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# Sun™ Enterprise™ Server Alternate Pathing 2.1 Reference Manual

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<b>NAME</b>	Intro – AP administration
<b>DESCRIPTION</b>	This section describes commands, scripts, and programs executed in the Alternate Pathing environment.
<b>LIST OF COMMANDS</b>	<p><b>ap</b>(1M) alternate pathing</p> <p><b>ap_daemon</b>(1M) alternate pathing daemon</p> <p><b>ap_reboot_host</b>(1M) fast boot alternate path</p> <p><b>ap_ssp_daemon</b>(1M) AP SSP daemon</p> <p><b>apboot</b>(1M) set up system files for boot meta-disk</p> <p><b>apcheck</b>(1M) determine accessibility of a meta-disk</p> <p><b>apconfig</b>(1M) display and manage AP configuration</p> <p><b>apdb</b>(1M) manage AP database</p> <p><b>apdisk</b>(1M) manage disk pathgroups</p> <p><b>apinst</b>(1M) identify disk host adapter instances, <b>/dev/dsk</b> targets</p> <p><b>apnet</b>(1M) manage network pathgroups</p> <p><b>apssp</b>(1M) client of AP SSP daemon</p>

<b>NAME</b>	ap – alternate pathing
<b>DESCRIPTION</b>	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.
<b>SEE ALSO</b>	<i>Sun Enterprise Server Alternate Pathing User's Guide</i>

<b>NAME</b>	ap_daemon – alternate pathing daemon
<b>SYNOPSIS</b>	<b>ap_daemon</b>
<b>DESCRIPTION</b>	<b>/usr/sbin/ap_daemon</b> is an RPC program that provides the interface to the Alternate Pathing (AP) driver.
<b>Configuration Information</b>	<p>The <b>ap_daemon</b> RPC program name is AP_SVR, its RPC program number is 300473, and its underlying protocol is TCP. It is invoked as an inetd server via the TCP transport. The UID required for access to the daemon is ssp. This UID can be a non-login UID.</p> <p>The entry for the daemon in the <b>/etc/inetd.conf</b> file is:</p> <pre>300473/1 tli rpc/tcp wait root /usr/sbin/ap_daemon ap_daemon</pre>
<b>SEE ALSO</b>	<i>Sun Enterprise Server Alternate Pathing User's Guide</i> <b>apconfig(1M)</b> , <b>apdb(1M)</b> , <b>apdisk(1M)</b> , <b>apnet(1M)</b>

<b>NAME</b>	ap_reboot_host – fast boot alternate path
<b>SYNOPSIS</b>	<b>ap_reboot_host</b>
<b>AVAILABILITY</b>	Sun Enterprise 10000 servers only.
<b>DESCRIPTION</b>	<b>Caution:</b> Do not execute <b>ap_reboot_host</b> on the command line; it is intended for use only by other commands. <b>SSSPOPT/bin/ap_reboot_host</b> is executed when a boot failure is detected. It determines the boot path of the previous boot and attempts to restart the host from an alternate path if one is available.

<b>NAME</b>	ap_ssp_daemon – AP SSP daemon
<b>SYNOPSIS</b>	<b>ap_ssp_daemon</b>
<b>AVAILABILITY</b>	Sun Enterprise 10000 servers only. This command is executed in the SSP environment.
<b>DESCRIPTION</b>	<p><b>SSSPOPT/bin/ap_ssp_daemon</b> is an RPC program that maintains an SSP-based file that contains Alternate Pathing (AP) information for the boot disks. This file is updated automatically by <b>ap_daemon(1M)</b>.</p> <p><b>ap_ssp_daemon</b> provides its information to <b>apssp(1M)</b>, which then passes it to <b>ap_reboot_host(1M)</b>. The SSP program <b>apssp(1M)</b> provides the interface to <b>ap_ssp_daemon</b>.</p> <p>The daemon's only clients are <b>apssp(1M)</b> and <b>ap_daemon(1M)</b>. <b>apssp(1M)</b> provides a way to access the information the daemon keeps. <b>ap_daemon(1M)</b> updates the information.</p>
<b>SEE ALSO</b>	<b>ap_daemon(1M)</b> , <b>ap_reboot_host(1M)</b> , <b>apssp(1M)</b>

<b>NAME</b>	apboot – set up system files for boot meta-disk
<b>SYNOPSIS</b>	<b>apboot</b> [-n] [-k <i>system-name</i> ] [-v <i>vfstab-name</i> ] <i>device</i> <b>apboot</b> [-m <i>metadevice-name</i> ] <b>apboot</b> [-u <i>metadevice-name</i> ]
<b>DESCRIPTION</b>	Use <b>/usr/sbin/apboot</b> to edit <b>/etc/vfstab</b> and <b>/etc/system</b> to make the system bootable from either the boot disk file systems on an AP meta-disk or the boot disk file systems on a disk device that is not alternately pathed; or to allow AP to coherently manage a mirrored boot device when both that boot device and its mirror are under AP control.
<b>OPTIONS</b>	-n     Print what would be done without actually doing it. -k <i>system-name</i> Edit <i>system-name</i> instead of the default <b>/etc/system</b> file. -v <i>vfstab-name</i> Edit <i>vfstab-name</i> instead of the default <b>/etc/vfstab</b> table of file system defaults. -m <i>metadevice-name</i> Enable boot mirror support for the specified AP meta-device. -u <i>metadevice-name</i> Disable boot mirror support for the specified AP meta-device.
<b>EXAMPLES</b>	<b>apboot mc3t0d0</b> Edits <b>/etc/system</b> and <b>/etc/vfstab</b> to specify that the boot disk file systems are now on meta-disk <b>mc3t0d0</b> . <b>apboot c3t0d0</b> Edits <b>/etc/system</b> and <b>/etc/vfstab</b> to specify that the boot disk file systems are now under the physical path <b>/dev/dsk/c3t0d0</b> . <b>apboot mc3t0d0</b> <b>apboot -m mc1t0d1</b> These commands edit <b>/etc/system</b> and <b>/etc/vfstab</b> to specify that the boot disk file systems are now on meta-disk <b>mc3t0d0</b> , with a mirror on <b>mc1t0d1</b> . <b>apboot -u mc1t0d1</b> Disables AP support for the mirror device created in the previous example.
<b>FILES</b>	<b>/etc/system</b> kernel patch file <b>/etc/vfstab</b> table of file system defaults
<b>SEE ALSO</b>	<b>system(4)</b> , <b>vfstab(4)</b> in <i>man Pages(4): File Formats</i> of the <i>SunOS Reference Manual</i>



<b>NAME</b>	apcheck – determine accessibility of a meta-disk
<b>SYNOPSIS</b>	<b>apcheck</b> <i>special</i>
<b>DESCRIPTION</b>	<b>Caution:</b> Do not execute <b>apcheck</b> on the command line; it is intended for use only by other commands, or by authorized service providers. <b>/sbin/apcheck</b> ascertains whether a meta-disk is usable. If it is able to locate dual paths, <b>apcheck</b> exits with a zero status; if not, it exits with a non-zero status.
<b>OPTION</b>	<i>special</i> represents the device node to be checked. This device node may reside under <b>/dev/ap/dsk</b> or <b>/dev/ap/rdisk</b> .

<b>NAME</b>	apconfig – display and manage AP configuration
<b>SYNOPSIS</b>	<b>apconfig -D</b> <b>apconfig -F</b> <b>apconfig -N [-u]</b> <b>apconfig -P meta_netwk_intrfc -a new_phys_path</b> <b>apconfig -P primary_path -a new_phys_path</b> <b>apconfig -R</b> <b>apconfig -S [-u]</b>
<b>DESCRIPTION</b>	The <code>/usr/sbin/apconfig</code> command displays and helps you manage the Alternate Pathing (AP) system configuration.
<b>OPTIONS</b>	<p><b>-D</b> Display location and status information for all known copies of the host database.</p> <p><b>-F</b> Force the state (attached or detached) of every committed pathgroup 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 pathgroups.</p> <p><b>-N [-u]</b> Display network AP information only. For each pathgroup, <b>apconfig -N</b> displays the meta-network interface and the corresponding physical network interfaces.</p> <p>If you specify the <b>-u</b> option, <b>apconfig</b> displays uncommitted pathgroup information only. If you do not specify the <b>-u</b> option, <b>apconfig</b> displays committed pathgroup information only. See <b>Letters after names and paths</b>, below.</p> <p><b>-P meta_ntwrk_intrfc -a new_phys_path</b> Switch to the new physical path specified by <b>-a</b> for the meta-network specified by <b>-P</b>.</p> <p><b>-P primary_path -a new_phys_path</b> Switch to the new physical path specified by <b>-a</b> for the primary path specified by <b>-P</b>.</p> <p><b>-R</b> Rebuild the meta-disk device nodes in <code>/dev/ap/dsk</code> and <code>/dev/ap/rdsk</code>. <b>apconfig</b> creates links to <code>/devices</code> for all committed disk pathgroups in the database.</p> <p><b>Note:</b> You must execute <b>drvconfig -i ap_dmd</b> before you can execute <b>apconfig -R</b>. See <b>drvconfig(1M)</b> and <b>ap_dmd(7)</b>.</p> <p><b>-S [-u]</b> Display alternate pathing information for disk pathgroups only. (S stands for SCSI.) For each pathgroup, <b>apconfig</b> shows the names for the meta-disk, its physical devices, and the disk I/O ports through</p>

which each physical device is accessed.

If you specify the `-u` option, **apconfig** displays only uncommitted pathgroup information. Otherwise, it displays only committed pathgroup information. See **Letters after names and paths**, below.

### Letters after names and paths

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

- D** Marked for deletion. The meta-disk or meta-network remains in the database and continues to be used by AP until a commit is done. See **apdb(1M)**.
- U** Uncommitted. Note that you cannot use a meta-disk or meta-network 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 meta-disk lead to different disks (i.e., different SSA's). `-S` only.

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

- A** The active alternate. To select another interface, use the `-P` and `-a` options.
- DR** Marked as being drained by Dynamic Reconfiguration. A switch cannot be made to a device path in this state. See the *Sun Enterprise Server Alternate Pathing User's Guide*.
- DE** Marked as detached by Dynamic Reconfiguration.
- P** The primary path. The primary path cannot be changed.
- T** Path has been tried as active.
- O** Marked as offline. See **apdisk(1M)** and **apnet(1M)**.

### EXAMPLES

#### Example 1

The following example displays all committed disk pathgroups in the AP database:

```
# apconfig -S

c6    pln0  A
c2    pln3  P
      metadiskname(s):
          mc2t5d0
          mc2t4d0  R
          mc2t3d0
          mc2t2d0
          mc2t1d0
```

```
mc2t0d0
```

**Example 2** The following example displays all uncommitted network pathgroups in the AP database.

```
# apconfig -N -u

meta-network:  mqe0  U
physical devices:
    qe1
    qe0      P  A
```

**Example 3** The following example switches the active alternate of the disk pathgroup for which the primary path is **pln1**. The new active alternate of that pathgroup is **pln0**.

```
# apconfig -P pln1 -a pln0
```

**Example 4** The following example switches the active alternate of the network pathgroup identified by the meta-network interface **mqe0**. The new active alternate of that network pathgroup is **qe1**.

```
# apconfig -P mqe0 -a qe1
```

**Example 5** 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 28 18:45:58 1994
checksum: 2636010350
default: yes
corrupt: no
inaccessible: no

path: /dev/rdisk/c3t3d0s6
major: 32
minor: 150
timestamp: Wed Sep 28 18:50:43 1994
checksum: 2636010350
default: no
synced: yes
```

```
corrupt: no  
inaccessible: no
```

**SEE ALSO**

*Sun Enterprise Server Alternate Pathing User's Guide*

**apdb(1M)**, **apdisk(1M)**, **apnet(1M)**, **ap\_dmd(7)** in this reference manual

**drvconfig(1M)** in *man Pages(1M): System Administration Commands of the SunOS Reference Manual*

<b>NAME</b>	apdb – manage AP database
<b>SYNOPSIS</b>	<b>apdb -c</b> <i>raw_disk_slice</i> [- <b>k</b> <i>system_file</i> ] [- <b>f</b> ] <b>apdb -d</b> <i>raw_disk_slice</i> [- <b>k</b> <i>system_file</i> ] [- <b>f</b> ] <b>apdb -m</b> <i>major</i> - <b>n</b> <i>minor</i> [- <b>f</b> ] <b>apdb -C</b> <b>apdb -Z</b>
<b>DESCRIPTION</b>	The <code>/usr/sbin/apdb</code> command helps you manage the AP database.
<b>OPTIONS</b>	<p><b>-c</b> <i>raw_disk_slice</i> Create a database copy on the specified raw disk slice. You can create up to 10 copies of the database. The minimum slice size is 300KBytes.</p> <p><b>-d</b> <i>raw_disk_slice</i> Delete a database copy from the specified raw disk slice.</p> <p><b>-f</b> Force deletion of the specified database. This option is required for creating the first copy of the database, and when 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><b>-k</b> <i>system_file</i> Patch the the database copy information to the kernel file <i>system_file</i>, rather than the default file, <code>/etc/system</code>.</p> <p><b>-m</b> <i>major</i> -<b>n</b> <i>minor</i> Remove a database copy by specifying its location as a major-minor pair. Use <b>-m</b> to specify the major and <b>-n</b> for the minor. This option pair is useful when there is no path to the database because the device no longer exists.</p> <p><b>-C</b> Commit all uncommitted entries within the database.</p> <p><b>-Z</b> 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. <b>-Z</b> lets you update the database copies at your discretion.</p>
<b>EXAMPLE</b>	<p>The following example creates a copy of the AP system database on <code>/dev/rdisk/c2t0d0s1</code>.</p> <pre># apdb -c /dev/rdisk/c2t0d0s1</pre>
<b>SEE ALSO</b>	<p><i>Sun Enterprise Server Alternate Pathing User's Guide</i></p> <p><b>apconfig(1M)</b>, <b>apdisk(1M)</b>, <b>apnet(1M)</b></p>

<b>NAME</b>	apdisk – manage disk pathgroups
<b>SYNOPSIS</b>	<b>apdisk -c -p</b> <i>primary_path</i> <b>-a</b> <i>alternate_path</i> <b>apdisk -d</b> <i>primary_path</i> <b>apdisk -z</b> <i>primary_path</i> <b>apdisk -f</b> <i>io_port</i> <b>apdisk -n</b> <i>io_port</i> <b>apdisk -u -p</b> <i>primary_path</i> <b>-a</b> <i>alternate_path</i> <b>apdisk -w</b> <i>io_port</i>
<b>DESCRIPTION</b>	The <code>/usr/sbin/apdisk</code> command helps you manage disk pathgroups in the Alternate Pathing (AP) system.
<b>OPTIONS</b>	<p><b>-c -p</b> <i>primary_path</i> <b>-a</b> <i>alternate_path</i>  Create database entries for disks (i.e., a SPARCStorage Arrays) connected to two I/O ports. Give the I/O port names (e.g., <b>pln0</b> and <b>pln1</b>) as the <i>primary_path</i> and <i>alternate_path</i>.</p> <p><b>-d</b> <i>primary_path</i>  Delete AP information for the specified disk pathgroup. If the existing information is uncommitted, <b>apdisk</b> removes it immediately. If the existing information is already committed, it is only marked for deletion and existing meta-devices continue to function until a commit is done, at which time the information is removed.</p> <p><b>-z</b> <i>primary_path</i>  Undelete AP information for the specified disk pathgroup. This option cancels a previous <b>apdisk -d</b> request that marked committed information for deletion.</p> <p><b>-f</b> <i>io_port</i>  Mark the I/O port as offline. Corresponding meta-disks can still be used if the other I/O port in the pathgroup is functioning properly. Note that you cannot mark an I/O port offline if it is currently the active alternate.</p> <p><b>-n</b> <i>io_port</i>  Mark the I/O port as online. Note that this operation does not automatically cause the I/O port to become the active alternate.</p> <p><b>-u -p</b> <i>primary_path</i> <b>-a</b> <i>alternate_path</i>  Update existing database entries for the disk pathgroup identified by the primary path (e.g., <b>pln0</b>). Disk targets that are no longer accessible through one or more paths are removed, and new disk targets are added. To update the meta-disk device nodes execute <b>drvconfig -i ap_dmd</b> and <b>apconfig -R</b>. See <b>apconfig(1M)</b> in this document and <b>drvconfig(1M)</b> in <i>man Pages(1M): System Administration Commands of the SunOS Reference Manual</i>.</p>

`-w io_port` Clear the **tried** flag for the specified I/O port.

**EXAMPLES****Example 1**

The following example creates meta-disk device nodes and AP database entries for disks reachable through **pln0** and **pln1**, with **pln0** specified as the primary path.

```
# apdisk -c -p pln0 -a pln1
# apdb -C
# drvconfig -i ap_dmd
# apconfig -R
```

**Example 2**

The following example deletes the AP database entries for disks with **sf1** specified as the primary path.

```
# apdisk -d sf1
# apdb -C
```

**SEE ALSO**

*Sun Enterprise Server Alternate Pathing User's Guide*

**apdb(1M)**, **apconfig(1M)**, **apinst(1M)**, **apnet(1M)** in this reference manual

**devlinks(1M)**, **drvconfig(1M)** in *man Pages(1M): System Administration Commands* of the *SunOS Reference Manual*



<b>NAME</b>	apinst – identify disk host adapter instances, <b>/dev/dsk</b> targets
<b>SYNOPSIS</b>	<b>apinst</b>
<b>DESCRIPTION</b>	The <b>/usr/sbin/apinst</b> program identifies all disk host bus adapters and provides the name, instance number and <b>/dev/dsk</b> targets attached to each.
<b>EXAMPLE</b>	<pre>% apinst  isp0     /dev/dsk/c0t0d0     /dev/dsk/c0t1d0     /dev/dsk/c0t2d0 pln0     /dev/dsk/c1t0d0     /dev/dsk/c1t1d0     /dev/dsk/c1t2d0     /dev/dsk/c1t3d0     /dev/dsk/c1t4d0     /dev/dsk/c1t5d0 pln1     /dev/dsk/c2t0d0     /dev/dsk/c2t1d0     /dev/dsk/c2t2d0     /dev/dsk/c2t3d0     /dev/dsk/c2t4d0     /dev/dsk/c2t5d0 sf0     /dev/dsk/c3t0d0     /dev/dsk/c3t1d0     /dev/dsk/c3t2d0     /dev/dsk/c3t3d0     /dev/dsk/c3t4d0     /dev/dsk/c3t5d0 sf1     /dev/dsk/c4t0d0     /dev/dsk/c4t1d0     /dev/dsk/c4t2d0     /dev/dsk/c4t3d0     /dev/dsk/c4t4d0     /dev/dsk/c4t5d0</pre>

<b>NAME</b>	apnet – manage network pathgroups
<b>SYNOPSIS</b>	<b>apnet -c -p</b> <i>ntwk_intrfc</i> [- <b>a</b> <i>ntwk_intrfc</i> ] <b>apnet -d</b> <i>meta_ntwk_intrfc</i> <b>apnet -z</b> <i>meta_ntwk_intrfc</i> <b>apnet -f</b> <i>ntwk_intrfc</i> <b>apnet -n</b> <i>ntwk_intrfc</i> <b>apnet -m</b> <i>meta_ntwk_intrfc</i> - <b>a</b> <i>ntwk_intrfc</i> <b>apnet -m</b> <i>meta_ntwk_intrfc</i> - <b>r</b> <i>ntwk_intrfc</i> <b>apnet -t</b> <i>meta_ntwk_intrfc</i> <b>apnet -w</b> <i>meta_ntwk_intrfc</i>
<b>DESCRIPTION</b>	The <code>/usr/sbin/apnet</code> command helps you manage network pathgroups in the Alternate Pathing (AP) system.
<b>OPTIONS</b>	<p><b>Note:</b> The parameters <i>meta_ntwk_intrfc</i> and <i>ntwk_intrfc</i> are strings of the form <i>type instance_#</i>, but with no space between them; for example, <b>mle0</b> and <b>mle1</b>.</p> <p><b>-c -p</b> <i>ntwk_intrfc</i> [-<b>a</b> <i>ntwk_intrfc</i>]  Create a meta-network interface and network pathgroup for the specified network. If <b>-a</b> is given, <b>apnet</b> designates the specified network interface as the alternate for the meta-network interface. (If you initially create a network pathgroup with only one path, you can later add an additional path using <b>apnet -m</b>.)</p> <p><b>-d</b> <i>meta_ntwk_intrfc</i>  Delete the specified meta-network interface and corresponding network pathgroup. If the pathgroup is currently uncommitted, <b>apnet</b> removes the interface and the pathgroup immediately. If the pathgroup is committed, the interface and pathgroup are only marked for deletion, and the interface continues to function until a commit is performed.</p> <p><b>-z</b> <i>meta_ntwk_intrfc</i>  Undelete the specified meta-network interface and pathgroup. This option cancels a previous <b>apnet -d</b> request that marked a committed pathgroup for deletion.</p> <p><b>-f</b> <i>ntwk_intrfc</i> Mark the specified network interface as offline and therefore inaccessible through its meta-network interface.  <b>Note:</b> An interface cannot be marked as offline if it is active.</p> <p><b>-n</b> <i>ntwk_intrfc</i> Mark the specified network interface as online and therefore accessible through its meta-network interface.</p>

- m** *meta\_ntwk\_intrfc* **-a** *ntwk\_intrfc*  
 Add the specified network interface as the alternate for the specified network pathgroup. You can use this option only if the network pathgroup currently contains exactly one path.
- m** *meta\_ntwk\_intrfc* **-r** *ntwk\_intrfc*  
 Remove the specified network interface from the specified network pathgroup.

**Note:** When an alternate is added (**-a**) or removed (**-r**) from a committed network pathgroup, a commit operation must be done for the change to take effect. In practice, the existing meta-network interface is marked for deletion and a new one is created without affecting current usage of the interface.
- t** *meta\_ntwk\_intrfc*  
 Make the next alternate path in sequence (after the primary) 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** *meta\_ntwk\_intrfc*  
 Make the current temporary active path the actual active path.

**EXAMPLES****Example 1**

The following example creates a network pathgroup and a meta-network interface, **mle0**, which has **le0** as its primary physical network interface and **le1** as its alternate physical network interface.

```
# apnet -c -p le0 -a le1
# apdb -C
```

**Example 2**

The following example deletes the network pathgroup and meta-network interface **mle0**:

```
# apnet -d mle0
# apdb -C
```

**SEE ALSO**

*Sun Enterprise Server Alternate Pathing User's Guide*  
**apconfig(1M)**, **apdb(1M)**, **apdisk(1M)**

<b>NAME</b>	apssp – client of AP SSP daemon
<b>SYNOPSIS</b>	<b>apssp</b>
<b>AVAILABILITY</b>	Sun Enterprise 10000 servers only.
<b>DESCRIPTION</b>	<b>Caution:</b> Do not execute <b>apssp</b> on the command line; it is intended for use only by other commands. <b>apssp</b> is a client of the Alternate Pathing SSP daemon, <b>ap_ssp_daemon(1M)</b> . It takes information from <b>ap_ssp_daemon</b> and passes it to <b>ap_reboot_host(1M)</b> .
<b>SEE ALSO</b>	<b>ap_ssp_daemon(1M)</b> , <b>ap_reboot_host(1M)</b>

<b>NAME</b>	Intro – AP special files																		
<b>DESCRIPTION</b>	This section describes AP files for your Sun server.																		
<b>LIST OF FUNCTIONS</b>	<table><tr><td><b>ap(7)</b></td><td>alternate pathing librarian driver, <b>/dev/ap</b></td></tr><tr><td><b>ap_dmd(7)</b></td><td>AP disk meta-driver</td></tr><tr><td><b>ap_nmd(7)</b></td><td>AP network meta-driver group</td></tr><tr><td><b>mhme(7)</b></td><td>Sun FastEthernet 2.0; see <b>ap_nmd(7)</b></td></tr><tr><td><b>mle(7)</b></td><td>Lance Ethernet special character device; see <b>ap_nmd(7)</b></td></tr><tr><td><b>mnf(7)</b></td><td>FDDI 3.0.x and 4.x special character device; see <b>ap_nmd(7)</b></td></tr><tr><td><b>mqe(7)</b></td><td>Quad Ethernet special character device; see <b>ap_nmd(7)</b></td></tr><tr><td><b>mqfe(7)</b></td><td>Quad Fast Ethernet special character device; see <b>ap_nmd(7)</b></td></tr><tr><td><b>mvge(7)</b></td><td>Sun Gigabit Ethernet special character device; see <b>ap_nmd(7)</b></td></tr></table>	<b>ap(7)</b>	alternate pathing librarian driver, <b>/dev/ap</b>	<b>ap_dmd(7)</b>	AP disk meta-driver	<b>ap_nmd(7)</b>	AP network meta-driver group	<b>mhme(7)</b>	Sun FastEthernet 2.0; see <b>ap_nmd(7)</b>	<b>mle(7)</b>	Lance Ethernet special character device; see <b>ap_nmd(7)</b>	<b>mnf(7)</b>	FDDI 3.0.x and 4.x special character device; see <b>ap_nmd(7)</b>	<b>mqe(7)</b>	Quad Ethernet special character device; see <b>ap_nmd(7)</b>	<b>mqfe(7)</b>	Quad Fast Ethernet special character device; see <b>ap_nmd(7)</b>	<b>mvge(7)</b>	Sun Gigabit Ethernet special character device; see <b>ap_nmd(7)</b>
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<b>mvge(7)</b>	Sun Gigabit Ethernet special character device; see <b>ap_nmd(7)</b>																		

<b>NAME</b>	ap – alternate pathing librarian driver, /dev/ap
<b>SYNOPSIS</b>	<b>ap</b>
<b>DESCRIPTION</b>	The AP driver provides a pseudo-driver interface to the kernel Alternate Pathing (AP) Librarian features.
<b>FILES</b>	<b>/kernel/drv/ap</b> AP driver module <b>/kernel/drv/ap.conf</b> AP driver configuration file
<b>SEE ALSO</b>	<i>Sun Enterprise Server Alternate Pathing User's Guide</i> <b>ap(1M)</b> , <b>ap_daemon(1M)</b>

<b>NAME</b>	ap_dmd – AP disk meta-driver
<b>SYNOPSIS</b>	<b>ap_dmd</b> @target,lun:partition
<b>DESCRIPTION</b>	<p>The <b>ap_dmd</b> driver works with the AP software to support Alternate Pathing for physical devices handled by the <b>ssd</b> SCSI disk driver. See <b>ssd(7)</b> in <i>man Pages(7): Device and Network Interfaces</i> of the <i>SunOS Reference Manual</i>.</p> <p>The AP feature lets you configure alternate SCSI paths to a physical device. These paths are associated with a <i>meta-disk device</i>, which is one of the file system special nodes associated with a particular meta-driver.</p> <p><b>ap_dmd</b> allows the AP Librarian, <b>ap(7)</b>, to configure or unconfigure physical paths to a SCSI device via an interface that allows APSET, APUNSET, and APSWITCH commands. These commands are issued by <b>ap(7)</b> at the behest of the user-invoked AP commands and AP daemon. To change the SCSI path information associated with a particular <b>ap_dmd</b> device, use <b>apconfig(1M)</b>, <b>apdb(1M)</b> and <b>apdisk(1M)</b>. For more information, see the <i>Sun Enterprise Server Alternate Pathing User's Guide</i>.</p> <p>All device operations supported by the <b>ssd</b> driver are also valid on <b>ap_dmd</b> devices that have been created via AP commands. See the other AP commands for details regarding other components of AP software, and <b>ssd(7)</b> man page for information about block/character file accesses, I/O requests, disk partitioning schemes, CD-ROM support, and ioctls.</p>
<b>ERRORS</b>	<p><b>ENXIO</b>            No physical SCSI path to the target device exists.</p> <p><i>Other</i>             For information on other errors, see <b>sd(7)</b>.</p>
<b>FILES</b>	<p><b>apdmd.conf</b>                    driver configuration file</p> <p><b>/dev/ap/dsk/mncntndnsn</b>        block files</p> <p><b>/dev/ap/rdisk/mncntndnsn</b>      raw files</p> <p>where <b>m</b> identifies the device as a meta-device and:</p> <p>   <b>cn</b>        Controller number</p> <p>   <b>tn</b>        Target number</p> <p>   <b>dn</b>        Logical unit number</p> <p>   <b>sn</b>        Slice (partition) number</p>
<b>DIAGNOSTICS</b>	See <b>ssd(7)</b> in <i>man Pages(7): Device and Network Interfaces</i> of the <i>SunOS Reference Manual</i> .
<b>SEE ALSO</b>	<p><i>Sun Enterprise Server Alternate Pathing User's Guide</i></p> <p><b>apconfig(1M)</b>, <b>apdb(1M)</b>, <b>apdisk(1M)</b>, <b>apnet(1M)</b>, <b>ap_daemon(1M)</b>, <b>ap(7)</b>, <b>ap_nmd(7)</b> in this reference manual</p> <p><b>ssd(7)</b> in <i>man Pages(7): Device and Network Interfaces</i> of the <i>SunOS Reference Manual</i></p>

<b>NAME</b>	ap_nmd, mhme, mle, mnf, mqe, mqfe, mvge – AP network meta-driver group
<b>SYNOPSIS</b>	<pre> /devices/pseudo/clone@0:mhme /devices/pseudo/clone@0:mle /devices/pseudo/clone@0:mnf /devices/pseudo/clone@0:mqe /devices/pseudo/clone@0:mqfe /devices/pseudo/clone@0:mvge </pre>
<b>DESCRIPTION</b>	<p><b>ap_nmd</b> is a group of multi-threaded, loadable, clonable, STREAMS meta-network device drivers that support the connectionless Data Link Provider Interface, <b>dlpi</b>(7), for <b>hme</b>(7) (Sun FastEthernet 2.0), <b>le</b>(7) (Lance Ethernet), <b>nf</b>(7) (FDDI 5.x), <b>qe</b>(7) (Quad Ethernet), <b>qfe</b> (Quad FastEthernet), and <b>vge</b> (Sun Gigabit Ethernet).</p> <p><b>Note:</b> SunOS man pages that describe drivers for optional packages, such as FDDI and Sun FastEthernet, are available only on systems that have those packages installed.</p> <p><b>ap_nmd</b> works with the AP software to support Alternate Pathing for physical network devices.</p> <p>Device operations of <b>ap_nmd</b> are an extension of the operations of the underlying network drivers. <b>ap_nmd</b> 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 DL_ATTACH_REQ and DL_INFO_ACK messages. 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 <b>/dev/mxx</b> is used to access all device-specific instances of the <b>ap_nmd</b> within the system.</p>
<b>ap_nmd and AP</b>	<p>The <b>ap_nmd</b> driver provides an interface to support Alternate Pathing. The APSET interface allows a user to provide a mapping between physical path and logical path. The APUNSET provides an interface to remove a physical-to-logical path mapping and APSWITCH provide a mechanism to switch a logical path from its existing physical path to a new physical path. For a more complete description of the AP capability, see the <i>Sun Enterprise Server Alternate Pathing User's Guide</i>.</p>
<b>ap_nmd and DLPI</b>	<p>The <b>ap_nmd</b> 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>
<b>ERRORS</b>	<p><b>EBUSY</b> An attempt was made to unload a busy device, or to APUNSET an active device</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

**EIO** An attempt to switch between physical devices failed

**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**

**mhme.conf** Driver configuration file

**mle.conf** Driver configuration file

**mnf.conf** Driver configuration file

**mqe.conf** Driver configuration file

**mqfe.conf** Driver configuration file

**mvge.conf** Driver configuration file

**/dev/mhme** hme special character device

**/dev/mle** le special character device

**/dev/mnf** nf special character device

**/dev/mqe** qe special character device

**/dev/mqfe** qfe special character device

**/dev/mvge** vge special character device

**DIAGNOSTICS**

See **le(7)** and **qe(7)** in *man Pages(7): Device and Network Interfaces of the SunOS Reference Manual*.

**SEE ALSO**

*Sun Enterprise Server Alternate Pathing User's Guide*

**ap\_daemon(1M)**, **apconfig(1M)**, **apdb(1M)**, **apnet(1M)**, **ap(7)**, **ap\_dmd(7)**, in this reference manual

**driver.conf(4)** in *man Pages(4): File Formats of the SunOS Reference Manual*

*man Pages(7): Device and Network Interfaces of the SunOS Reference Manual* and other optional reference manuals (for example, *FDDI Reference Manual*), as appropriate