Upper Layer Module Service Patch PHKL_30257 1.0Fibre Channel Mass Storage Patch
11i v2.0	Hardware Enablement Bundle May 2005 HWEnable11iB.11.23.0505 or later

Table 14 lists the configuration limits for Secure Path 3.0f SP1 Workgroup Edition for VA and MSA1500 disk arrays.

Table 14 Configuration limitations for Secure Path 3.0F SP1 Workgroup Edition for VA and MSA1500 disk arrays

Parameter	Minimum	Max qualified	Max supported
Adapter support	Single HBA	4	Platform limit
Storage arrays per host	1	4	Platform limit
LUNs per storage array per host	1	Array limit	Array limit
Paths per LUNs	1	32	N/A

Avoiding problem situations

Following are the problems that may arise during Secure Path operation and it also lists how to avoid these problems:

- The status of a path is updated only when I/O is performed through that path.
- Only Fibre Channel connectivity is supported.
- When all paths to an end LUN fail in the case of non-LVM devices with VxFS file system, I/O to the LUN aborts. The system reacts the same whether or not Secure Path is used.
- When all paths to an end LUN fail in the case of I/O to non-LVM devices with HFS file system, or for async I/O to non-LVM devices, I/O to the LUN waits until the connectivity through these paths is restored. I/O starts only if the original path (the path on which I/O was started) comes back, and not if any of the alternate path comes back.
- Enter the `autopath discover` command before using newly added paths or devices. Secure Path does not recognize newly added paths or devices that are in use before the `autopath discover` command is executed.
- Discovery of New Paths or LUNs is effective only if `ioscan` and `insf -e` are executed prior to `autopath discover` command.
- If `ioscan` and `insf -e` are not run before running the `autopath discover` command, and if there are changes made in the SAN, `autopath discover` may take very long time to complete because of attempted retries by the lower level layers on the device paths.
- Secure Path 3.0F SP1 for Workgroup Edition disk arrays does not support devices configured under Veritas Volume Manager.

- Secure Path 3.0F SP1 for Workgroup Edition disk arrays does not support wild characters. For example, you cannot use the question mark (?) along with a command to invoke the `help` command.
- If `HPswsp` is marked for uninstallation using `swremove` and if uninstallation is aborted, Load Balancing Policy settings defaults back to `NLB`.
- In a LUN collision scenario the new LUN is discovered through the paths used by the old LUN, provided the old LUN is not mounted or open. If the old LUN is mounted or open, the paths to the old LUN are marked failed since the LUN is unpresented. To recover the old LUN, assign the same `SCSI LUN ID` to the old LUN. To access the new LUN, present it at a different `SCSI LUN ID` or unmount or close the old LUN and run the `autopath discover` command.
- If the unattached list contains deleted LUN that you have configured under volume group, upon reboot the `autopath retrieve` command fails to retrieve the LUN back. As a workaround, deactivate the volume group till the retrieve functionality gets completed.

NOTE:

- Secure Path 3.0F SP1 for Workgroup Edition disk array supports infinite retry only for VxFS file systems.
- If a device configured under HFS file system encounters an *All Paths Fail* condition, the I/O restarts only if the path on which original I/O is sent down by Secure Path is active.
- If the file system changes from VxFS to HFS, Secure Path 3.0F SP1 for Workgroup Edition disk arrays does not automatically set the timeout value for a LUN as *infinite retry*.

IMPORTANT:

For Secure Path device path representation and usage, refer to Secure Path device path representation and usage.

Secure Path device path representation and usage

This section provides information about device path representation, usage, and the best practice recommended by HP for the devices controlled by Secure Path, including:

- Device path representation of Secure Path for Active-Passive disk arrays
- Device path representation of Secure Path for Active-Active disk arrays
- Differences between Secure Path for Active-Active disk arrays and LVM PVLINKS
- HP recommends

Device path representation of Secure Path for Active-Passive disk arrays

Secure Path for Active-Passive disk array uses single virtual path to represent an end device. The operations on the device are carried out on the virtual device path. You cannot view or access the physical paths present to an end device, as they are hidden.

Example:

```
# spmgr display
 ==================================================================
  Storage:  5000-1FE1-5002-EB30
  Load Balance: Off   Auto-restore: Off
  Path Verify: On    Verify Interval: 30
  HBAs: fcd0 fcd1
  Controller:  P5849D5AAPL033, Operational
               P5849D5AAPL076, Operational
  Devices:  c40t0d0
TGT/LUN   Device WWLUN_ID                               #_Paths H/W path
 0/ 0   c40t0d0  6005-08B4-0001-2DB3-0000-D000-03AC-0000   4255/255/0/0.0
```

```
Controller  Path_Instance   HBA     Preferred?  Path_Status
P5849D5AAPL033                         no
        c47t0d1            fcd0        no          Active
        c43t0d1            fcd1        no          Available

Controller  Path_Instance   HBA       Preferred?  Path_Status
P5849D5AAPL076                           no
        c45t0d1             fcd0        no          Standby
        c41t0d1             fcd1        no          Standby
```

NOTE:

`c40t0d0` is the virtual path for physical path instances `c47t0d1, c43t0d1, c45t0d1`, and `c41t0d1` through different controllers.

Device path representation of Secure Path for Active-Active disk arrays

Secure Path for Active-Active disk array uses the real physical paths to an end device. The alternate paths are presented via actual device files as seen by HP-UX and you can view and access these paths.

Example:

```
#autopath display
 ==================================================================
 HPswsp Version        : A.3.0F.01F.00F
 ==================================================================
 Auto Discover         : ON
 ==================================================================
 Array Type            : XP
 Array WWN             : 2747
 ==================================================================
 Lun WWN               : 50_0-2747-0121
 Load Balancing Policy : No Load Balancing
 Lun Timeout           : Infinite Retry (-1)
 ==================================================================
 Device Path                    Status
 ==================================================================
 /dev/dsk/c30t0d0               Active
 /dev/dsk/c35t0d0               Active
 /dev/dsk/c37t0d0               Active
 /dev/dsk/c39t0d0               Active
 /dev/dsk/c41t0d0               Active
 /dev/dsk/c43t0d0               Active
 /dev/dsk/c45t0d0               Active
 /dev/dsk/c47t0d0               Active
```

NOTE:

You can use any of the alternate device paths to an end device, as there is no alias device concept.

Differences between Secure Path for Active-Active disk arrays and LVM PVLINKS

This section provides information about Secure Path for Active-Active disk arrays with LVM and LVM PVLINKS, including:

- Secure Path for Active-Active disk arrays with LVM
- Secure Path for Active-Active disk arrays with LVM PVLINKS

Secure Path for Active-Active disk arrays with LVM

For a device configured under LVM, if the LVM primary path fails, then Secure Path failovers to an alternate path and continues the Input/Output (I/O) till the primary path gets restored. Once the primary path is restored, the I/O resumes on the primary path of LVM.

Secure Path for Active-Active disk arrays with LVM PVLINKS

Secure Path takes control of the device configured under LVM with PVLINKS for alternate paths, and overrides LVM PVLINKS to provide automatic I/O path failover and fail back functionality. LVM PVLINKS provides alternate path for the device during system reboot.

HP recommends

HP recommends that you specify the physical volume paths while configuring LVM with PVLINKS and using LVM PVLINKS with Secure Path for Active-Active disk arrays. The physical paths for the alternate paths are a combination of paths that emerge from different HBAs, pass through different switches, and map to different controller ports on the disk array.

This configuration allows:

- Secure Path to provide high availability and load balancing to the volume group when the system is up and running.
- LVM PVLINKS to provide high availability if the LVM primary path has failed during system boot.

The following example displays the list of devices managed by Secure Path, after Secure Path is installed.

```
# autopath discover
# autopath display


==================================================================
 HPswsp Version        : A.3.0F.01F.00F
 ==================================================================
 Auto Discover         : ON
 ==================================================================
 Array Type            : XP
 Array WWN             : 2747
 ==================================================================
 Lun WWN               : 50_0-2747-0121
 Load Balancing Policy : No Load Balancing
 Lun Timeout           : Infinite Retry (-1)
 ==================================================================
 Device Path                    Status
 ==================================================================
 /dev/dsk/c30t0d0               Active
 /dev/dsk/c35t0d0               Active
 /dev/dsk/c37t0d0               Active
 /dev/dsk/c39t0d0               Active
 /dev/dsk/c41t0d0               Active
 /dev/dsk/c43t0d0               Active
 /dev/dsk/c45t0d0               Active
 /dev/dsk/c47t0d0               Active
```

The following example displays how to set load balancing policy for all the devices managed by Secure Path:

```
 # autopath set_lbpolicy < {policy name} {path} >

Policy name: The load balancing policy to set. Valid policies are
     RR      : Round Robin.
     SST     : Shortest Service Time.
     SQL     : Shortest Queue Length.
     NLB/OFF : No load balancing.

  Path: Device Special File e.g./dev/dsk/c#t#d#

  Example: autopath set_lbpolicy RR /dev/dsk/c30t0d1
```

The following example displays how to configure PVLINKS using the `vgextend` command:

```
   vgextend - extend an LVM volume group by adding physical volumes
 SYNOPSIS
      /usr/sbin/vgextend [-f] [-A autobackup] [-g pvg_name]
           [-x extensibility] [-z sparepv] vg_name pv_path ...
```

The following example displays how to add physical volumes `/dev/dsk/c0t1d0` and `/dev/dsk/c0t2d0` to volume group `/dev/vg03`:

```
#vgextend /dev/vg03 /dev/dsk/c0t1d0 /dev/dsk/c0t2d0
```

NOTE:

You can determine the alternate paths `/dev/dsk/c0t1d0` and `/dev/dsk/c0t2d0` for `vg03` using the `autopath display` command.