



Sun Enterprise Server Alternate Pathing 2.3.1 Reference Manual

Sun Microsystems, Inc.
901 San Antonio Road
Palo Alto, CA 94303-4900
U.S.A.

Part Number 806-4151-10
September 2000

Copyright 2000 Sun Microsystems, Inc. 901 San Antonio Road, Palo Alto, California 94303-4900 U.S.A. All rights reserved.

This product or document is protected by copyright and distributed under licenses restricting its use, copying, distribution, and decompilation. No part of this product or document may be reproduced in any form by any means without prior written authorization of Sun and its licensors, if any. Third-party software, including font technology, is copyrighted and licensed from Sun suppliers.

Parts of the product may be derived from Berkeley BSD systems, licensed from the University of California. UNIX is a registered trademark in the U.S. and other countries, exclusively licensed through X/Open Company, Ltd.

Sun, Sun Microsystems, the Sun logo, docs.sun.com, AnswerBook, AnswerBook2, and Solaris are trademarks, registered trademarks, or service marks of Sun Microsystems, Inc. in the U.S. and other countries. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the U.S. and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

The OPEN LOOK and Sun™ Graphical User Interface was developed by Sun Microsystems, Inc. for its users and licensees. Sun acknowledges the pioneering efforts of Xerox in researching and developing the concept of visual or graphical user interfaces for the computer industry. Sun holds a non-exclusive license from Xerox to the Xerox Graphical User Interface, which license also covers Sun's licensees who implement OPEN LOOK GUIs and otherwise comply with Sun's written license agreements.

RESTRICTED RIGHTS: Use, duplication, or disclosure by the U.S. Government is subject to restrictions of FAR 52.227-14(g)(2)(6/87) and FAR 52.227-19(6/87), or DFAR 252.227-7015(b)(6/95) and DFAR 227.7202-3(a).

DOCUMENTATION IS PROVIDED "AS IS" AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT SUCH DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

Sun Enterprise 10000 SSP Attributions:

This software is copyrighted by the Regents of the University of California, Sun Microsystems, Inc., and other parties. The following terms apply to all files associated with the software unless explicitly disclaimed in individual files.

The authors hereby grant permission to use, copy, modify, distribute, and license this software and its documentation for any purpose, provided that existing copyright notices are retained in all copies and that this notice is included verbatim in any distributions. No written agreement, license, or royalty fee is required for any of the authorized uses. Modifications to this software may be copyrighted by their authors and need not follow the licensing terms described here, provided that the new terms are clearly indicated on the first page of each file where they apply.

Copyright 2000 Sun Microsystems, Inc. 901 San Antonio Road, Palo Alto, Californie 94303-4900 Etats-Unis. Tous droits réservés.

Ce produit ou document est protégé par un copyright et distribué avec des licences qui en restreignent l'utilisation, la copie, la distribution, et la décompilation. Aucune partie de ce produit ou document ne peut être reproduite sous aucune forme, par quelque moyen que ce soit, sans l'autorisation préalable et écrite de Sun et de ses bailleurs de licence, s'il y en a. Le logiciel détenu par des tiers, et qui comprend la technologie relative aux polices de caractères, est protégé par un copyright et licencié par des fournisseurs de Sun.

Des parties de ce produit pourront être dérivées du système Berkeley BSD licenciés par l'Université de Californie. UNIX est une marque déposée aux Etats-Unis et dans d'autres pays et licenciée exclusivement par X/Open Company, Ltd.

Sun, Sun Microsystems, le logo Sun, docs.sun.com, AnswerBook, AnswerBook2, et Solaris sont des marques de fabrique ou des marques déposées, ou marques de service, de Sun Microsystems, Inc. aux Etats-Unis et dans d'autres pays. Toutes les marques SPARC sont utilisées sous licence et sont des marques de fabrique ou des marques déposées de SPARC International, Inc. aux Etats-Unis et dans d'autres pays. Les produits portant les marques SPARC sont basés sur une architecture développée par Sun Microsystems, Inc.

L'interface d'utilisation graphique OPEN LOOK et Sun™ a été développée par Sun Microsystems, Inc. pour ses utilisateurs et licenciés. Sun reconnaît les efforts de pionniers de Xerox pour la recherche et le développement du concept des interfaces d'utilisation visuelle ou graphique pour l'industrie de l'informatique. Sun détient une licence non exclusive de Xerox sur l'interface d'utilisation graphique Xerox, cette licence couvrant également les licenciés de Sun qui mettent en place l'interface d'utilisation graphique OPEN LOOK et qui en outre se conforment aux licences écrites de Sun.

CETTE PUBLICATION EST FOURNIE "EN L'ETAT" ET AUCUNE GARANTIE, EXPRESSE OU IMPLICITE, N'EST ACCORDEE, Y COMPRIS DES GARANTIES CONCERNANT LA VALEUR MARCHANDE, L'APTITUDE DE LA PUBLICATION A REpondre A UNE UTILISATION PARTICULIERE, OU LE FAIT QU'ELLE NE SOIT PAS CONTREFAISANTE DE PRODUIT DE TIERS. CE DENI DE GARANTIE NE S'APPLIQUERAIT PAS, DANS LA MESURE OU IL SERAIT TENU JURIDIQUEMENT NUL ET NON AVENU.



Contents

Intro(1M)	5
ap(1M)	6
apboot(1M)	7
apcheck(1M)	10
apconfig(1M)	11
apdb(1M)	16
apdisk(1M)	18
apinst(1M)	21
apnet(1M)	22
Intro(7)	26
ap(7D)	27
ap_dmd(7D)	28
methers(7D)	30
mfddi(7D)	32

Maintenance Commands

NAME	Intro – AP administration																
DESCRIPTION	This section describes commands, scripts, and programs executed in the alternate pathing environment.																
LIST OF COMMANDS	<table><tr><td>ap(1M)</td><td>alternate pathing</td></tr><tr><td>apboot(1M)</td><td>set up system files for boot metadisk</td></tr><tr><td>apcheck(1M)</td><td>determine accessibility of a metadisk</td></tr><tr><td>apconfig(1M)</td><td>display and manage AP configuration</td></tr><tr><td>apdb(1M)</td><td>manage AP database</td></tr><tr><td>apdisk(1M)</td><td>manage disk path groups</td></tr><tr><td>apinst(1M)</td><td>identify disk host adapter instances, /dev/dsk targets</td></tr><tr><td>apnet(1M)</td><td>manage network path groups</td></tr></table>	ap(1M)	alternate pathing	apboot(1M)	set up system files for boot metadisk	apcheck(1M)	determine accessibility of a metadisk	apconfig(1M)	display and manage AP configuration	apdb(1M)	manage AP database	apdisk(1M)	manage disk path groups	apinst(1M)	identify disk host adapter instances, /dev/dsk targets	apnet(1M)	manage network path groups
ap(1M)	alternate pathing																
apboot(1M)	set up system files for boot metadisk																
apcheck(1M)	determine accessibility of a metadisk																
apconfig(1M)	display and manage AP configuration																
apdb(1M)	manage AP database																
apdisk(1M)	manage disk path groups																
apinst(1M)	identify disk host adapter instances, /dev/dsk targets																
apnet(1M)	manage network path groups																

NAME	ap - alternate pathing
DESCRIPTION	Alternate pathing (AP) enables you to define and control alternate physical paths to peripheral devices. If a path to a device becomes unavailable, your Sun server can use an alternate path.
SEE ALSO	<i>Sun Enterprise Server Alternate Pathing 2.3.1 User Guide</i> apconfig(1M), apdb(1M), apdisk(1M), apnet(1M)

NAME	apboot – set up system files for boot metadisk
SYNOPSIS	<p>apboot [-n] [-o] [-k <i>system-name</i>] [-v <i>vfstab-name</i>] <i>device</i></p> <p>apboot [-n] [-o] [-v <i>vfstab-name</i>] [-m <i>metadisk</i>]</p> <p>apboot [-n] [-o] [-v <i>vfstab-name</i>] [-u <i>metadisk</i>]</p>
DESCRIPTION	<p>Use apboot(1M) to edit <code>/etc/vfstab</code> and <code>/etc/system</code> to make the system bootable from either the boot disk file systems on an AP metadisk or the boot disk file systems on a physical disk device that is not alternately pathed. The apboot command enables AP to manage a mirrored boot device when both that boot device and its mirror are under AP control.</p> <p>In addition to editing <code>/etc/vfstab/</code> and <code>/etc/system</code>, apboot checks the current configuration of system swap and dump devices. If either is configured as a partition of the boot disk, apboot calls <code>swap(1M)</code> or <code>dump(1M)</code>, as appropriate, to ensure that swap and dump devices are consistent with the boot device.</p> <p>Finally, apboot modifies the <code>boot-device</code> property of the OpenBoot™ PROM (OBP) so that all paths to the <code>boot-device</code> (and its mirror, if applicable) are listed in the order in which they will be tried during an automatic or manual reboot. The default order in an alternately pathed mirrored system is: Primary root, Primary mirror, Alternate root, Alternate mirror. This is a change from previous versions of AP to improve redundancy and serviceability. The default order in an alternately pathed, non-mirrored system is: Primary root, Alternate root. Use the <code>eeeprom(1M)</code> command to view the <code>boot-device</code> property setting.</p>
OPTIONS	<p>The following options are supported:</p> <p>-n</p> <p>Print what would be done without actually doing it.</p> <p>-k <i>system-name</i></p> <p>Edit <i>system-name</i> instead of the default <code>/etc/system</code> file.</p> <p>-v <i>vfstab-name</i></p> <p>Use or edit <i>vfstab-name</i> instead of the default <code>/etc/vfstab</code> table of file system defaults.</p> <p>-m <i>metadisk</i></p>

Enable boot mirror support for the specified AP metadisk.

-o

Suppress automatic update of the `boot-device` property in OpenBoot™ PROM.

-u *metadisk*

Disable boot mirror support for the specified AP metadisk.

EXAMPLES

EXAMPLE 1 Using apboot with Metadisks

The following command edits `/etc/system` and `/etc/vfstab` to specify that the boot disk file systems are now on metadisk `mc3t0d0`.

```
apboot mc3t0d0
```

EXAMPLE 2 Using apboot with Physical Devices

The following command edits `/etc/system` and `/etc/vfstab` to specify that the boot disk file systems are now under the physical path `/dev/dsk/c3t0d0`.

```
apboot c3t0d0
```

EXAMPLE 3 Using apboot with Mirrored Devices

The following commands edit `/etc/system` and `/etc/vfstab` to specify that the boot disk file systems are now on metadisk `mc3t0d0`, with a mirror on `mc1t0d1`.

```
apboot mc3t0d0
apboot -m mc1t0d1
```

EXAMPLE 4 Using apboot to Disable Mirrored Devices

The following command disables AP support for the mirror device created in the previous example.

```
apboot -u mc1t0d1
```

FILES

The following files are used by this utility:

`/etc/system` Kernel patch file

`/etc/vfstab` Table of file system defaults

SEE ALSO

boot(1M), dumpadm(1M), eeprom(1M), swap(1M), system(4), and vfstab(4)
in the *SunOS Reference Manual*

NAME	apcheck – determine accessibility of a metadisk
SYNOPSIS	apcheck <i>special</i>
DESCRIPTION	apcheck(1M) ascertains whether a metadisk is usable. If it is able to locate dual paths, apcheck exits with a zero status; if not, it exits with a non-zero status.
CAUTION	Do not execute apcheck on the command line; it is intended for use only by other commands or by authorized service providers.
OPTIONS	The following options are supported: special This option represents the device node to be checked. This device node may reside under /dev/ap/dsk or /dev/ap/rdsk.

NAME	apconfig – display and manage AP configuration
SYNOPSIS	<p>apconfig -D</p> <p>apconfig -F</p> <p>apconfig -N [-u]</p> <p>apconfig -P <i>metanetwork_interface</i> -a <i>physical_interface</i></p> <p>apconfig -P <i>primary_disk_controller</i> -a <i>physical_disk_controller</i></p> <p>apconfig -P <i>primary_disk_controller</i> -a <i>physical_disk_controller</i> -a <i>physical_disk_controller</i></p> <p>apconfig -R</p> <p>apconfig -S [-u]</p>
DESCRIPTION	apconfig(1M) displays and helps you manage the alternate pathing (AP) 2.3.1 system configuration.
OPTIONS	<p>The following options are supported:</p> <p>-D</p> <p>Display location and status information for all known copies of the host database.</p> <p>-F</p> <p>Force the state (attached or detached) of every committed path group alternate to match the physical state of the system. Use this option if the two states differ. It refreshes the dynamic reconfiguration (DR) flags for every disk I/O port and physical network interface defined for all committed path groups.</p> <p>-N [-u]</p> <p>Display network AP information only. For each path group, apconfig -N displays the metanetwork interface and the corresponding physical network interfaces.</p> <p>If you specify the -u option, apconfig displays uncommitted path group information only. If you do not specify the -u option, apconfig displays committed path group information only. See "Character flags after metadevice names" and "Character flags after physical device paths", below.</p>

-P *metanetwork_interface* -a *physical_interface*

Switch to the new physical path specified by *-a* for the metanetwork specified by *-P*.

-P *primary_disk_controller* -a *physical_disk_controller*

Switch to the new physical path specified by *-a* for the metadisk(s) associated with the primary path specified by *-P*.

This command will automatically disable path optimization for this path group on a Sun StorEdge™ T3 disk tray. Recommended prior to any DR activity.

Note - Path names for disk controllers consist of the I/O port name and the instance number separated by a colon (:), for example, `pln:0`. This naming convention differs from previous versions of AP. The addition of the colon (:) delimiter allows AP to provide support for a wider variety of disk controllers. This change does not apply to network path names.

-P *primary_disk_controller* -a *physical_disk_controller* -a *physical_disk_controller*

Re-enables path optimization for the T3. This command is only effective after path optimization has been disabled and both paths are again available.

Note - Path names for disk controllers consist of the I/O port name and the instance number separated by a colon (:), for example, `pln:0`. This naming convention differs from previous versions of AP. The addition of the colon (:) delimiter allows AP to provide support for a wider variety of disk controllers. This change does not apply to network path names.

-R

This option has no effect and remains for backward compatibility only. With AP 2.3.1, device nodes are automatically created at the time the database is committed using `apdb -C`.

-S [-u]

Display alternate pathing information for disk path groups only. For each path group, `apconfig` shows the names for the metadisk, its physical

devices, and the disk I/O ports through which each physical device is accessed.

If you specify the `-u` option, `apconfig` displays only uncommitted path group information. Otherwise, it displays only committed path group information. See "Character flags after metadvice names" and "Character flags after physical device paths", below.

Character flags after metadvice names

When you specify `-N` or `-S`, one or more of the following letters may be displayed after each metanetwork or metadisk name:

- D Marked for deletion. The metadisk or metanetwork remains in the database and continues to be used by AP until a commit is done. See `apddb(1M)`.
- U Uncommitted. Note that you cannot use a metadisk or metanetwork until a commit has been done.
- R Marked for use as a root device (`-S` only).
- M Marked as the mirror for a boot device (`-S` only).
- X The physical paths for this metadisk lead to different disks—that is, different supported dual-ported disk array storage devices (`-S` only). For a list of supported devices, see the *Sun Enterprise Server Alternate Pathing 2.3.1 User Guide*.

Character flags after physical device paths.

When you specify `-N` or `-S`, one or more of the following letters may be displayed after each physical network path or physical disk I/O port path:

- N Automatic switching is not allowed for this physical device.
- X The physical paths for this metadisk lead to different disks (that is, different storage array device disks). (`-S` only.)
- A The active alternate (to select another alternate, use the `-P` and `-a` options). Optimized T3 path groups have "A" flags displayed for both alternates.
- DR Marked as being drained by the DR daemon. A switch cannot be made to a device path in this state. See the *Sun Enterprise Server Alternate Pathing 2.3.1 User Guide*.
- DE Marked as detached by the DR daemon.

P	The primary path for disk path groups. This primary path cannot be changed. (-S only.)
T	Path has been tried as active.
O	Marked as offline. See <code>apdisk(1M)</code> and <code>apnet(1M)</code> .

EXAMPLES**EXAMPLE 1** Displaying Committed Disk Path Groups

The following command displays all of the committed disk path groups in the AP database. Path optimization is not enabled on the T3.

```
# apconfig -S
c6      pln:0  P
c2      pln:3  A
      metadiskname(s):
          mc2t5d0
          mc2t4d0  R
          mc2t3d0
          mc2t2d0
          mc2t1d0
          mc2t0d0
```

EXAMPLE 2 Displaying Committed T3 Disk Path Groups with Path Optimization Enabled

The following command displays all of the committed T3 disk path groups in the AP database when path optimization is enabled.

```
# apconfig -S
c6      pln:0  P A
c2      pln:3  A
      metadiskname(s):
          mc2t5d0
          mc2t4d0  R
          mc2t3d0
          mc2t2d0
          mc2t1d0
          mc2t0d0
```

EXAMPLE 3 Displaying Uncommitted Network Path Groups

The following example displays all of the uncommitted network path groups in the AP database:

```
# apconfig -N -u
metanetwork:  mether0  U
physical devices:
    qfe1  A
    qfe0
```

EXAMPLE 4 Switching the Active Path Group

The following example switches the active alternate of the disk path group for which the primary path is `pln:1`. The new active alternate of that path group is `pln:0`. Executing this command disables path optimization on the T3.

```
# apconfig -P pln:1 -a pln:0
```

EXAMPLE 5 Switching the Network Path Group

The following example switches the active alternate of the network path group identified by the metanetwork interface `methernet0`. The new active alternate of that network path group is `qe1`.

```
# apconfig -P methernet0 -a qe1
```

EXAMPLE 6 Displaying AP Database Information and Location

The following example displays the location and status information of all known copies of the AP database.

```
# apconfig -D
path: /dev/rdisk/c3t3d0s1
major: 32
minor: 145
timestamp: Wed Sep 29 18:45:58 1999
checksum: 2636010350
default: yes
corrupt: no
inaccessible: no

path: /dev/rdisk/c3t3d0s6
major: 32
minor: 150
timestamp: Wed Sep 29 18:50:43 1999
checksum: 2636010350
default: no
synced: yes
corrupt: no
inaccessible: no
```

SEE ALSO

Sun Enterprise Server Alternate Pathing 2.3.1 User Guide

`apdb(1M)`, `apdisk(1M)`, `apnet(1M)`, `ap_dmd(7D)`, `methernet(7D)`, `mfdi(7D)` in this reference manual

NAME	apdb – manage AP database
SYNOPSIS	<p>apdb -c <i>raw_disk_slice</i> [-k <i>system_file</i>]</p> <p>apdb -d <i>raw_disk_slice</i> [-k <i>system_file</i>] [-f]</p> <p>apdb -m <i>major_number</i> -n <i>minor_number</i> [-f]</p> <p>apdb -C</p> <p>apdb -Z</p>
DESCRIPTION	apdb(1M) helps you manage the AP database.
OPTIONS	<p>The following options are supported:</p> <p>-c <i>raw_disk_slice</i></p> <p>Create a database copy on the specified raw disk slice. You can create up to ten copies of the database. The minimum slice size is 300 Kbytes.</p> <p>-d <i>raw_disk_slice</i></p> <p>Delete a database copy from the specified raw disk slice.</p> <p>-f</p> <p>Force the deletion of the specified database. This option is required for deleting each of the last two copies of the database. If you try to delete a database copy without this option when fewer than two database copies exist, AP displays an error message.</p> <p>-k <i>system_file</i></p> <p>Patch the database copy information to the kernel file <i>system_file</i>, rather than the default file, <i>/etc/system</i>.</p> <p>-m <i>major_number</i> -n <i>minor_number</i></p> <p>Remove a database copy by specifying its location as a major-minor pair. Use -m to specify the major number and -n for the minor number. This option pair is useful when there is no path to the database because the device no longer exists.</p> <p>-C</p> <p>Commit all uncommitted entries within the database.</p>

-Z

Copy the database in memory to all database copies. Note that all database copies are in sync with memory and are automatically updated at system shutdown. The -Z option lets you update the database copies at your discretion.

EXAMPLES**EXAMPLE 1** Creating an AP Database Copy

The following command creates a copy of the AP system database on /dev/rdisk/c2t0d0s1.

```
# apdb -c /dev/rdisk/c2t0d0s1
```

SEE ALSO

Sun Enterprise Server Alternate Pathing 2.3.1 User Guide

apconfig(1M), apdisk(1M), apnet(1M)

NAME	apdisk – manage disk path groups
SYNOPSIS	<p>apdisk -c -p <i>primary_disk_controller</i> -a <i>physical_disk_controller</i></p> <p>apdisk -d <i>primary_disk_controller</i></p> <p>apdisk -z <i>primary_disk_controller</i></p> <p>apdisk -f <i>physical_disk_controller</i></p> <p>apdisk -n <i>physical_disk_controller</i></p> <p>apdisk -u -p <i>primary_disk_controller</i> -a <i>physical_disk_controller</i></p> <p>apdisk -w <i>physical_disk_controller</i></p>
DESCRIPTION	apdisk(1M) helps you manage disk path groups in the alternate pathing (AP) system.
OPTIONS	<p>The following options are supported:</p> <p>-c -p <i>primary_disk_controller</i> -a <i>physical_disk_controller</i></p> <p>Create database entries for disk arrays connected to two I/O ports. Give the I/O port names (for example, sf:0 and sf:1) as the <i>primary_disk_controller</i> and <i>physical_disk_controller</i>.</p> <p>By default, path groups are created with path optimization enabled for Sun StorEdge™ T3 disk trays when two physical paths are available.</p> <hr/> <p>Note - Path names for disk controllers consist of the I/O port name and the instance number separated by a colon (:). This naming convention differs from previous versions of AP. The addition of the colon (:) delimiter allows AP to provide support for a wider variety of disk controllers. This change does not apply to network path names.</p> <hr/> <p>-d <i>primary_disk_controller</i></p> <p>Delete AP information for the specified disk path group. If the existing information is uncommitted, apdisk removes it immediately. If the existing information is already committed, it is only marked for deletion and existing metadevices continue to function until a commit is done, at which time the information is removed.</p> <p>-z <i>primary_disk_controller</i></p>

Undelete AP information for the specified disk path group. This option cancels a previous `apdisk -d` request that marked committed information for deletion.

`-f physical_disk_controller`

Mark the physical disk controller as offline. The corresponding metadisk interface can still be used if the other disk controller in the path group is functioning properly. Note that you cannot mark a physical disk controller as offline if it is currently the active alternate.

`-n physical_disk_controller`

Mark the physical disk controller as online. Note that this operation does not automatically cause the disk controller to become the active alternate.

`-u -p primary_disk_controller -a physical_disk_controller`

Update existing database entries for the disk path group identified by the primary path (for example, `sf:0`). Disk targets that are no longer accessible through one or more paths are removed, and new disk targets are added.

An update can result in the need to update the AP metadvice nodes in `/dev/ap/[r]dsk`. To update the metadvice nodes, use the following command:

```
apdb -C
```

`-w physical_disk_controller`

Clear the `tried` flag for the specified I/O controller path.

EXAMPLES

EXAMPLE 1 Creating Metadisk Nodes and AP Database Entries

The following commands create metadisk device nodes and AP database entries for disks that use the `pln:0` and `pln:1` interfaces, with `pln:0` specified as the primary path.

```
# apdisk -c -p pln:0 -a pln:1
# apdb -C
```

EXAMPLE 2 Deleting Database Entries

The following commands delete the AP database entries for disks with `sf:1` specified as the primary path.

```
# apdisk -d sf:1
# apdb -C
```

EXAMPLE 3 Clearing the Tried Flag

The following command clears the tried flag for `sf:1`.

```
# apdisk -w sf:1
```

SEE ALSO

Sun Enterprise Server Alternate Pathing 2.3.1 User Guide

`apdb(1M)`, `apconfig(1M)`, `apinst(1M)`, `apnet(1M)` in this manual.

NAME	apinst – identify disk host adapter instances, /dev/dsk targets
SYNOPSIS	apinst
DESCRIPTION	apinst(1M) identifies all disk host bus adapters and provides the <i>name:instance number</i> , and /dev/dsk targets attached to each.
EXAMPLES	<pre>% apinst pln:0 /dev/dsk/c1t0d0 /dev/dsk/c1t1d0 /dev/dsk/c1t2d0 /dev/dsk/c1t3d0 /dev/dsk/c1t4d0 /dev/dsk/c1t5d0 pln:1 /dev/dsk/c2t0d0 /dev/dsk/c2t1d0 /dev/dsk/c2t2d0 /dev/dsk/c2t3d0 /dev/dsk/c2t4d0 /dev/dsk/c2t5d0 sf:0 /dev/dsk/c3t0d0 /dev/dsk/c3t1d0 /dev/dsk/c3t2d0 /dev/dsk/c3t3d0 /dev/dsk/c3t4d0 /dev/dsk/c3t5d0 sf:1 /dev/dsk/c4t0d0 /dev/dsk/c4t1d0 /dev/dsk/c4t2d0 /dev/dsk/c4t3d0 /dev/dsk/c4t4d0 /dev/dsk/c4t5d0</pre>

NAME	apnet - manage network path groups
SYNOPSIS	<p>apnet -c -a <i>physical_interface</i> -a <i>physical_interface</i></p> <p>apnet -d <i>metanetwork_interface</i></p> <p>apnet -z <i>metanetwork_interface</i></p> <p>apnet -f <i>physical_interface</i></p> <p>apnet -n <i>physical_interface</i></p> <p>apnet -m <i>metanetwork_interface</i> -a <i>physical_interface</i></p> <p>apnet -m <i>metanetwork_interface</i> -r <i>physical_interface</i></p> <p>apnet -t <i>metanetwork_interface</i></p> <p>apnet -w <i>metanetwork_interface</i></p>
DESCRIPTION	apnet(1M) helps you manage network path groups in the alternate pathing (AP) 2.3.1 system.
OPTIONS	<p>The following options are supported:</p> <p>-c -a <i>physical_interface</i> [-a <i>physical_interface</i>]</p> <p>Create a metanetwork and network path group for the network connected to the specified network controller paths. If a second -a is given, apnet designates the specified network interface as the alternate for the metanetwork. (If you initially create a network path group with only one path, you can later add an additional path using apnet -m.)</p> <hr/> <p>Note - <i>metanetwork_interface</i> refers to an AP metadvice such as mether0. <i>physical_interface</i> refers to an actual physical device such as hme0.</p> <hr/> <p>Note - For backwards compatibility with older versions of AP the -p option can be used for <i>physical_interface</i> instead of -a , however, the -p option has no significance other than indicating an alternate.</p> <hr/> <p>-d <i>metanetwork_interface</i></p> <p>Delete the specified metanetwork and corresponding network path group. If the path group is currently uncommitted, apnet removes the metanetwork</p>

and the path group immediately. If the path group is committed, the metanetwork and path group are only marked for deletion, and the metanetwork interface continues to function until a commit is performed.

–z ***metanetwork_interface***

Undelete the specified metanetwork and path group. This option cancels a previous `apnet -d` request that marked a committed path group for deletion.

–f ***physical_interface***

Mark the specified physical interface as offline, making it unavailable to the metanetwork interface.

Note - A physical interface cannot be marked as offline if it is active.

–n ***physical_interface***

Mark the specified physical interface as online, making it available to the metanetwork interface.

–m ***metanetwork_interface*** –a ***physical_interface***

Add the physical interface as an alternate path for the specified metanetwork. You can use this option only if there is currently only one interface associated with the metanetwork.

Note - When an alternate is added (–a) or removed (–r) from a committed path group, a commit operation must be performed before the change takes effect. In practice, the existing metanetwork interface is marked for deletion, and a new metanetwork interface is created without affecting usage of the existing interface.

–m ***metanetwork_interface*** –r ***physical_interface***

Remove the physical interface from the specified metanetwork.

Note - When an alternate is added (–a) or removed (–r) from a committed path group, a commit operation must be performed before the change takes effect. In practice, the existing metanetwork interface is marked for deletion, and a new metanetwork interface is created without affecting usage of the existing interface.

`-t metanetwork_interface`

Make the next alternate path the temporary active path. This option is intended for scripts that are trying alternate paths in sequence until a working path is found. The command returns an error if the sequencing wraps back to the original primary.

`-w metanetwork_interface`

Make the current temporary active path the actual active path.

EXAMPLES

EXAMPLE 1 Creating a Network Path Group and Metanetwork Interface

The following command creates a network path group and a metanetwork interface, `mether0`, which has `hme0` and `qfe1` as its alternates.

```
# apnet -c -a hme0 -a qfe1
# apdb -C
```

EXAMPLE 2 Deleting a Network Path Group and Metanetwork Interface

The following example deletes the network path group and metanetwork interface `mether0`:

```
# apnet -d mether0
# apdb -C
```

SEE ALSO

Sun Enterprise Server Alternate Pathing 2.3.1 User Guide

`apconfig(1M)`, `apdb(1M)`, `apdisk(1M)`

Device and Network Interfaces

NAME	Intro – AP special files
DESCRIPTION	This section describes AP files for your Sun Enterprise server.
LIST OF FUNCTIONS	
ap(7D)	alternate pathing librarian driver, /dev/ap
ap_dmd(7D)	AP disk metadriver
methernet(7D)	AP network Ethernet metadriver
mfddi(7D)	AP network FDDI metadriver

NAME	ap – alternate pathing librarian driver, /dev/ap
DESCRIPTION	The AP driver provides a pseudo-driver interface to the kernel alternate pathing (AP) Librarian features.
FILES	The following files are used: /kernel/drv/ap AP driver module /kernel/drv/ap.conf AP driver configuration file
SEE ALSO	<i>Sun Enterprise Alternate Pathing 2.3.1 User Guide</i> ap_dmd(7D), mether(7D), mfddi(7D)

sn Slice (partition) number

DIAGNOSTICS

See `ssd(7D)` in the *SunOS Reference Manual*.

SEE ALSO

Sun Enterprise Server Alternate Pathing 2.3.1 User Guide

`apconfig(1M)`, `apdb(1M)`, `apdisk(1M)`, `apnet(1M)`, `ap(7D)`, `mether(7D)`,
and `mfddi(7D)` in this reference manual

NAME	mether – AP network metadriver
SYNOPSIS	/dev/mether
DESCRIPTION	<p>mether(7D) is the multithreaded, loadable, clonable, STREAMS metanetwork device driver that supports the connectionless Data Link Provider Interface, <code>dlpi(7P)</code>, for Ethernet drivers. For a list of supported devices see <i>Release Notes Supplement Solaris 8 8/00</i>.</p> <p>The <code>mether</code> driver works with the AP software to support alternate pathing for physical network devices.</p> <p>Device operations of <code>mether</code> are an extension of the operations of the underlying network drivers. The <code>mether</code> driver normally operates as a transparent pass-through module; it neither interprets nor modifies any of the STREAMS DLPI type messages. However, it does intercept and modify the <code>DL_ATTACH_REQ</code> and <code>DL_INFO_ACK</code> messages.</p> <p><code>DL_ATTACH_REQ</code> messages are captured and used to drive the initial connection between logical and physical devices. <code>DL_INFO_ACK</code> messages are captured and responded to with a prebuilt response to eliminate the possibility of the message response timing out due to induced message delays.</p> <p>The cloning, character-special device <code>/dev/mether</code> is used to access all device-specific instances of the <code>mether</code> driver within the system.</p>
mether and AP	<p>The <code>mether</code> driver provides an interface to support Alternate Pathing. The <code>APSET</code> interface enables a user to provide a mapping between physical path and logical path. <code>APUNSET</code> provides an interface to remove a physical-to-logical path mapping, and <code>APSWITCH</code> provides a mechanism to switch a logical path from its existing physical path to a new physical path. For a more complete description of this AP capability, see the <i>Sun Enterprise Server Alternate Pathing 2.3.1 User Guide</i>.</p>
mether and DLPI	<p>The <code>mether</code> driver is a "style 2" Data Link Service provider. All DLPI processing is handled by the underlying physical device driver. See the man page that corresponds to each underlying driver.</p>
ERRORS	<p>The <code>mether</code> device driver sets <code>errno</code> as listed for the following conditions:</p> <p>EBUSY An attempt was made to unload a busy device or to <code>APUNSET</code> an active device.</p> <p>EEXIST An attempt was made to <code>APSET</code> an existing logical-to-physical mapping and a logical path when the system was out of memory.</p> <p>EIO An attempt to switch between physical devices failed.</p>

ENODEV No physical mapping exists.

ENOMEM System memory was exhausted during an attempt to create a mapping between a physical path and a logical path.

FILES

The following files are used by this utility:

`mether.conf` driver configuration file

`/dev/mether` metaEthernet special character device

DIAGNOSTICS

See `dlpi(7P)` in the *SunOS Reference Manual*.

SEE ALSO

Sun Enterprise Server Alternate Pathing 2.3.1 User Guide

`apconfig(1M)`, `apdb(1M)`, `apnet(1M)`, `ap(7D)`, `ap_dmd(7D)`, and `mfddi(7D)` in this reference manual

`driver.conf(4)` and `dlpi(7P)` in the *SunOS Reference Manual*

The *SunOS Reference Manual* and other optional reference manuals (for example, the *SunFDDI Reference Manual*), as appropriate.

NAME	mfddi – AP network metadriver for FDDI
SYNOPSIS	/dev/mfddi
DESCRIPTION	<p>mfddi(7D) is the multithreaded, loadable, clonable, STREAMS metanetwork device driver that supports the connectionless Data Link Provider Interface, dlpi(7P), for FDDI drivers. For a list of supported devices see <i>Release Notes Supplement Solaris 8 8/00</i>.</p> <p>The mfddi driver works with the AP software to support alternate pathing for physical network devices.</p> <p>Device operations of mfddi are an extension of the operations of the underlying network drivers. The mfddi driver normally operates as a transparent pass-through module; it neither interprets nor modifies any of the STREAMS DLPI type messages nor the FDDI messages specific to Sun, such as DL_IOC_FDG. However, it does intercept and modify the DL_ATTACH_REQ, and DL_INFO_ACK messages.</p> <p>DL_ATTACH_REQ messages are captured and used to drive the initial connection between logical and physical devices. DL_INFO_ACK messages are captured and responded to with a prebuilt response to eliminate the possibility of the message response timing out due to induced message delays.</p> <p>The cloning, character-special device /dev/mfddi is used to access all device-specific instances of the mfddi driver within the system.</p>
mfddi and AP	<p>The mfddi driver provides an interface to support Alternate Pathing. The APSET interface enables a user to provide a mapping between physical path and logical path. APUNSET provides an interface to remove a physical-to-logical path mapping, and APSWITCH provides a mechanism to switch a logical path from its existing physical path to a new physical path. For a more complete description of this AP capability, see the <i>Sun Enterprise Server Alternate Pathing 2.3.1 User Guide</i>.</p>
mfddi and DLPI	<p>The mfddi driver is a "style 2" Data Link Service provider. All DLPI processing is handled by the underlying physical device driver. See the man page that corresponds to each underlying driver.</p>
ERRORS	<p>The mfddi device driver sets errno as listed for the following conditions:</p> <p>EBUSY An attempt was made to unload a busy device or to APUNSET an active device.</p> <p>EEXIST An attempt was made to APSET an existing logical-to-physical mapping and a logical path when the system was out of memory.</p> <p>EIO An attempt to switch between physical devices failed.</p>

ENODEV No physical mapping exists.

ENOMEM System memory was exhausted during an attempt to create a mapping between a physical path and a logical path.

FILES

The following files are used by this utility:

`mfddi.conf` driver configuration file

`/dev/mfddi` metaFDDI special character device

DIAGNOSTICS

See `dlpi(7P)` in the *SunOS Reference Manual*.

SEE ALSO

Sun Enterprise Server Alternate Pathing 2.3.1 User Guide

`apconfig(1M)`, `apdb(1M)`, `apnet(1M)`, `ap(7D)`, `ap_dmd(7D)`, and `methet(7D)` in this reference manual

`driver.conf(4)` in the *SunOS Reference Manual*.

The *SunOS Reference Manual* and other optional reference manuals (for example, the *SunFDDI Reference Manual*), as appropriate.