WWIDMGR Users' Manual

Alpha Systems' Console World Wide ID Manager for Fibre Channel devices

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Table 1 REVISION HISTORY

Revision Number	Date	Description
V1.0	March 1, 1999	Initial document.
V1.1	October 7, 1999	"Nvram read failed." warning message. (section 2.2.) FC-AL / Loop support statement. (section 2.2.) Added wwidmgr –set adapter. (section 2.2.) Ffauto/ffnext (section 5)
V1.2	May, 2000	Modified the FC-AL/Loop support. Loop is now supported. statement (section 2.2) Fibre Channel related release notes for V5.8 appended to this document.
V1.3	May, 2004	General revision to reflect existence of multiple fibre-channel adapter types, and multiple storage controllers.

1 Overview

The wwidmgr command is used to define alias names of fibre channel devices used in booting and dumping. Fibre channel devices have long worldwide identifiers (WWIDs) that cannot be incorporated into a console device name. For example:

```
WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0002-0000
```

The console allows these devices to be given names that are assigned by the user. The user specifies associations between WWIDs and device names that are used in booting and dumping.

Users familiar with the console "show dev" command will quickly notice that command behaves differently with the fibre-channel adapter option than with other options. Before any devices appear in the "show dev" display, the wwidmgr command must be used to define the device name to WWID association. Only devices that have an alias association are presented in the show device display. The wwidmgr provides an exhaustive list of devices accessible through a fibre-channel adapter.

The examples used in this document to explain storage controller commands are based on the HSG80. The syntax and semantics of commands used on other storage controllers may vary.

1.1 Who needs to use the wwidmgr command?

1.1.1 NT Users

NT users do not have a need to use the wwidmgr command.

1.1.2 Unix users booting via a fibre-channel adapter

UNIX 4.0 does not support booting via the fibre-channel adapter. UNIX 4.0 users do not have to use the wwidmgr command. UNIX 5.x users that want to boot via a fibre-channel adapter will need to use the wwidmgr. If the UNIX user is not booting via a fibre-channel adapter, then the operator does not need to use the wwidmgr command.

1.1.3 VMS users booting via a fibre-channel adapter

VMS users that want to boot or dump via a fibre-channel adapter will need to use the wwidmgr to setup device and path information needed by the console. If the VMS system is not booting or dumping via the fibre-channel adapter, you do not need to use the wwidmgr command.

1.1.4 Diagnostic users and advanced users

The wwidmgr command can be helpful with new installations. The information displayed by the wwidmgr can be helpful in examining the topology and accessibility of fibre channel ports on the storage controller and in gathering disk information. In many cases where "show dev" would be used, the wwidmgr command is now used for fibre channel devices.

1.2 When do you need to use the wwidmgr command?

The wwidmgr only needs to be used to set up non-volatile storage with information the console will use later for booting and showing devices. Once the user has done this setup, the wwidmgr does not have to be run again until:

1. Initial setup of boot devices and dump devices
2. The configuration changes and the non-volatile information is not correct
3. A new or additional boot or dump device is added
4. A previously existing boot or dump device is deleted

Note: device definitions in the bootdef_dev and dump_dev environment variables should be verified and re-entered after making any device setup changes using wwidmgr.

1.3 wwidmgr command highlights

The wwidmgr command is invoked by the user to:

1. Display the worldwide id's (WWID) of the disk devices
2. Display accessible disk devices
3. Display connections to the fabric
4. Display the unit IDENTIFIER defined at the storage controller console
5. Display topology information
6. Set the console device name for a selected WWID into console non-volatile memory
7. Set the desired path(s) through fibre channel connections to control accessibility.

2 Basic wwidmgr operation

2.1 Where to start

To use the wwidmgr command on models **AS8x00, GS60/140, AS4x00,** or **AS1200**, the console must be in diagnostic mode. On all other platforms, the wwidmgr command can be issued at any time prior to booting. To get into diagnostic mode:

```
P00>>> set mode diag
```

If the console is not in diagnostic mode on the above platforms, the error response is:

```
P00>>>wwidmgr -show wwid
wwidmgr: No such command
```

After completing all wwidmgr commands, either an init or system reset must be issued prior to booting.

On all platforms, after issuing any wwidmgr command, the console is in **wwidmgr mode** until the system is re-initialized. After issuing any wwidmgr commands, booting is not allowed until the system is re-initialized. A system reset or initialization is the only mechanism to exit wwidmgr mode.

2.2 -show adapter / -set adapter

V5.6 SRM console and higher revisions have the capability of setting a fibre-channel adapter to run in arbitrated loop mode or in fabric (switch) mode. If a fibre-channel adapter in LOOP mode is connected to a switch, the results are unpredictable. The same is true for a fibre-channel adapter in FABRIC mode that is connected to a loop. By default, the console assumes a FABRIC topology. The "-set adapter" command stores the selected topology into the nvram storage on the fibre-channel adapter. If the adapter is moved from one AlphaServer to another, this setting stays with the module. The V5.6 and earlier console fibre-channel adapter drivers do not support the FC-AL (loop) topology. A setting of LOOP is a valid setting in V5.6, however that setting just tells the console driver not to run. As of V5.8, FC-

AL is supported in the console, with the same capabilities as has been available for FABRIC configurations.

2.2.1 –show adapter

The fibre-channel adapter configuration can be displayed with the command:

wwidmgr –show adapter

```
P00>>>wwidmgr -show adapter
item    adapter                 WWN                     Cur. Topo  Next Topo
   pga0.0.0.4.6 - Nvram read failed.
[ 0]    pga0.0.0.4.6         1000-0000-c921-0c22         FABRIC     UNAVAIL
   pgb0.0.0.8.6 - Nvram read failed.
[ 1]    pgb0.0.0.8.6         1000-0000-c921-027a         LOOP       UNAVAIL
[9999] All of the above.
```

Figure 1 -show adapter with an unformatted nvram

In Figure 1, note the warning message "Nvram read failed." This indicates that the Nvram on the fibre-channel adapter has not been initialized and formatted. This is expected and can be corrected by issuing a "-set adapter" command as described in the next section.

```
LP00>>>wwidmgr -show adapter
item    adapter                 WWN                   Cur. Topo  Next Topo
[ 0]    pga0.0.0.4.6     1000-0000-c920-05ab           FABRIC     FABRIC
[ 1]    pgb0.0.0.8.6     1000-0000-c921-0ce0           FABRIC     FABRIC
[9999] All of the above.
```

Figure 2 -show adapter display

Figure 2 shows a display from "wwidmgr –show adapter" where there are 2 adapters in the system. For a detailed look at a line item, we can use the first line item:

[0] pga0.0.0.4.6 1000-0000-c920-05ab FABRIC FABRIC

1. [0] – Item number. The bracketed value is used as a parameter to the *–item* qualifier in the "wwidmgr –set adapter" command. You can select which adapter to configure by its item number. An item number of 9999 selects all adapters.

2. Pga0.0.0.4.6 – adapter mnemonic. Error messages and displays use this identifier.

3. 1000-0000-c920-05ab – The World Wide Name of the adapter. This value is used to identify the adapter to other nodes on the fibre channel link.

4. FABRIC – Current topology. This value is either FABRIC or LOOP. It indicates the mode the fibre-channel adapter is operating in currently, during this wwidmgr session. The current mode the adapter is running in is not altered during a wwidmgr session.

5. FABRIC – Next topology. This value can be FABRIC, LOOP, or UNAVAIL. It indicates the topology setting that is in the fibre-channel adapter 's NVRAM. An UNAVAIL setting indicates the NVRAM is not formatted, a condition corrected by a *–set* adapter command. A setting of FABRIC or LOOP indicates how the adapter will be configured the next time the system is initialized.

2.2.2 –set adapter

A "wwidmgr –set adapter" command is used to format the fibre-channel adapter NVRAM and to configure a fibre-channel adapter to run on a LOOP or a FABRIC. The command format is:

wwidmgr –set adapter –item <itemno> -topo <FABRIC|LOOP>

where itemno is the bracketed value from the *–show* adapter command. In Figure 3, the operator changes all the fibre-channel adapter's from FABRIC to LOOP by specifying an itemno value of 9999. The init is shown at the end to emphasize that the setting in the running adapter is not changed until the next initialization.

```
LP00>>>wwidmgr -show ada
item    adapter                 WWN                 Cur. Topo  Next Topo
[ 0]    pga0.0.0.8.1      1000-0000-c920-05ab          FABRIC     FABRIC
[ 1]    pgb0.0.0.10.1     1000-0000-c921-0ce0          FABRIC     FABRIC
[9999] All of the above.
LP00>>>wwidmgr -set adapter -item 9999 -topo loop
LP00>>>wwidmgr -show ada
item    adapter                 WWN                 Cur. Topo  Next Topo
[ 0]    pga0.0.0.8.1      1000-0000-c920-05ab          FABRIC     LOOP
[ 1]    pgb0.0.0.10.1     1000-0000-c921-0ce0          FABRIC     LOOP
[9999] All of the above.
LP00>>>init
```

Figure 3 -set adapter example

2.3 Displaying devices

There are several mechanisms for displaying fibre channel devices. The storage controller console, the host console, and the operating system, all have displays of the available devices. These different mechanisms have different ways of naming disk devices and different displays. However, all these mechanism do share a common way of identifying devices by the World Wide Identifier (WWID). The WWID is guaranteed to be a unique value. The WWID, as you will see in Figure 5, is a long value. Optionally, the storage controller operator can assign a shorter IDENTIFIER.

2.3.1 Displaying devices at the storage controller console

The first step in identifying a disk device is to list the devices know to a storage controller. Issuing a "show dev" command at the storage controller console does this, as shown in Figure

4. The “D-number” in the “Used by” column is a shorthand handle used in other storage controller console commands.

At the storage controller console, 5 devices are configured as shown:

```
HSG80> show dev
Name          Type                      Port Targ  Lun        Used by
------------------------------------------------------------------------------

DISK20000     disk                         2    0    0        D1
DISK30200     disk                         3    2    0        D2
DISK50000     disk                         5    0    0        D40
DISK50300     disk                         5    3    0        D77
DISK60100     disk                         6    1    0        D99
```

Figure 4 HSG80 show device display

More detail about a device is displayed with another HSG80 command, “show D<n>” command as demonstrated in Figure 5. The device’s WWID is displayed at the HSG80 (labeled LUN ID: **[1]**) and the unit IDENTIFIER **[2]** is also presented.

```
HSG80> show d40
    LUN                                      Uses             Used by
------------------------------------------------------------------------------

  D40                                        DISK50000
       LUN ID:      6000-1FE1-0000-04A0-FFFF-FFFE-0005-0000            [1]
       IDENTIFIER = 40                                                 [2]
       Switches:
         RUN                    NOWRITE_PROTECT        READ_CACHE
         READAHEAD_CACHE
         MAXIMUM_CACHED_TRANSFER_SIZE = 32
       Access:
              ALL
       State:
         ONLINE to this controller
         Not reserved
         NOPREFERRED_PATH
       Size: 4110480 blocks
       Geometry (C/H/S): ( 3045 / 16 / 85 )
```

Figure 5 HSG80 show d40 display

Setting up the IDENTIFIER on the storage controller is mandatory for VMS installations, but optional for UNIX and NT installations. Installations that do set up the IDENTIFIER can use this value with the *–quickset* and the *–set* qualifiers of the wwidmgr command. If a device is associated with an storage controller IDENTIFIER, then a boot disk can be set up in a single AlphaServer console command (see section 2.4.1 “Setting up a device using the UDID”). If the IDENTIFIER value is not set, then users will need to use the *wwidmgr –show wwid* command described below in this section.

2.3.2 Displaying devices at the AlphaServer console

To display the devices' wwids that are known to the console, either as previously defined wwids or currently accessible, use the wwidmgr command with the qualifier as shown:

>>> wwidmgr –show wwid

At the AlphaServer console, the wwidmgr displays the WWID and the User Defined IDentifier for each device that is found or previously defined in the console non-volatile memory.

A list if WWIDs is presented after the last fibre-channel adapter is probed. InFigure 6, there are two fibre-channel adapters in the system. Each fibre-channel adapter is started and probed. Five WWIDs were found on either of the fibre-channel adapters. The WWID list appears at the end of probing all fibre-channel adapter and does not apply to just the last fibre-channel adapter in the list. To display the topology information that indicates which WWIDs are found on each fibre-channel adapter, the *–full* qualifier can be used (see section 3.1.1). Also, fibre-channel adapters can be started individually with the *–adapter* switch (see section 3.8).

```
P00>>>set mode diag
Console is in diagnostic mode
P00>>>wwidmgr -show wwid
polling for units on kgpsa0, slot 4, bus 0, hose6...
   pga0.0.0.4.6            PGA0        WWN 1000-0000-c920-05ab                  [1a]
polling for units on kgpsa1, slot 8, bus 0, hose6...
   pgb0.0.0.8.6            PGB0        WWN 1000-0000-c920-5e75                  [1b]
[0] UDID:1 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0002-0000 (ev:none)
[1] UDID:2 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0003-0200 (ev:none)
[2] UDID:77 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0300 (ev:none)
[3] UDID:99 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0006-0100 (ev:none)
[4] UDID:40 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000 (ev:none)     [2]
```

See note[1]

Figure 6 AlphaServer console wwidmgr -show wwid

The wwid number for the storage controller D40 device, UDID:40 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe--0005-0000 is found in the display **[2]**. Also shown in this display are the worldwide names (WWN) for each of the fibre-channel adapters **[1a]**, **[1b]**. The fibre-channel adapter WWN is assigned at the factory to the adapter and stays with the adapter. It is important to know the fibre-channel adapter's WWN when using the storage controller commands that display and manipulate the CONNECTION (e.g. SHOW CONNECTION, SET <connection name> OPERATING_SYSTEM, and SET <connection name> OFFSET).

[1] This is a log from an 8400. Displays vary slightly on other system types.

2.3.3 Detailed description of the wwid line item

There are 4 pieces of information on a wwid line display that are used to identify disks. These identifiers are used as parameters in other wwidmgr commands.

[4] UDID:40 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000 (ev:none)

1. [4] – Item number. The item number is used as the parameter to the *–item* qualifier. This item number is used to reference the WWID on that line. See section 2.4.2 "Setting up a device using the WWID menu item number".

2. UDID:40 – User Defined IDentifier. This is a value the user assigns by an storage controller console command (i.e. SET IDENTIFIER). This value is used as an alias for the WWID. This value is used by the wwidmgr as the parameter to the *–udid* qualifier on some wwidmgr commands. *VMS installations are required to set this value on the storage controller, and all identifiers must be unique. UNIX and NT installations do not use this value.* When the storage controller device is not set (NOIDENTIFIER), the console displays UDID:-1. A UDID can also have a value of –1 if a WWID stored in non-volatile storage is not found during probing (See 0 "WWIDs that are set in non-volatile environment variables are displayed by wwidmgr –show wwid even if they are not found while probing the fabric.

3. Device not found").

At most 4 wwids can be 'set' into non-volatile memory. And only the devices that are 'set' during a wwidmgr session, will later show in a "show dev' command when not in diagnostic mode.

4. WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000 – The worldwide id that is presented in the console display is different from the storage controller display only in that it is prefixed by "WWID:01000010:". This presentation is consistent with the UNIX presentation. Since UNIX installations may not setup the user defined IDENTIFIER (UDID) on the storage controller, the WWID is the identification string used by UNIX installations.

5. (ev:none) – when an wwid is 'set' by the wwidmgr *–quickset* or *–set* qualifiers, the wwid is stored in non-volatile memory and referenced through the environment variables wwid0, wwid1, wwid2, and wwid3. *Note that in this implementation, only 4 wwids can be aliased and set in non-volatile memory.* That is, console will only recognize 4 distinct disks during normal operation. The console "show dev" command, during normal mode, will only display the disk devices that are defined in these environment variables. Users should not normally need to look at these environment variables, but a value other than 'none' is a quick way to view which wwids are currently 'set'.

2.4 Setting up a device with -*quickset*

A device that has its WWID and port path information stored in console non-volatile storage is considered "set up". The wwidmgr command helps the user to set up this information such that the user does not have to enter long WWIDs and WWNs. At the console, there are two ways of referring to a device, either by its HDG80 IDENTIFIER value (called the UDID in console nomenclature) or by its WWID menu item number.

VMS installations usually refer to a device by its UDID. The console accepts the UDID as a parameter in wwidmgr commands.

Tru64 UNIX installations refer to the device by its WWID. The console wwidmgr presents a menu list of WWIDs. A menu item is then used to refer to a WWID in wwidmgr commands.

2.4.1 Setting up a device using the UDID

The user assigned storage controller IDENTIFIER (or UDID) can be used to select a device in wwidmgr commands. Selecting devices with the wwidmgr is necessary to store the WWID alias and port alias into console non-volatile memory. Only those disks that have been selected using *wwidmgr –quickset* or *wwidmgr –set* are available to the console outside of wwidmgr mode. The console uses the UDID value as the unit number in the console name for the device.

At the storage controller console:

set d<n> identifier =<decimal value>

At the AlphaServer console:

>>> wwidmgr –quickset –udid <decimal value>

In the example in Figure 7, the device referred to as d40 on the storage controller console, is given an IDENTIFIER of value 40 **[1]**. *Note that the D-number and the IDENTIFIER value do not have to be the same, but is just the convention used here*. The d40 device is referenced in a console wwidmgr command **[2]** by "-udid 40".

In this example, one disk is accessible via 8 different paths. The *–quickset* command also provides a "reachability" display which shows the user what the device will be called when booting or setting environment variables (see section 3.2 "show reachability"). The device names shown will be the devices as presented in a "show dev" after the next initialization. To use any of these device names in a 'set bootdef_dev' command, you must first exit wwidmgr mode by re-initializing the console.

On the 8x00 platform, writing the non-volatile memory takes longer than on other platforms. This *wwidmgr -quickset* command can take up to 1 minute to complete on the 8x00.

```
At the HSG80 console:
HSG80> set d40 identifier = 40                                    [1]

At the AlphaServer console:
P00>>>wwidmgr -quickset -udid 40                                  [2]

Disk assignment and reachability after next initialization:


6000-1fe1-0000-04a0-ffff-fffe-0005-0000
                          via adapter:         via fc nport:        connected:
dgb40.1001.0.8.6            pgb0.0.0.8.6      5000-1fe1-0000-04a3      Yes
dgb40.1002.0.8.6            pgb0.0.0.8.6      5000-1fe1-0000-04a2      No
dgb40.1003.0.8.6            pgb0.0.0.8.6      5000-1fe1-0000-04a1      No
dgb40.1004.0.8.6            pgb0.0.0.8.6      5000-1fe1-0000-04a4      Yes
dga40.1001.0.4.6            pga0.0.0.4.6      5000-1fe1-0000-04a3      Yes
dga40.1002.0.4.6            pga0.0.0.4.6      5000-1fe1-0000-04a2      No
dga40.1003.0.4.6            pga0.0.0.4.6      5000-1fe1-0000-04a1      No
dga40.1004.0.4.6            pga0.0.0.4.6      5000-1fe1-0000-04a4      Yes
```

Figure 7 Quickset example with the reachability display

The device names shown in the first column of the reachability display will be the names after the next initialization. The device name cannot be used in bootdef_dev, dump_dev, or for booting until after the console is re-initialized.

2.4.2 Setting up a device using the WWID menu item number

Not all devices are necessarily set up with an storage controller IDENTIFIER. For example, UNIX installations and NT installations may not set up their storage controller devices with identifiers. A WWID can be referenced by its menu *item* number (see section 2.3.3). In Figure 8, **[1]**, WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000 is positioned in the list as item 4. That WWID can be referred to in wwidmgr commands as "-*item* 4" as in Figure 8 **[2]** . Selecting with the –*item* qualifier allows the user to specify the unit number that the console will use in creating the device name. If no unit number is specified, console will generate one that is a hashed value of the WWID. In the example below, Figure 8 **[2]**, the user assigns the disk device the unit number 200.

In this example, one disk is accessible via 8 different paths. The –*quickset* command also provides a "reachability" display which shows the user what the device will be called when

booting or setting environment variables (see section 3.2 “show reachability”). The device names shown will be the devices as presented in a “show dev” after the next initialization. To use any of these device names in a ‘set bootdef_dev’ command, you must first exit wwidmgr mode by re-initializing the console.

On the 8x00 platform, writing the non-volatile memory takes longer than on other platforms. This *wwidmgr -quickset* command can take up to 1 minute to complete on the 8x00.

```
P00>>>wwidmgr -show wwid
[0] UDID:1 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0002-0000 (ev:none)
[1] UDID:2 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0003-0200 (ev:none)
[2] UDID:77 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0300 (ev:none)
[3] UDID:99 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0006-0100 (ev:none)
[4] UDID:40 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000 (ev:none)     [1]
P00>>>wwidmgr -quickset -item 4 -unit 200                                        [2]

Disk assignment and reachability after next initialization:


6000-1fe1-0000-04a0-ffff-fffe-0005-0000
                          via adapter:         via fc nport:        connected:
dgb200.1001.0.8.6           pgb0.0.0.8.6      5000-1fe1-0000-04a3      Yes
dgb200.1002.0.8.6           pgb0.0.0.8.6      5000-1fe1-0000-04a2      No
dgb200.1003.0.8.6           pgb0.0.0.8.6      5000-1fe1-0000-04a1      No
dgb200.1004.0.8.6           pgb0.0.0.8.6      5000-1fe1-0000-04a4      Yes
dga200.1001.0.4.6           pga0.0.0.4.6      5000-1fe1-0000-04a3      Yes
dga200.1002.0.4.6           pga0.0.0.4.6      5000-1fe1-0000-04a2      No
dga200.1003.0.4.6           pga0.0.0.4.6      5000-1fe1-0000-04a1      No
dga200.1004.0.4.6           pga0.0.0.4.6      5000-1fe1-0000-04a4      Yes
```

Figure 8 Using the -item qualifier

Unlike a UDID or a WWID, which are the same each time the wwidmgr is run, an *item* number is a temporary reference number to a WWID in the currently listed display of WWIDs.

2.5 The show device display

Show device will show the disk devices and all the paths to that device that are currently reachable. This is the same list of devices as presented in the reachability display under the wwidmgr. At most 4 different disk devices can be accessed, however, each disk device may have more than one access path from the host. A console device name is created for each path to that device. Therefore a disk device may have several representative names that are distinguished by path information.

Show dev will only show devices that are previously defined and currently accessible.

After exiting wwidmgr mode by re-initializing, the next show device command displays the disks that have been set up in Figure 9. In this example, one disk is accessible via eight different paths. The disk is available to four different storage controller ports. The four storage controller ports are all accessible to each of the two fibre-channel adapters on the host.

Only one of the five disks in this configuration is presented because only one WWID has been aliased or setup using the wwidmgr command.

Show dev displays the WWN of each adapter **[1a]**, **[1b]** and the device name that VMS will use in the 2nd column **[2]**.

```
P00>>>show dev kgpsa*
polling for units on kgpsa0, slot 4, bus 0, hose6...
   pga0.0.0.4.6            PGA0        WWN 1000-0000-c920-05ab          [1a]
dga200.1001.0.4.6  $1$DGA200               HSG80  R003                   [2]
dga200.1002.0.4.6  $1$DGA200               HSG80  R003
dga200.1003.0.4.6  $1$DGA200               HSG80  R003
dga200.1004.0.4.6  $1$DGA200               HSG80  R003
polling for units on kgpsa1, slot 8, bus 0, hose6...
   pgb0.0.0.8.6            PGB0        WWN 1000-0000-c920-5e75          [1b]
dgb200.1001.0.8.6  $1$DGA200               HSG80  R003
dgb200.1002.0.8.6  $1$DGA200               HSG80  R003
dgb200.1003.0.8.6  $1$DGA200               HSG80  R003
dgb200.1004.0.8.6  $1$DGA200               HSG80  R003
```

Figure 9 Show device display

Note: Show devices, when issued in wwidmgr mode, may list more devices than the reachability display. In wwidmgr mode, arbitrary console device names are created for all WWIDs. This is for diagnostic purposes.

2.6 Putting it all together

2.6.1 VMS installations

1. On the storage controller console, set the device IDENTIFIER
2. On the AlphaServer console, set the console to diagnostic mode if appropriate
3. wwidmgr –quickset –udid <udidno>
4. init
5. set bootdef_dev <device>,<device>,…

2.6.2 UNIX installations

1. On the storage controller, show the LUN ID (WWID) of a device
2. On the AlphaServer console, set the console to diagnostic mode if appropriate
3. wwidmgr –show wwid

4. determine item number of the WWID

5. wwidmgr –quickset –item <itemno> -unit <unitno>

6. init

7. set bootdef_dev <device>,<device>,…

2.7 Limitations of -*quickset*

The *–quickset* qualifier is great for setting up:

1. only one device

2. more than one device if those devices share access through the same ports on the storage controller.

The *–quickset* qualifier is not useful when defining more than one device when those devices do not share access through the same ports on the storage controller. *–Quickset* stores away port accessibility information for the device that is specified on the *–quickset* command line. A subsequent issuing of a *–quickset* command will overwrite that port accessibility information, and the port access information for the earlier defined device will be lost.

For installations with topologies where more than one disk must be set up, and those disks are not accessed through common storage controller ports, the *–set port* command must be used. Installations that would need to use *–set port* would include:

1. A VMS installation where the boot disk and the dump disk do not share common paths.

2. An installation where more than one boot disk needs to be set up for console use and those boot disks are not on a common path.

```
P08>>> wwidmgr -show wwid -item 11 -full
[11] UDID:13 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002b (ev:none)
 - current_unit:20790 current_col: 0 default_unit:20790
          via adapter       via fc_nport       Con     DID     Lun
 -         pga0.0.0.6.1   5000-1fe1-0000-74b1   Yes   200213      3

P08>>> wwidmgr -show wwid -item 21 -full
[21] UDID:113 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002e (ev:wwid1)
 - current_unit:113 current_col: 0 default_unit:21238
          via adapter       via fc_nport       Con     DID     Lun
 -         pga0.0.0.6.1   5000-1fe1-0000-74b2   Yes   200713      3
```

Figure 10 Devices that cannot both be set up with –quickset

In Figure 10, item 11 and item 21 do not share common port paths. Item 11 is accessible only through the storage controller port 5000-1fe1-0000-74b1, while item 21 is accessible only

through the storage controller port 5000-1fe1-0000-74b2. *–Quickset* cannot be used to properly define access to both of these devices. The *–quickset* qualifier will only set up the port information for the device specified in the most recently issued *–quickset* command.

The *–set wwid* and *–set port* qualifiers are used to set up devices in configurations as in Figure 7. This is described in section 3.6 "Setting up devices that do not share a common path". Below are configurations where *–quickset* can and cannot be used. Configuration A in Figure 11, requires the setup process described in section 3.6 to setup both 11 and 21. Configuration B is suitable for *–quickset* to setup 11 and 21.

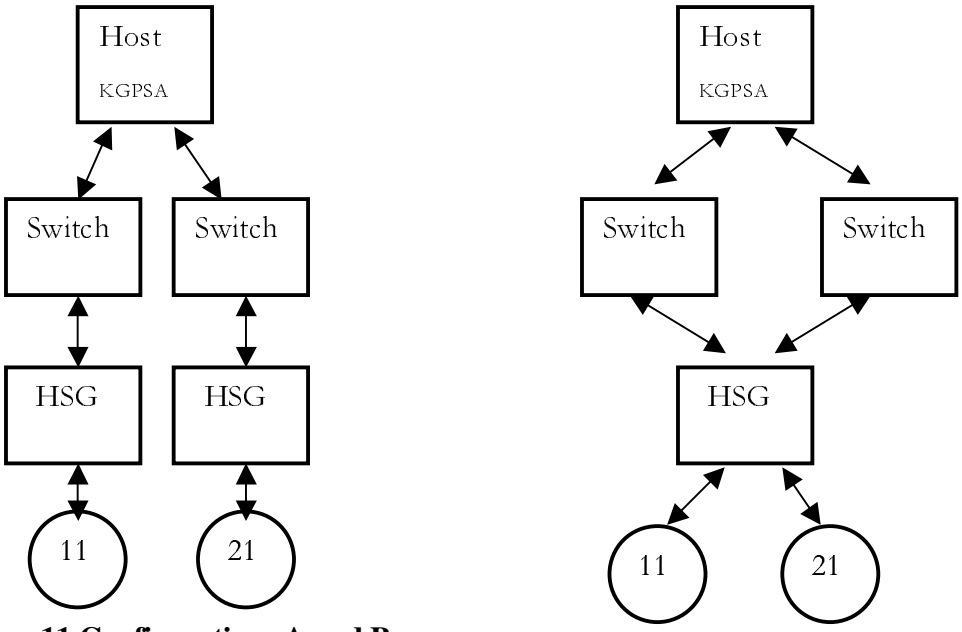

Figure 11 Configurations A and B

Further detailed discussion of the –quickset limitation with configuration A is presented in section 3.6 "Setting up devices that do not share a common path". A log of using –quickset to setup configuration B is included in 6.1 "Example of setting up more than one device with –quickset".

3 Advanced wwidmgr commands

3.1 show wwid options

The *–show wwid* command has been discussed earlier in section 2.3.2 "Displaying devices at the AlphaServer console". For more complete information on the topology, the *–full* qualifier can be used. On some configurations, there may be many disks and wwid displays may be large. The *–item* qualifier and the *–filter* qualifier described below can help to narrow down the display. As with any console command, piping to *more* or using *grep* are options available to the user.

3.1.1 Displaying wwids with full topology information

The topology of a configuration as seen from the console, can be displayed with the *–full* qualifier.. In the example below, the host has one fibre-channel adapter device and there are two connections to the storage controller. The command form that provides topology information is:

wwidmgr -show wwid -full

```
P00>>>wwidmgr -show wwid -full

   pga0.0.0.4.6
- Port: 1000-0000-c920-05ab

   pga0.0.0.4.6
- Port: 2000-0060-6900-01b7

   pga0.0.0.4.6
- Port: 20fc-0060-6900-01b7

   pga0.0.0.4.6
- Port: 5000-1fe1-0000-04a1
 - dga22204.3.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0002-0000          [1]
 - dga2.1003.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0003-0200
 - dga26381.3.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0300
 - dga2044.3.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0006-0100
 - dga5901.3.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000

   pga0.0.0.4.6
- Port: 5000-1fe1-0000-04a4
 - dga22204.4.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0002-0000
 - dga2.1004.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0003-0200
 - dga26381.4.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0300
```

```
 - dga2044.4.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0006-0100
 - dga5901.4.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000


[0] UDID:2 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0003-0200 (ev:wwid1)
 - current_unit:2 current_col: 1 default_unit:30444
          via adapter       via fc_nport       Con     DID     Lun
 -         pga0.0.0.4.6  5000-1fe1-0000-04a1   Yes   210513      2
 -         pga0.0.0.4.6  5000-1fe1-0000-04a4   No    210713      2

[1] UDID:1 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0002-0000 (ev:none)          [2a]
 - current_unit:22204_current_col: 0 default_unit:22204                             [2b]
          via adapter       via fc_nport       Con     DID     Lun                 [2c]
 -         pga0.0.0.4.6  5000-1fe1-0000-04a1   No    210513      1                 [2d]
 -         pga0.0.0.4.6  5000-1fe1-0000-04a4   Yes   210713      1                 [2e]

[2] UDID:77 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0300 (ev:none)
 - current_unit:26381 current_col: 0 default_unit:26381
          via adapter       via fc_nport       Con     DID     Lun
 -         pga0.0.0.4.6  5000-1fe1-0000-04a1   No    210513     77
 -         pga0.0.0.4.6  5000-1fe1-0000-04a4   Yes   210713     77

[3] UDID:99 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0006-0100 (ev:none)
 - current_unit:2044 current_col: 0 default_unit: 2044
          via adapter       via fc_nport       Con     DID     Lun
 -         pga0.0.0.4.6  5000-1fe1-0000-04a1   No    210513     99
 -         pga0.0.0.4.6  5000-1fe1-0000-04a4   Yes   210713     99

[4] UDID:40 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000 (ev:none)
- current_unit:5901 current_col: 0 default_unit: 5901
          via adapter       via fc_nport       Con     DID     Lun
 -         pga0.0.0.4.6  5000-1fe1-0000-04a1   No    210513     40
 -         pga0.0.0.4.6  5000-1fe1-0000-04a4   Yes   210713     40
```

Figure 12 wwidmgr -show wwid –full

There are two different formats in this display. In the top half of Figure 12, an adapter and port are paired with a list of all devices accessible through that adapter-port path. Some adapter-port combinations have no devices. Those that have devices list console generated device names **[1]** along side of the WWID. These device names are available in wwidmgr mode for diagnostic exercisers.

The lower part of the display is organized by each WWID. The first line of each WWID block **[2a]** has been described earlier. The 2nd line **[2b]** has 3 parts:

- current_unit:22204_current_col: 0 default_unit:22204

1. current_unit – the value currently used as the unit number in a console device name. This is either the user specified unit or the console generated unit number.

2. current_col – the value used in the collision field of the console device name. The console generated unit number may be the same as that generated from another WWID. This value differentiates identical unit numbers. It is generated by the

console and can be set by the user (See 3.7) although this is not recommended. A collision value of 1 indicates the unit number is a UDID value.

3. default_unit – this is the unit value generated by the console for the WWID. If no UDID is available and no unit is specified by the user, this value is used in the device name. In wwidmgr mode, disks that have not been set up have names created using this unit number. This number should be persistent across resets and from host to host.

A list of paths is presented starting at **[2d]**. The WWID is accessible via each path listed. In this example there are two paths to the WWID. Both paths share the same fibre-channel adapter, but the disk is accessible through two storage controller ports.

via adapter	via fc_nport	Con	DID	Lun	**[2c]**
pga0.0.0.4.6	5000-1fe1-0000-04a1	No	210513	1	**[2d]**
pga0.0.0.4.6	5000-1fe1-0000-04a4	Yes	210713	1	**[2e]**

1. via adapter - the mnemonic for the fibre-channel adapter used in accessing the device. The same fibre-channel adapter is used in both paths for **[2d]** and **[2e]**. Each path is using pga0.0.0.4.6.

2. via fc_nport - the fibre channel nport WWN used in accessing this WWID via the adapter listed in the previous field. There are two n_port paths in this example.

3. Con – indicates if the device is currently on-line via this path. (See 3.2.1)

4. DID - the current device identifier used in this connection.

5. Lun – the lun offset of the device.

3.1.2 Displaying wwid information of a single device

The long display that ***wwidmgr –show wwid –full*** produces can be reduced by further qualifying the command. Either the ***–item*** or the ***–udid*** qualifier is used to select just the one wwid of interest. The command format is:

wwidmgr –show wwid {–item <n> | -udid <n>} [-full]

```
P08>>>wwidmgr -show ww -udid 13 -full
[11] UDID:13 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002b (ev:none)
 - current_unit:20790 current_col: 0 default_unit:20790
          via adapter       via fc_nport       Con     DID     Lun
 -         pga0.0.0.6.1  5000-1fe1-0000-74b1   Yes   200213      3
P08>>>wwidmgr -show ww -item 11 -full
[11] UDID:13 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002b (ev:none)
 - current_unit:20790 current_col: 0 default_unit:20790
          via adapter       via fc_nport       Con     DID     Lun
 -         pga0.0.0.6.1  5000-1fe1-0000-74b1   Yes   200213      3
```

Figure 13 wwidmgr -show wwid -item|-udid

3.1.3 Displaying wwids using a filter

Installations, that do not set the storage controller IDENTIFIER for the disks, rely on the WWID string to identify disks. Manually searching through a long console display of wwids could be cumbersome. The *–filter* qualifier allows the user to partially specify the WWIDs to display.

wwidmgr –show wwid –filter <regexp> [-full]

where <regexp> is a regular expression for a console format WWID string. Remember that the console format WWID string has an additional "WWID:01000010:" prefix as compared with the WWID displayed by the storage controller.

```
P00>>>wwidmgr -show wwid -filter *0005*
[0] UDID:40 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000 (ev:wwid0)
[3] UDID:77 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0300 (ev:none)
```

Figure 14 show wwid with a filter

3.1.4 NO LONGER VALID

One subtle point to emphasize is that the wwids that are displayed are those known to the console either from a prior setting or because that wwid was found during probing. There may be wwids that are listed that are not found. In the following section, the *–full* qualifier is used to reveal this situation. In the example below, the console knows of five wwids during normal operation. If the link fails, the wwid display still shows all five wwids. The *–full* qualifier provides the information "NO LONGER VALID" indicating that the port is no longer accessible to the console.

```
P00>>>wwidmgr -show ww
[0] UDID:2 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0003-0200 (ev:none)
[1] UDID:1 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0002-0000 (ev:none)
[2] UDID:77 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0300 (ev:wwid0)
[3] UDID:99 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0006-0100 (ev:none)
[4] UDID:40 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000 (ev:none)
P00>>>

P00>>>wwidmgr -show ww -full
   pga0.0.0.4.6
- Port: 1000-0000-c920-05ab   NO LONGER VALID
     .   .   .
[0] UDID:2 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0003-0200 (ev:none)
 - current_unit:2 current_col: 1 default_unit:30444
          via adapter       via fc_nport       Con     DID     Lun
 -         pga0.0.0.4.6  5000-1fe1-0000-04a1   No  NO LONGER VALID
 -         pga0.0.0.4.6  5000-1fe1-0000-04a4   Yes NO LONGER VALID
     .   .   .
```

Figure 15 NO LONGER VALID

3.1.5 Device not found

WWIDs that are set in non-volatile environment variables are displayed by wwidmgr –show wwid even if they are not found while probing the fabric.

A WWID is displayed by *wwidmgr –show wwid* if it is set up in non-volatile storage, even if that WWID was not found during probing. Without the *–full* qualifier, only a single line (Figure 16, **[1]**) would be displayed. But the *–full* qualifier reveals that the device was not found (Figure 16, **[2]**), indicating the WWID is represented in non-volatile storage only (in the wwid1 environment variable) and was not found probing the fibre channel fabric.

Another aid to realizing that the device was not found is that the UDID value is –1. This indicates that the console could not read the remote device identifier, either because the device does not exist or because the INDENTIFER was not set on the storage controller.

```
P00>>>wwidmgr -show ww -item 1 -full
[1] UDID:-1 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-9999 (ev:wwid1)      [1]
 - current_unit:77 current_col: 1 default_unit:11687
          via adapter       via fc_nport       Con     DID     Lun
 - Device not found                                                               [2]
```

Figure 16 Device not found

3.2 show reachability

The reachability display presents the list of devices that will be shown by the "show dev" command after the next initialization. Reachability information is also shown after wwidmgr set up commands. It is invoked by issuing the command:

wwidmgr –show r[eachability]

In this example,

Figure 17, the topology contains one switch that connects two host fibre-channel adapters to the four storage controller ports. This configuration, although unrealistic, demonstrates how the accessibilit e can multiply

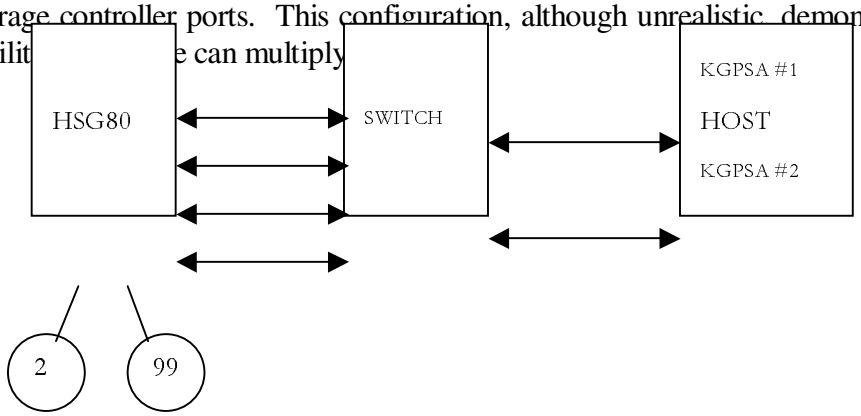

Figure 17 Fully connected topology drawing

The reachability display, Figure 18, shows how each disk is accessible through eight paths. Each device name reflects the path information to that device (see section 3.9 "Device names"). The "via adapter" column shows the adapter path used to access the device. The "via fc n_port" column shows the fibre channel port WWN that is used to access the device. The "connected" column indicates if the device is on-line through that path (see section 3.2.1 "Connected vs not connected devices").

The devices in the reachability display are available for booting and setting into bootdef_dev and dump_dev during normal console mode (i.e. after exiting wwidmgr mode by re-initializing the system). Devices not in the reachability display are not available during normal console operation and will not show up in a show device display.

```
P00>>>wwidmgr -show reachability
Disk assignment and reachability after next initialization:

6000-1fe1-0000-04a0-ffff-fffe-0006-0100
                          via adapter:         via fc nport:        connected:
dgb99.1001.0.8.6            pgb0.0.0.8.6      5000-1fe1-0000-04a3      Yes
dgb99.1002.0.8.6            pgb0.0.0.8.6      5000-1fe1-0000-04a2      No
dgb99.1003.0.8.6            pgb0.0.0.8.6      5000-1fe1-0000-04a1      No
dgb99.1004.0.8.6            pgb0.0.0.8.6      5000-1fe1-0000-04a4      Yes
dga99.1001.0.4.6            pga0.0.0.4.6      5000-1fe1-0000-04a3      Yes
dga99.1002.0.4.6            pga0.0.0.4.6      5000-1fe1-0000-04a2      No
dga99.1003.0.4.6            pga0.0.0.4.6      5000-1fe1-0000-04a1      No
dga99.1004.0.4.6            pga0.0.0.4.6      5000-1fe1-0000-04a4      Yes

6000-1fe1-0000-04a0-ffff-fffe-0003-0200
                          via adapter:         via fc nport:        connected:
dgb2.1001.0.8.6             pgb0.0.0.8.6      5000-1fe1-0000-04a3      Yes
dgb2.1002.0.8.6             pgb0.0.0.8.6      5000-1fe1-0000-04a2      No
dgb2.1003.0.8.6             pgb0.0.0.8.6      5000-1fe1-0000-04a1      No
dgb2.1004.0.8.6             pgb0.0.0.8.6      5000-1fe1-0000-04a4      Yes
dga2.1001.0.4.6             pga0.0.0.4.6      5000-1fe1-0000-04a3      Yes
dga2.1002.0.4.6             pga0.0.0.4.6      5000-1fe1-0000-04a2      No
dga2.1003.0.4.6             pga0.0.0.4.6      5000-1fe1-0000-04a1      No
dga2.1004.0.4.6             pga0.0.0.4.6      5000-1fe1-0000-04a4      Yes
```

Figure 18 Reachability Display

3.2.1 Connected vs not connected devices

An storage controller that is configured for MULTIBUS_FAILOVER supports on-line connectivity through two of the four ports at any one time. The "connected" column in Figure 18 indicates the current on-line status of the device.

3.3 show port

The fibre channel n_ports that are found by the console after probing the fabric can be displayed with the command:

wwidmgr –show port [-full] [-filter <regexp>]

3.3.1 Displaying port information at the AlphaServer console

Console maintains a list of fibre channel ports that it has found while probing the fabric. Examples of a fibre channel port are an storage controller controller port, a fibre-channel adapter, or a connection to a switch.

```
P00>>>wwidmgr –show port
[0] 1000–0000–c920–05ab                          [The fibre–channel adapter WWN on this
system]
[1] 2000–0060–6900–01b7                      [Connection to switches F_PORT]
[2] 20fc–0060–6900–01b7                      [Connection to switches NAME SERVER]
[3] 5000–1fe1–0000–04a1 (N3)                 [An HSG80 port]
[4] 5000–1fe1–0000–04a4 (N4)                 [An HSG80 port]
```

Figure 19 show port display

Dissecting Figure 19, the ports found by the console are its own fibre-channel adapter, two connections to the switch, and two HSG80 ports. Determining the correspondence of an identifier to a remote device can usually be done at the remote device's console. For example, the host's fibre-channel adapter port identifier is displayed when the driver starts up as shown in Figure 6 at **[1a]** and **[1b]**. At the HSG80 console the port names are shown by the "Show THIS" or "Show OTHER" command as in Figure 20 at the "Reported PORT_ID" line.

```
HSG80> show this
   .  .  .
Host PORT_1:
        Reported PORT_ID = 5000–1FE1–0000–04A3
   .  .  .
Host PORT_2:
        Reported PORT_ID = 5000–1FE1–0000–04A4
   .  .  .
```

Figure 20 HSG80 Show This

3.3.2 Detailed description of the show port line item

In Figure 19, line item 3 is detailed below:

[3] 5000-1fe1-0000-04a1 (N3)

1. [3] – Item number. The item number is used as the parameter to the *–item* qualifier with the *–set* option. This item number is used to reference the port address on that line. See section 3.6.1 "set port".

2. 5000-1fe1-0000-04a1 – The worldwide name is the port address of a fibre channel n_port. N_port addresses for the storage controller ports, host ports (e.g. fibre-channel adapters), and switch ports that the console has found are displayed.

3. (N3) – when a port address is 'set' by the wwidmgr *–quickset* or *–set* qualifiers, the port is stored in non-volatile memory and referenced through the environment variables N1, N2, N3, and N4. *Note that in this implementation, only 4 wwids can be aliased and set in non-volatile memory.*

At most 4 port addresses can be 'set' into non-volatile memory.

3.3.3 Displaying port information with full topology info

The topology of a configuration as seen from the console, can be displayed with the the *–full* qualifier. In the below example, Figure 21, the host has one fibre-channel adapter device and two connections to the storage controller. The command form is:

wwidmgr –show port -full

```
P00>>>wwidmgr -show port -full

   pga0.0.0.4.6
- Port: 1000-0000-c920-05ab

   pga0.0.0.4.6
- Port: 2000-0060-6900-01b7

   pga0.0.0.4.6
- Port: 20fc-0060-6900-01b7

   pga0.0.0.4.6
- Port: 5000-1fe1-0000-04a1
 - dga22204.3.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0002-0000
 - dga2.1003.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0003-0200
 - dga26381.3.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0300
 - dga2044.3.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0006-0100
 - dga5901.3.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000

   pga0.0.0.4.6
- Port: 5000-1fe1-0000-04a4
 - dga22204.4.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0002-0000
 - dga2.1004.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0003-0200
 - dga26381.4.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0300
 - dga2044.4.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0006-0100
 - dga5901.4.0.4.6 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000


[0] 1000-0000-c920-05ab
[1] 2000-0060-6900-01b7
[2] 20fc-0060-6900-01b7
[3] 5000-1fe1-0000-04a1 (N3)
[4] 5000-1fe1-0000-04a4 (N4)
```

Figure 21 Showing full port information

3.3.4 Displaying ports using a filter

Manuallly searching a long list of port identifiers in the console display may be cumbersome. The –filter qualifier allows the user to partially specify the port to display. The command:

Wwidmgr –show port –filter <regexp>

may be used, where <regexp> is a regular expression selecting part of the port string. In the example below (Figure 22), the user filters out all port identifiers except for the storage controller.

```
P00>>>wwidmgr -show port -filter 5000*
[3] 5000-1fe1-0000-04a1 (N3)
[4] 5000-1fe1-0000-04a4 (N4)
```

Figure 22 Show port with a filter

3.4 show ev

The wwidmgr stores the associations and aliases for WWIDs and port WWNs in non-volatile environment variables. The information in the environment variables persists after exiting the wwidmgr, across system resets, and across power cycling. This is the information the console uses, when not in wwidmgr mode, to find and name devices. When not in wwidmgr mode, devices only get created for WWIDs specified in the wwid<n> environment variables, and the devices only get created if they are accessible through the a port specified in the N<n> environment variable. See the reachability discussion in section 3.2

wwidmgr –show ev

With the information specified in the environment variables in Figure 23, after initialization, a show device command creates two fibre channel disk device names. The two device names refer to the same physical spindle accessed via the two paths specified in N1 and N2.

This set of wwid<n> and N<n> environment variables is common to all fibre-channel adapter drivers running. On a topology that has additional fibre-channel adapters which have access to the fibre channel ports, those adapters also create two fibre channel disk device names.

```
P00>>>wwidmgr -show ev
wwid0                   77 1 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0300
wwid1
wwid2
wwid3
N1                      50001fe1000004a1
N2                      50001fe1000004a4
N3
N4
```

Figure 23 show ev

3.4.1 Console fibre channel ev's (advanced topic)

The wwidmgr allows the user to manipulate these environment variables. The user has no need to set these environment variables manually with the console ">>> set <evname>" command. If the user does change or set one of these ev's without the wwidmgr, a system initialization is required for the change to take effect. The format of the N<n> environment variable is the port WWN without any hyphens, in string format. The format of the wwid<n> is a string with 3 fields separated by a space.

77 1 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0300

1. 77 – the first field is the unit number used in creating the device name for the WWID shown.

2. 1 – the collision value; normally 1.

3. The WWID aliased by the unit number.

3.5 clear

The information stored in non-volatile memory can be erased. This information has been set to non-volatile memory by prior *-quickset* or *–set* commands. Even novice users may want to use *–clear all* from time to time as their configuration changes and a new boot or dump disk needs to be specified. Advanced users may use the *–clear wwid* and *–clear N<n>* options to pick and choose and replace individual disk and path settings.

3.5.1 clear all

This command will clear out all stored non-volatile information. It will clear the environment variables wwid0, wwid1, wwid2, wwid3, N1, N2, N3, and N4.

wwidmgr –clear all

3.5.2 clear wwid

This command can be used to erase an individual wwid<n> environment variable that associates a disk wwid to a unit number.

wwidmgr –clear wwid0 | wwid1 | wwid2 | wwid3

3.5.3 clear N

This command can be used to erase individual N<n> environment variables that store the port pathing information.

wwidmgr –clear N1 | N2 | N2 | N4

3.6 Setting up devices that do not share a common path

For installations with topologies where more than one disk must be set up, and those disks are not accessed through common storage controller ports, the *–set port* must be used. Installations that would need to use *–set port* would include:

1. VMS installations where the boot disk and the dump disk do not share a common path.

2. An installation where more than one boot disk needs to be set up for console use and those boot disks are not on a common path.

Below are two examples. The first example demonstrates the problem that would occur from using *–quickset*. The second example demonstrates how to properly set up

In the following example, the operator needs to set up item 11 and item 21.

```
P08>>>wwidmgr -show wwid -udid 13 -full
 [11] UDID:13 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002b (ev:none)
 - current_unit:20790 current_col: 0 default_unit:20790
          via adapter       via fc_nport       Con     DID     Lun
 -         pga0.0.0.6.1  5000-1fe1-0000-74b1   Yes   200213      3            [1]

P08>>>wwidmgr -show wwid -item 21 -full
 [21] UDID:113 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002e (ev:none)
 - current_unit:21238 current_col: 0 default_unit:21238
          via adapter       via fc_nport       Con     DID     Lun
 -         pga0.0.0.6.1  5000-1fe1-0000-74b2   Yes   200713      3            [2]
```

Figure 24 Devices not on a common path

In Figure 8, we see that item 11 and item 21 are not accessible via the same path, (e.g. the same fc_nport). Item 11 is accessible via the storage controller port 5000-1fe1-0000-74b1 **[1]**, while item 21 is accessible via the storage controller port 5000-1fe1-0000-74b2 **[2]**. In this case *–quickset* will not be able to set up both devices. It could set up either one of the devices, but to configure the 2nd device, *–set wwid* and *-set port* must be used.

The example below, Figure 25, *-quickset* is erroneously used to try and setup the two devices. The problem of overwriting the path is demonstrated.

```
P08>>>wwidmgr -clear all
P08>>>wwidmgr -show ev
wwid0
wwid1
wwid2
wwid3
N1
N2
N3
P08>>>wwidmgr -show reach
```

The environment variables are all empty. The subsequent reachability display shows no devices.

Disk assignment and reachability after next initialization:

```
P08>>>wwimdgr -quickset -udid 13
```

The user sets up the first device using *–quickset*, and the results are as expected.

Disk assignment and reachability after next initialization:

```
6000-1fe1-0000-04d0-0009-8170-1057-002b
                          via adapter:         via fc nport:        connected:
dga13.1001.0.6.1            pga0.0.0.6.1      5000-1fe1-0000-74b1      Yes
P08>>>wwidmgr -show ev
wwid0                   13 1 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002b
wwid1
wwid2
wwid3
N1                          50001fe1000074b1
N2
N3
N4
P08>>>wwidmgr -show port
[0] 1000-0000-c920-ca72
[1] 2006-0060-6900-0953
[2] 20fc-0060-6900-0953
[3] 5000-1fe1-0000-74a1
[4] 5000-1fe1-0000-74b1 (N1)
[5] 5000-1fe1-0000-74c2
[6] 5000-1fe1-0000-74b2
```

After the *-quickset*, one device is reachable. The ev display shows one disk wwid stored in the non-volatile ev wwid0, and one port path is stored in the non-volatile ev N1.

```
P08>>>wwidmgr -quckset -udid 113

Disk assignment and reachability after next initialization:

6000-1fe1-0000-04d0-0009-8170-1057-002b
                          via adapter:         via fc nport:        connected:

6000-1fe1-0000-04d0-0009-8170-1057-002e
                          via adapter:         via fc nport:        connected:
dga113.1001.0.6.1           pga0.0.0.6.1      5000-1fe1-0000-74b2      Yes
P08>>>wwidmgr -show ev
wwid0                   13 1 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002b
wwid1                   113 1 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002e
wwid2
wwid3
N1                      50001fe1000074b2
N2
N3
N4
P08>>>wwidmgr -show port
[0] 1000-0000-c920-ca72
[1] 2006-0060-6900-0953
[2] 20fc-0060-6900-0953
[3] 5000-1fe1-0000-74a1
[4] 5000-1fe1-0000-74b1
[5] 5000-1fe1-0000-74c2
[6] 5000-1fe1-0000-74b2 (N1)
```

User erroneously sets up a 2nd disk with *-quickset*. UDID 13 and UDID 113 do not share a common HSG80 path. The first device now would not be reachable after then next initialization.

-quickset always starts saving the port information to N1, then N2, N3, and N4 subsequently. It overwrites any pre-existing information.

Figure 25 Quickset limitation example

3.6.1 set port

The console, outside of the wwidmgr, only operates on fibre channel n_ports that are set up through the wwidmgr. One way of setting up the environment variables, *-quickset*, has already been discussed. Due to the limitations of quickset, sometimes it is necessary to selectively set up the environment variables that filter the fibre channel ports that are recognized outside of wwidmgr mode. The way to select n_ports individually is to use:

wwidmgr –set port –item <itemno> -node <1|2|3|4>

where <itemno> is the bracketed item number from the *wwidmgr –show port* display. The *–node* qualifier selects one of 4 non-volatile positions to store away the n_port address. The 4 non-volatile storage areas are the environment variables N1, N2, N3, and N4.

```
P08>>>wwidmgr -show port
[0] 1000-0000-c920-ca72
[1] 2006-0060-6900-0953
[2] 20fc-0060-6900-0953
[3] 5000-1fe1-0000-74a1
[4] 5000-1fe1-0000-74b1                    [1]
```

```
[5] 5000-1fe1-0000-74c2
[6] 5000-1fe1-0000-74b2
P08>>>wwidmgr -set port -item 4 -node 1      [2]
P08>>>wwidmgr -show port                     [3]
[0] 1000-0000-c920-ca72
[1] 2006-0060-6900-0953
[2] 20fc-0060-6900-0953
[3] 5000-1fe1-0000-74a1
[4] 5000-1fe1-0000-74b1 (N1)                 [4]
[5] 5000-1fe1-0000-74c2
[6] 5000-1fe1-0000-74b2
P08>>>wwidmgr -show ev                       [5]
            .
            .
N1                      50001fe1000074b1
N2
N3
N4
```

Figure 26 selectively setting up a port using –set

In Figure 26, the user wants to select the storage controller n_port address 5000-1fe1-0000-74b1 **[1]** to be active for booting and for show device. The command **[2]** issued by user selects bracketed item number 4 from the n_port list. The command also selects the first of the 4 non-volatile storage locations to store this value. This storage location number, called the node number, is used in the creation of the device name (see future reference). From the next *–show port* command **[3]** , we see the association of the n_port address to the storage identifier that is in parenthesis **[4]** next to the n_port address.

Users that are more curious can look at the environment variables that get set up with the *–show ev* command. The display shows the N1 console ev set to the port address. Equivalently, the console command "*>>>show N**" could have been used.

See 3.9 "Device names", where list item 5 discusses the node field.

3.6.2 set wwid

The console, outside of wwidmgr mode, only recognizes world wide id's that are set up in non-volatile memory from a prior wwidmgr operation. One way of defining a wwid in non-volatile storage is with the *–quickset* qualifier which has already been discussed. Due to the limitations of quickset, sometimes it is necessary to selectively set up the wwids in the non-volatile storage. The command to set up a wwid is to use:

wwidmgr –set wwid –item <itemno> -unit <unitno>

or

wwidmgr –set wwid –udid <udidno>

where <itemno> is the bracketed item number from the *wwidmgr –show wwid* display. The <unitno> is a value used in the device name. Up to 4 wwids can be set into the non-volatile storage areas identified by the environment variables wwid0, wwid1, wwid2, wwid3.

```
P08>>>wwidmgr -show ww
     ...
[11] UDID:13 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002b (ev:none)
     ...
[21] UDID:113 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002e (ev:none)

P08>>>wwidmgr -show ev
wwid0
wwid1
wwid2
wwid3
     ...
P08>>> wwidmgr -set wwid -item 11 -unit 500                [1]
P08>>> wwidmgr -set wwid -udid 113                         [2]

P08>>>wwidmgr -show ww
     ...
[11] UDID:13 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002b (ev:wwid0)       [3]
     ...
[21] UDID:113 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002e (ev:wwid1)      [4]

P08>>>wwidmgr -show ev                                                              [5]
wwid0                   500 0 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002b
wwid1                   113 1 WWID:01000010:6000-1fe1-0000-04d0-0009-8170-1057-002e
wwid2
wwid3
     ...
```

Figure 27 setting up a wwid using –set

In Figure 27, the user sets up two wwids seen in the *–show wwid* display at item 11 and item 21. The *–item* qualifier is used in **[1]** with the *–unit* qualifier which will be used in the device name that the console creates. It is recommended that this user defined unit number be set the same for the same wwid on all hosts. That will help to minimize operator error when looking at console created device names.

The *–udid* qualifier is used in **[2]**. The resulting device name will have the udid value as the unit number.

3.7 set wwid –col

The *–col* qualifier is not used at this time.

3.8 –adapter

On a host configuration with many fibre-channel adapters, the operator may wish to limit the amount of data presented by the wwidmgr by selectively starting fibre-channel adapters. The command

wwidmgr –adapter kgpsa<n>

can be used on the 8x00, 4x00, and 1200 platforms where kgpsa<n> is the adapter to start. Normally the first issued wwidmgr command will start all fibre-channel adapters. If the *wwidmgr –adapter* command is the first wwidmgr command issued, then only the selected adapter will be used in subsequent wwidmgr commands. Additional *wwidmgr –adapter* commands can start fibre-channel adapters **in addition** to the any adapters that are already started. Only those fibre-channel adapters which are started will contribute to the topology information.

```
P00>>>wwidmgr -adapter kgpsa0                                    [1]
polling kgpsa0 (fibre-channel adapter-B) slot 3, bus 0 PCI, hose 1
   pga0.0.0.3.1            PGA0        WWN 1000-0000-c920-a5a4

Disk assignment and reachability after next initialization:



6000-1fe1-0000-04a0-ffff-fffe-0002-0000
                          via adapter:         via fc nport:        connected:
dga1.1001.0.3.1             pga0.0.0.3.1      5000-1fe1-0000-04a2      No
dga1.1002.0.3.1             pga0.0.0.3.1      5000-1fe1-0000-04a1      No
dga1.1003.0.3.1             pga0.0.0.3.1      5000-1fe1-0000-04a4      Yes

6000-1fe1-0000-04a0-ffff-fffe-0005-9999
                          via adapter:         via fc nport:        connected:
P00>>>wwidmgr -show wwid                                          [2]
```

Figure 28 wwidmgr –adapter

The host system in Figure 28 has two fibre-channel adapters connected to separate fabrics. The user is only interested in probing one of the fabrics. This is done by starting up just the one adapter **[1].** Subsequent commands **[2]** only act upon the started adapter.

3.9 Device names

The devices names generated by the console for fibre channel devices follow the style of other devices names with a few differences. Also, users who are unfamiliar with device names that have path information will gain from reading this section. The device name

dga200.1002.0.6.0

can be deconstructed:

1. **dg** a200.1002.0.6.0 - the **dg** indicates a fibre channel disk device. User may already be familiar with SCSI devices identified with dk, or mscp device identified with du.

2. dg**a**200.1002.0.6.0 – the **a** is the controller letter. Each adapter is given a unique controller letter, starting with a, and sequencing through a,b,c,…,z,aa,ab,ac,…zz. This helps in abbreviating the device name since it represents the last two fields of the device name. The format and meaning of this field is identical to other console devices.

3. dga**200**.1002.0.6.0 – the unit number is the alias for the WWID of the device. This unit number value that was assigned with the wwidmgr commands. In this case, the value **200** could have originated from the udid value or it could have been assigned by the user with the *–unit* qualifier. The lun information, that users of SCSI devices are used to seeing in a SCSI device name, is not represented in a fibre channel device name. Users of MSCP configurations are comfortable with this device name since MSCP controllers supply the device name in a similar fashion to the UDID method.

4. dga200.**1**002.0.6.0 - this field is a qualifier of the unit number. In this case, the value **1** indicates that the unit number is compliant with the udid naming convention that is used by VMS. A value of 1 in this field means that the unit number originated from the value defined at the storage controller. Recall that the unit number was set at the storage controller with the SET D<n> IDENTIFIER command.

5. dga200.1**002**.0.6.0 – the node field, in this case **002**, is sometimes called the remote identifier. This value represents the n_port path used to access the device. The value is a short hand for the n_port WWN. This field is a small integer alias for the 64 bit WWN of the n_port. During normal operation (e.g. when not in wwidmgr mode), this value will be 1, 2, 3, or 4. The association between the small integer value and the WWN of the n_port is kept in non-volatile storage in the N1, N2, N3, and N4 environment variables. The path used by dga200.1002.0.6.0 will be the n_port represented in N2. A node field value of 003 indicates that the n_port in N3 will be used accessed. The node field values, or the N<n> environment variables, are set up *–quickset* or with *–set port.* When *–quickset* is used, any paths found to the device are registered in the N<n> environment variables in the order that they are found. Since the n_ports can be found in a different order on different hosts, using *–quickset* does not assure that the node field of the console device name will be consistent from host to host. The user may want to keep this part of the device name consistent from one host to the next. This is accomplished by using the *–set port –node* operation of the wwidmgr. The node field assignment of 1, 2, 3, or 4 is used in the console device name. If the *–node* assignments are made the same on each host, then the console device names will be consistent from host to host. Note that during wwidmgr mode, device names are chosen randomly. The table below shows the relationship between the device name, the environment variable, and the command that set the port into the environment variable.

DEVICE NAME	EV	WWIDMGR COMMAND
dga200.1001.0.6.0	N1	wwidmgr –set port -node 1
dga200.1002.0.6.0	N2	wwidmgr –set port –node 2

dga200.1003.0.6.0	N3	wwidmgr –set port -node 3
dga200.1004.0.6.0	N4	wwidmgr –set port -node 4

6. dga200.1002.**0**.6.0 - the channel field is used for adapters with multiple channels. This value will always be 0 with fibre-channel adapters. The format and meaning of this field is identical to other console devices.

7. dga200.1002.0.**6**.0 - the field contains information about the bus, slot, and function of the adapter. In this case, the adapter is in slot **6**. The format and meaning of this field is identical to other console devices.

8. dga200.1002.0.6.**0** - the hose field identifies the path from the system bus to the adapter. The format and meaning of this field is identical to other console devices.

4 Quiz

Q. What is the difference between *wwidmgr –quickset, wwidmgr -set wwid*, and *wwidmgr –set port* ?

A. Both commands store aliasing information into console non-volatile storage environment variables. The *wwidmgr –quickset* command does the job of *wwidmgr –set wwid* and *wwidmgr –set port* combined. For example, in a topology where all four storage controller ports access disk UDID 2, the *–quickset* command on the left is equivalent to the five commands on the right.

```
wwidmgr –quickset –udid 2  ==  wwidmgr –set wwid –udid  2
                                wwidmgr –set port –item 3 –node 1
                               wwidmgr –set port –item 1 –node 2
                               wwidmgr –set port –item 7 –node 3
                               wwidmgr –set port –item 2 –node 4
```

Q. Given,

[3] UDID:99 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0006-0100 (ev:none)

Write a command using the *–item* qualifier that is equivalent to the command below:

wwidmgr –quickset –udid 99

A. When selecting the device by its UDID value, that UDID value is used as the unit number in the device name created by the console. When selecting a device by its WWID menu item number, the user must additionally use the *–unit* qualifier to specify the unit number used to construct the console device name.

The following console commands are equivalent:

```
wwidmgr –quickset –udid 99  ==  wwidmgr –quickset –item 3 –unit 99
```

Q. You have one fibre-channel adapter in your system which is connected to a switch which is powered off. You init the console,

enter wwidmgr –show wwid, and 2 WWIDs are listed. The console prints out a message that the link is down, yet you see 2 line items. What is going on here?

Link is down.
[0] UDID:-1 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0002-0000 (ev:wwid0)
[1] UDID:-1 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-9999 (ev:wwid1)

A. The console displays all WWIDs it knows about, whether it found them by probing the fabric, or if it found the WWIDs in the non-volatile storage. From the line item shown, notice that these two WWIDs both have associated ev's. Also note that the console could not find read their UDID value. The UDID value is not stored in non-volatile memory and the console must read it from the device. A –1 means it could not read the UDID value from the device. Putting that all together, you issue *wwidmgr –show wwid –full* and see the "Device not found" message.

P00>>>wwidmgr -show ww -full -item 0
[0] UDID:-1 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0002-0000 (ev:wwid0)
- current_unit:1 current_col: 1 default_unit:22204
via adapter via fc_nport Con DID Lun
- Device not found.

P00>>>wwidmgr -show ww -full -item 1
[1] UDID:-1 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-9999 (ev:wwid1)
- current_unit:77 current_col: 1 default_unit:11687
via adapter via fc_nport Con DID Lun
- Device not found.

5 Using Console Environment Variables FFAUTO and FFNEXT

This section describes how to use console environment variables FFAUTO and FFNEXT to force devices (e.g. disks) from a "not connected" state to a "connected" state to make them bootable. The console does not allow booting devices that are in the "not connected" state.

FFAUTO and FFNEXT are used for situations and configurations where an operator needs to force the console to boot a "not connected" device. These console environment variables were introduced in console firmware V5.5 (August 1999).

5.1 Background

5.1.1 Behavior of "Not Connected" Devices

HSZ8x disk array controllers or HSG8x array controllers may have their disks in a "connected" or "not connected" state. In MULTIBUS mode, a disk state of "not connected" is normal and correct. Because the console does not allow booting devices in the "not connected" state, attempted to boot a "not connected" disk produces the console error message below:

```
P00>>>b dga40.1003
resetting all I/O buses
VGA Bios failed, status = 1
(boot dga40.1003.0.6.0 -flags 0)
dga40.1003.0.6.0 is not connected
failed to open dga40.1003.0.6.0
```

Therefore, to successfully boot a disk, select either a "connected" disk or use the FFAUTO or FFNEXT command.

5.1.2 Determining a "Not Connected" Device from an HSZ80 or HSG80

The HSZ8x or HSG8x console can help the operator determine where a disk device is connected. In this HSG80 console example below, the state of disk device d40 is 'ONLINE to this controller' therefore connected.

```
HSG80> show d40
    LUN                                         Uses             Used by
------------------------------------------------------------------------------

  D40                                           DISK50000
        LUN ID:      6000-1FE1-0000-04A0-FFFF-FFFE-0005-0000
        IDENTIFIER = 40
        Switches:
          RUN                    NOWRITE_PROTECT        READ_CACHE
          READAHEAD_CACHE
```

```
          MAXIMUM_CACHED_TRANSFER_SIZE = 32
        Access:
          ALL
        State:
          ONLINE to this controller
          Not reserved
          NOPREFERRED_PATH
        Size: 4110480 blocks
        Geometry (C/H/S): ( 3045 / 16 / 85 )
```

5.1.3 Determining a "Not Connected Device" from an AlphaServer Console

There are a couple of ways:

- The console error message at boot time, as previously shown, is one way to determine a not connected device. This console error message is also displayed when a console disk exerciser attempts to exercise a not connected device.

- Using the WWIDMGR command, the console can also display the status of fibre channel devices controlled by an HSG8x.

```
P00>>>wwidmgr -show wwid -udid 40 -full

[0] UDID:40 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000 (ev:wwid0)
 - current_unit:40 current_col: 1 default_unit: 5901
          via adapter       via fc_nport              Con     DID     Lun
 -         pga0.0.0.6.0  5000-1fe1-0000-04a2   Yes   210313     40
 -         pga0.0.0.6.0  5000-1fe1-0000-04a1   Yes   210513     40
 -         pga0.0.0.6.0  5000-1fe1-0000-04a4   No    210713     40
```

5.2 Forcing the Console to Use a Not Connected Device

5.2.1 Using FFAUTO

FFAUTO determines console behavior when the system is trying to autoboot. An autoboot is any boot other than a manual **>>>boot** command issued at the SRM console by a user. FFAUTO can be set to ON or OFF. The default state is OFF where console behavior is not affected. FFAUTO is stored in non-volatile memory therefore its state persists across system resets and power cycles.

>>> set FFAUTO ON

In the ON state, console behavior is affected during an autoboot. When the console is trying to autoboot, the console attempts to boot from each "connected" device listed in bootdef_dev. If the console reaches the end of the bootdef_dev list without successfully booting, the console goes to the beginning of the bootdef_dev list and attempts booting again. Disks that are found in the

"not connected" state are changed to the "connected state", thereby enabling the console to access that device.

5.2.1.1 EXAMPLE: FFAUTO

```
P00>>>set FFAUTO ON
P00>>>set bootdef_dev dga40.1003
P00>>>b
(boot dga40.1003.0.6.0 -flags 0)
dga40.1003.0.6.0 is not connected
failed to open dga40.1003.0.6.0
P00>>>init

VMS PALcode V5.56-7, OSF PALcode V1.45-12
starting console on CPU 0
CPU 0 booting

(boot dga40.1003.0.6.0 -flags 0)
dga40.1003.0.6.0 is not connected
failed to open dga40.1003.0.6.0

Retrying, type ^C to abort...

(boot dga40.1003.0.6.0 -flags 0)
block 0 of dga40.1003.0.6.0 is a valid boot block
reading 896 blocks from dga40.1003.0.6.0
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 70000
initializing HWRPB at 2000
initializing page table at 1ff0000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
```

5.2.2 Using FFNEXT

FFNEXT determines the console behavior of the next command issued to a "not connected" device. FFNEXT can be set to either OFF or ON. The default-state is OFF where console behavior is not affected. FFNEXT is a volatile environment variable and its value is temporary therefore does not propagate across a system reset or reboot.

```
>>> set FFNEXT ON
```

In the ON-state, the console will change the next "not connected" device to a "connected" state for booting.

The FFNEXT state is automatically reset to OFF after the console changes device state from "not connected" to "connected".

Resetting FFNEXT to OFF protects the user from accidentally changing the state of disks. Stated in another way, FFNEXT is a one shot. It stays in effect until a not connected device is accessed.

5.2.2.1 EXAMPLE: FFNEXT

```
P00>>>b dga40.1001
(boot dga40.1001.0.6.0 -flags 0)
dga40.1001.0.6.0 is not connected
failed to open dga40.1001.0.6.0
P00>>>set ffnext on
P00>>>b dga40.1001
(boot dga40.1001.0.6.0 -flags 0)
block 0 of dga40.1001.0.6.0 is a valid boot block
reading 896 blocks from dga40.1001.0.6.0
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 70000
initializing HWRPB at 2000
initializing page table at 1ff0000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code


    OpenVMS (TM) Alpha Operating System, Version X6PC-SSB


halted CPU 0

halt code = 5
HALT instruction executed
PC = ffffffff8b4e2ba4
P00>>>show ffnext
ffnext                  OFF
```

6 APPENDIX

6.1 Example of setting up more than one device with –quickset

In the Example below, all disk have the same paths. This is seen in the "via fc_nport" column. The *–quickset* qualifier can be used multiple times in setting up these disks. Note that the attempt to setup UDID 40 fails because of the 4 WWID limit.

```
[0] UDID:1 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0002-0000 (ev:none)
 - current_unit:22204 current_col: 0 default_unit:22204
        via adapter      via fc_nport       Con     DID     Lun
 -      pga0.0.0.3.1  5000-1fe1-0000-04a1   No    210513      1
 -      pga0.0.0.3.1  5000-1fe1-0000-04a4   Yes   210713      1

[1] UDID:2 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0003-0200 (ev:none)
 - current_unit:30444 current_col: 0 default_unit:30444
        via adapter      via fc_nport       Con     DID     Lun
 -      pga0.0.0.3.1  5000-1fe1-0000-04a1   Yes   210513      2
 -      pga0.0.0.3.1  5000-1fe1-0000-04a4   Yes   210713      2

[2] UDID:77 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0300 (ev:none)
 - current_unit:26381 current_col: 0 default_unit:26381
        via adapter      via fc_nport       Con     DID     Lun
 -      pga0.0.0.3.1  5000-1fe1-0000-04a1   No    210513     77
 -      pga0.0.0.3.1  5000-1fe1-0000-04a4   Yes   210713     77

[3] UDID:99 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0006-0100 (ev:none)
 - current_unit:2044 current_col: 0 default_unit: 2044
        via adapter      via fc_nport       Con     DID     Lun
 -      pga0.0.0.3.1  5000-1fe1-0000-04a1   No    210513     99
 -      pga0.0.0.3.1  5000-1fe1-0000-04a4   Yes   210713     99

[4] UDID:40 WWID:01000010:6000-1fe1-0000-04a0-ffff-fffe-0005-0000 (ev:none)
 - current_unit:5901 current_col: 0 default_unit: 5901
        via adapter      via fc_nport       Con     DID     Lun
 -      pga0.0.0.3.1  5000-1fe1-0000-04a1   No    210513     40
 -      pga0.0.0.3.1  5000-1fe1-0000-04a4   Yes   210713     40

P00>>>wwidmgr –quickset –udid 1
```

Disk assignment and reachability after next initialization:

```
6000-1fe1-0000-04a0-ffff-fffe-0002-0000
                         via adapter:         via fc nport:        connected:
dga1.1001.0.3.1          pga0.0.0.3.1      5000-1fe1-0000-04a1      No
dga1.1002.0.3.1          pga0.0.0.3.1      5000-1fe1-0000-04a4      Yes

P00>>>wwidmgr –quickset –udid 2
```

Disk assignment and reachability after next initialization:

```
6000-1fe1-0000-04a0-ffff-fffe-0002-0000
                          via adapter:         via fc nport:        connected:
dga1.1001.0.3.1          pga0.0.0.3.1      5000-1fe1-0000-04a1      No
dga1.1002.0.3.1          pga0.0.0.3.1      5000-1fe1-0000-04a4      Yes

6000-1fe1-0000-04a0-ffff-fffe-0003-0200
                          via adapter:         via fc nport:        connected:
dga2.1001.0.3.1          pga0.0.0.3.1      5000-1fe1-0000-04a1      Yes
dga2.1002.0.3.1          pga0.0.0.3.1      5000-1fe1-0000-04a4      Yes

P00>>>wwidmgr -quickset -udid 77
```

Disk assignment and reachability after next initialization:

```
6000-1fe1-0000-04a0-ffff-fffe-0002-0000
                          via adapter:         via fc nport:        connected:
dga1.1001.0.3.1            pga0.0.0.3.1      5000-1fe1-0000-04a1      No
dga1.1002.0.3.1            pga0.0.0.3.1      5000-1fe1-0000-04a4      Yes

6000-1fe1-0000-04a0-ffff-fffe-0003-0200
                          via adapter:         via fc nport:        connected:
dga2.1001.0.3.1            pga0.0.0.3.1      5000-1fe1-0000-04a1      Yes
dga2.1002.0.3.1            pga0.0.0.3.1      5000-1fe1-0000-04a4      Yes

6000-1fe1-0000-04a0-ffff-fffe-0005-0300
                          via adapter:         via fc nport:        connected:
dga77.1001.0.3.1           pga0.0.0.3.1      5000-1fe1-0000-04a1      No
dga77.1002.0.3.1           pga0.0.0.3.1      5000-1fe1-0000-04a4      Yes

P00>>>wwidmgr -quickset -udid 99
```

Disk assignment and reachability after next initialization:

```
6000-1fe1-0000-04a0-ffff-fffe-0002-0000
                          via adapter:         via fc nport:        connected:
dga1.1001.0.3.1            pga0.0.0.3.1      5000-1fe1-0000-04a1      No
dga1.1002.0.3.1            pga0.0.0.3.1      5000-1fe1-0000-04a4      Yes

6000-1fe1-0000-04a0-ffff-fffe-0003-0200
                          via adapter:         via fc nport:        connected:
dga2.1001.0.3.1            pga0.0.0.3.1      5000-1fe1-0000-04a1      Yes
dga2.1002.0.3.1            pga0.0.0.3.1      5000-1fe1-0000-04a4      Yes

6000-1fe1-0000-04a0-ffff-fffe-0005-0300
                          via adapter:         via fc nport:        connected:
dga77.1001.0.3.1           pga0.0.0.3.1      5000-1fe1-0000-04a1      No
dga77.1002.0.3.1           pga0.0.0.3.1      5000-1fe1-0000-04a4      Yes

6000-1fe1-0000-04a0-ffff-fffe-0006-0100
                          via adapter:         via fc nport:        connected:
dga99.1001.0.3.1           pga0.0.0.3.1      5000-1fe1-0000-04a1      No
dga99.1002.0.3.1           pga0.0.0.3.1      5000-1fe1-0000-04a4      Yes
```

```
P00>>>wwidmgr -quickset -udid 40
All the ev's are used up.  Delete something first
```