HITACHI
DATA SYSTEMS

Thunder 9200 & HP-UX

How to Enable Their Full Potential!

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Recognition

Many thanks to Peter Egli who tested the configuration and created this document. Peter works as an Open Systems Advanced Technical Consultant for Hitachi Data Systems, and is based out of Denver, Colorado, USA. Thanks also to Doug Cohen, Director of Open Systems Advanced Technical Consultants, for his support and contributions to Sales Support for the Thunder 9200, Lightning 9900 and other Hitachi Data Systems offerings. Many thanks are also due to all our colleagues in Japan who helped implement these features and reviewed this document for accuracy.

Objective & Supported Features for HP-UX

This document describes the method for upgrading the Thunder 9200 microcode from 055A/C or earlier to 055B. This enables the following features for use on HP hosts running HP-UX:

Feature	Notes
> 8 LUNs	More than 8 LUNs per port are supported • a maximum of 64 are allowed currently by the 9200 • a maximum of 256 are allowed by the HPUX operating system per FC port
SANtinel 9200	The optional SANtinel 9200 (LUN security) program product is now supported
Queue depth	The maximum queue depth has been increased • from 8 to a maximum of 256 commands can be queued per LUN by HP-UX • from 256 to a maximum of 1,024 commands can be queued per per FC port by HP-UX The Thunder 9200 queue depth capability is for a maximum of 128 commands per port, for a maximum of 256 commands per Thunder 9200 controller.

Baseline

These procedures were established using the following configuration: (detailed connection diagram see Appendix A)

HP Host	• Model B-2000 • HP-UX 11.11 • two FC Adapters A5158A using driver version 11.11.06 • One volume group and file system on the Thunder 9200 • One alternate path defined for disks in the volume group
Brocade Switch	• Model 2800 • firmware version 2.4.1b
Thunder 9200	• Using ports 0B and 1B • Topology “FC_AL” • 20 LUNs in Raid Group 0 on controller 0 • 20 LUNs in Raid Group 1 on controller 1 • (see detailed parameter and RG/LUN settings in Appendix B) • Initially a maximum of 8 LUNs are accessible and SANtinel (LUN security) is not enabled.

Preparations before upgrading Thunder 9200 Microcode

The upgrade makes the data on the 9200 temporarily unavailable to the host(s) and must be done during a scheduled downtime. All hosts attached must un-mount the file systems and/or raw devices. This applies to all non-HP hosts attached to the 9200 as well. Additionally, on HP host(s) attached to the Thunder 9200 via fibre, the volume groups must be de-activated and exported before the microcode upgrade is performed because the **HW Path and the associated device files for each of the LUNs for the HP host(s) will change**. The reason for this change is due to the way HP-UX maps devices attached via fibre channel. **Toggling back & forth between the HP Specific Setting on the Thunder 9200 will cause this phenomenon to occur.**

The Resource Manager 9200 version 5.50 is required to activate the greater than 8 LUN per port feature. Make sure this program is available.

Note: Access to data is temporarily unavailable. Perform this procedure during scheduled downtime.

Note: A port set for HP access cannot be shared with non-HP hosts. Change LUN mapping if necessary to move non-HP LUNs to other ports. However, more than 1 HP host can be connected to the same Thunder 9200 port.

Note: Although the procedures outlined do not require a backup & restoring of data, it is recommended that data be backed up as a precaution.

Step 1: De-activating access from the HP host to the 9200 and save configuration

Un-mount all files systems and access to raw devices.

umount /<mount point>

Take a snapshot of the current disk I/O configuration and save in file

ioscan –fnkC disk > /home/user/ioscan-before.map

An example for a listing from ioscan follows:

```
Class     I  H/W Path       Driver S/W State   H/W Type     Description
===================================================================
disk      0  10/0/14/0.0.0  sdisk  CLAIMED     DEVICE       MITSUMI CD-ROM FX4830T!B
                           /dev/dsk/c0t0d0   /dev/rdsk/c0t0d0
disk      1  10/0/15/0.5.0  sdisk  CLAIMED     DEVICE       FUJITSU MAJ3182MC
                           /dev/dsk/c2t5d0   /dev/rdsk/c2t5d0
disk      2  10/0/15/0.6.0  sdisk  CLAIMED     DEVICE       QUANTUM ATLAS5-9LVD
                           /dev/dsk/c2t6d0   /dev/rdsk/c2t6d0
disk    124  10/1/1/0.1.24.255.14.15.0  sdisk  CLAIMED     DEVICE       HITACHI DF500F
                           /dev/dsk/c10t15d0   /dev/rdsk/c10t15d0
disk    125  10/1/1/0.1.24.255.14.15.1  sdisk  CLAIMED     DEVICE       HITACHI DF500F
                           /dev/dsk/c10t15d1   /dev/rdsk/c10t15d1
disk    126  10/1/1/0.1.24.255.14.15.2  sdisk  CLAIMED     DEVICE       HITACHI DF500F
                           /dev/dsk/c10t15d2   /dev/rdsk/c10t15d2
disk    127  10/1/1/0.1.24.255.14.15.3  sdisk  CLAIMED     DEVICE       HITACHI DF500F
                           /dev/dsk/c10t15d3   /dev/rdsk/c10t15d3
disk    128  10/1/1/0.1.24.255.14.15.4  sdisk  CLAIMED     DEVICE       HITACHI DF500F
                           /dev/dsk/c10t15d4   /dev/rdsk/c10t15d4
disk    129  10/1/1/0.1.24.255.14.15.5  sdisk  CLAIMED     DEVICE       HITACHI DF500F
                           /dev/dsk/c10t15d5   /dev/rdsk/c10t15d5
```

[abbreviated]

De-activate all volume groups with disks on the 9200

vgchange –a n <vgname>

Export all volume groups with disks on the 9200

vgexport –m /home/user/vgname.map –f /home/user/vgnameout.file <vgname>

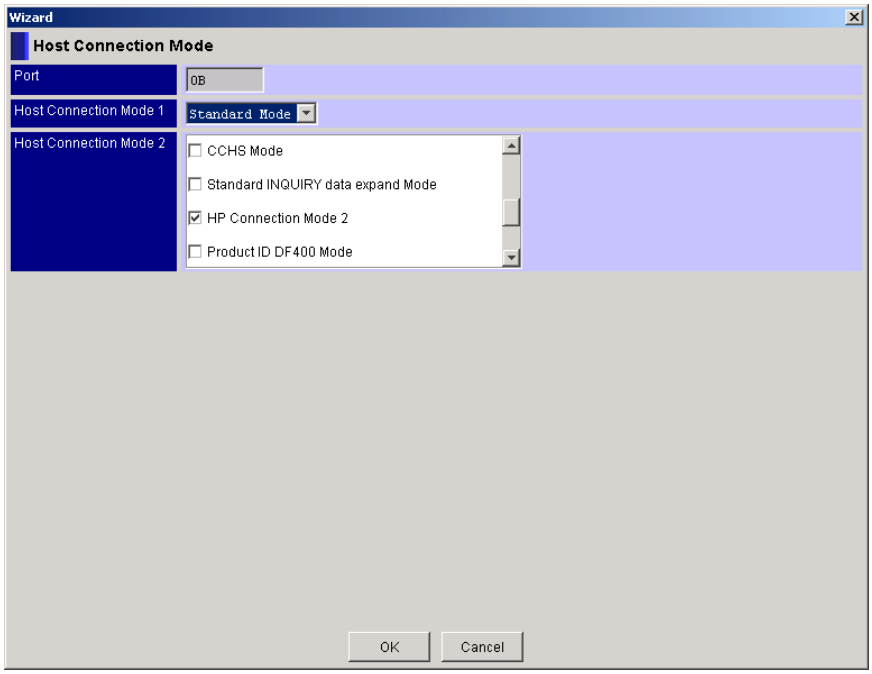
Note: Use any directory where the file can be accessed later. Make a hardcopy now if necessary.

Note: <u>Do not export the boot volume group</u>. If the boot disk is on the 9200, follow procedure in step 3, booting from the Thunder 9200.

Step 2: Upgrade the microcode on the 9200 and configure its port(s) for HP-UX

Using Resource Manager 9200 version 5.5, connect to the 9200 and download the new microcode version 055B. If you are unfamiliar with this procedure, please review the Resource Manager 9200 Users Guide, chapter 6 section 9. Upgrade one controller at a time with the new microcode.

Before more than 8 LUNs can be detected by the host, a flag in the 9200 configuration must be set. Using Resource Manager 9200 version 5.5, select the System Parameter Wizard and go to the screen titled 'System Startup Settings'. Click on the port(s) which will be used to connect to HP hosts. This will open the Host Connection Mode window. Under the subsection 'Host Connection Mode 2' scroll down and select the flag for 'HP Host Connection Mode 2'. This will enable access to more than 8 LUNs per port. To enable the optional SANtinel 9200 (LUN Security) feature, the optional LUN Security software key must be installed. Please contact your HDS representative for details.



Click OK and step through the screens of the Wizard. At the end, click OK again and save this new configuration. Do this for each port you want to enable.

Note: This will re-boot the 9200 and access to data is temporarily unavailable! Make sure no hosts are accessing the 9200.

Note: Once this procedure has been completed, and if this setting were to be toggled back to "disabled", all procedures in this document will need to be followed once more since the hardware address will change in a similar fashion and for the same reasons.

Step 3: Re-activating HP host access to the 9200 LUNs

The hardware Path to the LUNs will have changed with this new configuration.

> ***For installations where the boot disk is on the 9200 do as follows:***
>
> Before the host is ready to load the ISL, interrupt the boot process by pressing the **ESC** key. From the main menu, type
>
> **SEArch** **# the system will search for valid boot devices**
>
> and let the system find the boot path to the 9200 disk. This may take several minutes. Type ***boot px*** where x is the number relating to the correct hardware boot path. Allow the system to boot from this path. Update the boot volume group information in /etc/lvmtab.

Check access to the disk devices by scanning the I/O bus, allowing the system to find the disk devices on the new hardware path.

ioscan –fnC disk > ioscan-after.map

This will list all disk devices known to the host. A sample listing from the ioscan command looks as follows:

```
Class     I  H/W Path       Driver   S/W State   H/W Type     Description
===================================================================
disk      0  10/0/14/0.0.0  sdisk    CLAIMED     DEVICE       MITSUMI CD-ROM FX4830T!B
                           /dev/dsk/c0t0d0   /dev/rdsk/c0t0d0
disk      1  10/0/15/0.5.0  sdisk    CLAIMED     DEVICE       FUJITSU MAJ3182MC
                           /dev/dsk/c2t5d0   /dev/rdsk/c2t5d0
disk      2  10/0/15/0.6.0  sdisk    CLAIMED     DEVICE       QUANTUM ATLAS5-9LVD
                           /dev/dsk/c2t6d0   /dev/rdsk/c2t6d0
disk    140  10/1/1/0.1.24.239.0.0.0    sdisk    CLAIMED     DEVICE       HITACHI DF500F
disk    141  10/1/1/0.1.24.239.0.0.1    sdisk    CLAIMED     DEVICE       HITACHI DF500F
disk    142  10/1/1/0.1.24.239.0.0.2    sdisk    CLAIMED     DEVICE       HITACHI DF500F
disk    143  10/1/1/0.1.24.239.0.0.3    sdisk    CLAIMED     DEVICE       HITACHI DF500F
disk    144  10/1/1/0.1.24.239.0.0.4    sdisk    CLAIMED     DEVICE       HITACHI DF500F
disk    145  10/1/1/0.1.24.239.0.0.5    sdisk    CLAIMED     DEVICE       HITACHI DF500F
disk    124  10/1/1/0.1.24.255.14.15.0  sdisk    NO_HW       DEVICE       HITACHI DF500F
                           /dev/dsk/c10t15d0   /dev/rdsk/c10t15d0
disk    125  10/1/1/0.1.24.255.14.15.1  sdisk    NO_HW       DEVICE       HITACHI DF500F
                           /dev/dsk/c10t15d01   /dev/rdsk/c10t15d1
disk    126  10/1/1/0.1.24.255.14.15.2  sdisk    NO_HW       DEVICE       HITACHI DF500F
                           /dev/dsk/c10t15d2   /dev/rdsk/c10t15d2
```

[abbreviated]

In this example, three of the disk devices prior to the upgrade are still listed but they have no hardware (**NO_HW**) available to them since the disk devices are now accessed via the new hardware path. These device files will be deleted during the next re-boot or they can be deleted manually with the command

rmsf –H 10/1/1/0.1.24.255 # Hardware path will be different for other systems

The parameter after the –H option defines on which devices the command acts. The more specific the parameter is the fewer devices will match the parameter.

The host has not created the associated device files for the devices on the new hardware path yet. Install the device files for the new hardware path with the command:

insf # Install special file

This will install block and character device files for the new devices discovered by ioscan on the new hardware path. Please note the disk devices are the same, just the right portion of the hardware path (239.0.0.5) and related device files have changed. The first part of the hardware path (10/1/1/0.1.24) is identical to the path before the upgrade. Apply this hardware path to the disks from the ioscan listing after the microcode upgrade to find the same disks. The files ioscan-before.map and ioscan-after.map can be used to identify the disk devices. The LUN numbers (z) will be identical. Carefully match the new device files to the volume group.

Import the volume groups with reference to the new device files.

vgimport <vgname> /dev/dsk/<cxtydz>

All devices belonging to a volume group should be specified with the vgimport command.

Activate the volume groups and save the volume group configuration.

vgchange –a y <vgname>

vgcfgbackup <vgname>

Mount all file systems. All data is available again to the host system.

Notes when using Raw Devices

The same procedure applies to devices used as raw devices in a database or other application not using the HDS or JFS file system. Check your application configuration files to see if any hardcoded reference to a raw device needs to be changed.

References

HDS Disk Administrator Management Program User Guide, Hitachi Data Systems, revision 6, July 2001

HP-UX 11.i System Administration Manuals

HP Fibre Channel Fabric Migration Guide, Edition 4

HP A5158A Fibre Channel Adapter Release Notes, June 2001

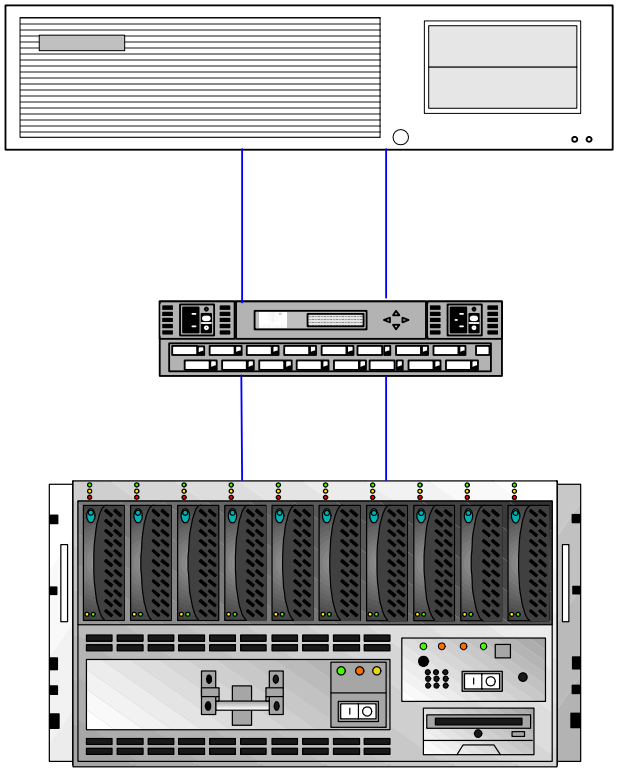
Appendix A: Sample Host Connectivity Diagram

9200 Micro code version 055B, > 8 LUN per port

HP B-2000 , HP-UX 11.11
two HBA A5158A

Brocade 2800, OS 2.4.1b
two zones

HDS 9200



Appendix B: Sample 9200 Configuration File (System Parameter List)

```
System parameter list.

DF Name : 9200-Denver
Date : 2001/10/16 13:31:07
Micro Program Revision : 055B
Flash Program Revision : 055B
Array Unit Type : DF500

---- Common Parameter ----
System Startup Attribute = Dual Active Mode
  SCSI ID/Port ID Take-over Mode = ---
  Default Controller
    Port A = ---
    Port B = ---
  Data Share Mode = Not Used
Host Connection Mode 1
  Port 0A = Standard Mode
  Port 0B = Standard Mode
  Port 1A = Standard Mode
  Port 1B = Standard Mode
Host Connection Mode 2
  Port 0A
    VxVM DMP mode enable = OFF
    ODE Mapper mode enable = ---
    HP Connection mode enable = OFF
    Report inquiry page 83H = OFF
    UA(06/2A00) suppress mode enable = OFF
    HISUP mode enable = OFF
    CCHS convert mode enable = OFF
    Standard INQUIRY data expand mode = OFF
    HP Connection mode2 enable = OFF
    Product ID DF400 mode = OFF
    HBA WWN Report Mode = OFF
    NACA Mode = OFF
    SUN Cluster Connection Mode = OFF
  Port 0B
    VxVM DMP mode enable = OFF
    ODE Mapper mode enable = ---
    HP Connection mode enable = OFF
    Report inquiry page 83H = OFF
    UA(06/2A00) suppress mode enable = OFF
    HISUP mode enable = OFF
    CCHS convert mode enable = OFF
    Standard INQUIRY data expand mode = OFF
    HP Connection mode2 enable = ON
    Product ID DF400 mode = OFF
    HBA WWN Report Mode = ON
    NACA Mode = OFF
    SUN Cluster Connection Mode = OFF
  Port 1A
    VxVM DMP mode enable = OFF
    ODE Mapper mode enable = ---
    HP Connection mode enable = OFF
    Report inquiry page 83H = OFF
    UA(06/2A00) suppress mode enable = OFF
    HISUP mode enable = OFF
    CCHS convert mode enable = OFF
    Standard INQUIRY data expand mode = OFF
    HP Connection mode2 enable = OFF
    Product ID DF400 mode = OFF
    HBA WWN Report Mode = OFF
    NACA Mode = OFF
    SUN Cluster Connection Mode = OFF
  Port 1B
    VxVM DMP mode enable = OFF
    ODE Mapper mode enable = ---
```

```
    HP Connection mode enable = OFF
    Report inquiry page 83H = OFF
    UA(06/2A00) suppress mode enable = OFF
    HISUP mode enable = OFF
    CCHS convert mode enable = OFF
    Standard INQUIRY data expand mode = OFF
    HP Connection mode2 enable = ON
    Product ID DF400 mode = OFF
    HBA WWN Report Mode = ON
    NACA Mode = OFF
    SUN Cluster Connection Mode = OFF
Serial Number = 3892
Delay Planned Shutdown = 0
Option 1
  Drive Detach mode enable = ON
Option 2
  Multipath(Controller) = OFF
  PROCOM mode enable = OFF
  Report status (normal / warning) = ON
  Multipath (Array Unit) = OFF
  Turbo LU Warning = ON
  NX Mode = OFF
  Auto Reconstruction Mode = OFF
  Forced Write Through Mode = OFF
  RAID3 Mode = OFF
Data Striping Size = 16KB
Operation if the Processor failures Occurs = Reset a Fault
INQUIRY Information
  Command Queuing = ON
  ANSI Version = ---
  Vendor ID = HITACHI
  Product ID = DF500F
  ROM Microprogram Version =
  RAM Microprogram Version =
Web Title
  Web Title = "ATC LAB in Denver"
Cache Mode = Random mode
Host Connection Mode
  Link Separation = OFF
---- CTL0 Parameter ----
Target ID
  S-TID,M-LUN : NO
  M-TID,S-LUN : NO
  M-TID,M-LUN : YES

  Data
  Port  Target ID  H-LUN  LUN
Port Type
  Port Option
    Reset/LIP Mode(Signal)
      Port A = OFF
      Port B = OFF
    Reset/LIP Mode(Process)
      Port A = OFF
      Port B = OFF
    LIP Port All Reset Mode
      Port A = OFF
      Port B = OFF
    Target Reset (Bus Device Reset) Mode
      Port A = OFF
      Port B = OFF
    Reserve Mode
      Port A = OFF
      Port B = OFF
    Logical Unit Reset Mode
      Port A = OFF
      Port B = OFF
    Third Party Process Logout Mode
      Port A = OFF
```

```
      Port B = OFF
ROM Pseudo-response command processing = ---
Save Data pointer response
  Port A = ---
  Port B = ---
Controller Identifier = Enable(DF500-00 C0)
RS232C Error Information Outflow Mode = OFF
Write & Verify Execution Mode = ON
LAN Const
  DHCP = OFF
  IP Address = 140.243.163.96
  Subnet Mask = 255.255.255.128
  Default Gateway = 140.243.163.1
  Ether Address = 00:00:87:F0:A8:42
SCSI transfer rate
  Port A = ---
  Port B = ---
---- CTL1 Parameter ----
Target ID
  S-TID,M-LUN : NO
  M-TID,S-LUN : NO
  M-TID,M-LUN : YES

  Data
  Port  Target ID  H-LUN  LUN
Port Type
  Port Option
    Reset/LIP Mode(Signal)
      Port A = OFF
      Port B = OFF
    Reset/LIP Mode(Process)
      Port A = OFF
      Port B = OFF
    LIP Port All Reset Mode
      Port A = OFF
      Port B = OFF
    Target Reset (Bus Device Reset) Mode
      Port A = OFF
      Port B = OFF
    Reserve Mode
      Port A = OFF
      Port B = OFF
    Logical Unit Reset Mode
      Port A = OFF
      Port B = OFF
    Third Party Process Logout Mode
      Port A = OFF
      Port B = OFF
ROM Pseudo-response command processing = ---
Save Data pointer response
  Port A = ---
  Port B = ---
Controller Identifier = Enable(DF500-00 C1)
RS232C Error Information Outflow Mode = OFF
Write & Verify Execution Mode = ON
LAN Const
  DHCP = OFF
  IP Address = 140.243.163.97
  Subnet Mask = 255.255.255.128
  Default Gateway = 140.243.163.1
  Ether Address = 00:00:87:F0:A8:E4
SCSI transfer rate
  Port A = ---
  Port B = ---
--- Parameter ---
FD Back UP = YES
```

Appendix C: Sample 9200 Configuration File (Array Unit Configuration List)

```
Array unit configuration information list.

DF Name : 92denver
Date : 2001/10/15 13:50:39
Micro Program Revision : 055A/C
Flash Program Revision : 055A/C
Array Unit Type : DF500

---- RAID Configuration ----
RAID   RAID   Start Location       Number of HDU    Number of       Remains
Group  Level  [Unit No.  HDU No.]  in parity group  parity group
0      5       0         0             5                1          237797376
1      5       0         5             5                1          237797376
2      -
3      -
4      -
5      -
6      -
7      -
8      -
9      -
10     -
11     -
12     -
13     -
14     -
15     -
16     -
17     -
18     -
19     -

---- LU Configuration ----
LU     Capacity  Status    Staging  C-CTL  D-CTL  RG RAID  Capacity(MB)
00      2048000  Normal        128  0      0       0  5        1000
01      2048000  Normal        128  0      0       0  5        1000
02      2048000  Normal        128  0      0       0  5        1000
03      2048000  Normal        128  0      0       0  5        1000
04      2048000  Normal        128  0      0       0  5        1000
05      2048000  Normal        128  0      0       0  5        1000
06      2048000  Normal        128  0      0       0  5        1000
07      2048000  Normal        128  0      0       0  5        1000
08      2048000  Normal        128  0      0       0  5        1000
09      2048000  Normal        128  0      0       0  5        1000
10      2048000  Normal        128  0      0       0  5        1000
11      2048000  Normal        128  0      0       0  5        1000
12      2048000  Normal        128  0      0       0  5        1000
13      2048000  Normal        128  0      0       0  5        1000
14      2048000  Normal        128  0      0       0  5        1000
15      2048000  Normal        128  0      0       0  5        1000
16      2048000  Normal        128  0      0       0  5        1000
17      2048000  Normal        128  0      0       0  5        1000
18      2048000  Normal        128  0      0       0  5        1000
19      2048000  Normal        128  0      0       0  5        1000
20      2048000  Normal        128  1      1       1  5        1000
21      2048000  Normal        128  1      1       1  5        1000
22      2048000  Normal        128  1      1       1  5        1000
23      2048000  Normal        128  1      1       1  5        1000
24      2048000  Normal        128  1      1       1  5        1000
25      2048000  Normal        128  1      1       1  5        1000
26      2048000  Normal        128  1      1       1  5        1000
27      2048000  Normal        128  1      1       1  5        1000
28      2048000  Normal        128  1      1       1  5        1000
29      2048000  Normal        128  1      1       1  5        1000
30      2048000  Normal        128  1      1       1  5        1000
31      2048000  Normal        128  1      1       1  5        1000
```

```
32      2048000  Normal        128  1      1       1  5        1000
33      2048000  Normal        128  1      1       1  5        1000
34      2048000  Normal        128  1      1       1  5        1000
35      2048000  Normal        128  1      1       1  5        1000
36      2048000  Normal        128  1      1       1  5        1000
37      2048000  Normal        128  1      1       1  5        1000
38      2048000  Normal        128  1      1       1  5        1000
39      2048000  Normal        128  1      1       1  5        1000
 After 40, not define.

---- Drive Configuration ----
Location    Vendor ID   Product ID    Product Revision  Drive Capacity   Status
Unit0,HDU0  HITACHI     DK32CJ-36FC          J5DB              36GB       Normal
Unit0,HDU1  HITACHI     DK32CJ-36FC          J5DB              36GB       Normal
Unit0,HDU2  HITACHI     DK32CJ-36FC          J5DB              36GB       Normal
Unit0,HDU3  HITACHI     DK32CJ-36FC          J5DB              36GB       Normal
Unit0,HDU4  HITACHI     DK32CJ-36FC          J5DB              36GB       Normal
Unit0,HDU5  HITACHI     DK32CJ-36FC          J5DB              36GB       Normal
Unit0,HDU6  HITACHI     DK32CJ-36FC          J5DB              36GB       Normal
Unit0,HDU7  HITACHI     DK32CJ-36FC          J5DB              36GB       Normal
Unit0,HDU8  HITACHI     DK32CJ-36FC          J5DB              36GB       Normal
Unit0,HDU9  HITACHI     DK32CJ-36FC          J5DB              36GB       Normal
Unit1,HDU0  Nothing
Unit1,HDU1  Nothing
Unit1,HDU2  Nothing
Unit1,HDU3  Nothing
Unit1,HDU4  Nothing
Unit1,HDU5  Nothing
Unit1,HDU6  Nothing
Unit1,HDU7  Nothing
Unit1,HDU8  Nothing
Unit1,HDU9  Nothing
Unit2,HDU0  Nothing
Unit2,HDU1  Nothing
Unit2,HDU2  Nothing
Unit2,HDU3  Nothing
Unit2,HDU4  Nothing
Unit2,HDU5  Nothing
Unit2,HDU6  Nothing
Unit2,HDU7  Nothing
Unit2,HDU8  Nothing
Unit2,HDU9  Nothing
Unit3,HDU0  Nothing
Unit3,HDU1  Nothing
Unit3,HDU2  Nothing
Unit3,HDU3  Nothing
Unit3,HDU4  Nothing
Unit3,HDU5  Nothing
Unit3,HDU6  Nothing
Unit3,HDU7  Nothing
Unit3,HDU8  Nothing
Unit3,HDU9  Nothing
Unit4,HDU0  Nothing
Unit4,HDU1  Nothing
Unit4,HDU2  Nothing
Unit4,HDU3  Nothing
Unit4,HDU4  Nothing
Unit4,HDU5  Nothing
Unit4,HDU6  Nothing
Unit4,HDU7  Nothing
Unit4,HDU8  Nothing
Unit4,HDU9  Nothing
Unit5,HDU0  Nothing
Unit5,HDU1  Nothing
Unit5,HDU2  Nothing
Unit5,HDU3  Nothing
Unit5,HDU4  Nothing
Unit5,HDU5  Nothing
Unit5,HDU6  Nothing
```

```
Unit5,HDU7  Nothing
Unit5,HDU8  Nothing
Unit5,HDU9  Nothing
Unit6,HDU0  Nothing
Unit6,HDU1  Nothing
Unit6,HDU2  Nothing
Unit6,HDU3  Nothing
Unit6,HDU4  Nothing
Unit6,HDU5  Nothing
Unit6,HDU6  Nothing
Unit6,HDU7  Nothing
Unit6,HDU8  Nothing
Unit6,HDU9  Nothing
Unit7,HDU0  Nothing
Unit7,HDU1  Nothing
Unit7,HDU2  Nothing
Unit7,HDU3  Nothing
Unit7,HDU4  Nothing
Unit7,HDU5  Nothing
Unit7,HDU6  Nothing
Unit7,HDU7  Nothing
Unit7,HDU8  Nothing
Unit7,HDU9  Nothing
Unit8,HDU0  Nothing
Unit8,HDU1  Nothing
Unit8,HDU2  Nothing
Unit8,HDU3  Nothing
Unit8,HDU4  Nothing
Unit8,HDU5  Nothing
Unit8,HDU6  Nothing
Unit8,HDU7  Nothing
Unit8,HDU8  Nothing
Unit8,HDU9  Nothing
Unit9,HDU0  Nothing
Unit9,HDU1  Nothing
Unit9,HDU2  Nothing
Unit9,HDU3  Nothing
Unit9,HDU4  Nothing
Unit9,HDU5  Nothing
Unit9,HDU6  Nothing
Unit9,HDU7  Nothing
Unit9,HDU8  Nothing
Unit9,HDU9  Nothing

---- Cache Information ----
          Controller 0              Controller 1
Slot    Capacity    Status        Capacity    Status
0            512    Normal             512    Normal
1            512    Normal             512    Normal
2           None    Nothing           None    Nothing
3           None    Nothing           None    Nothing

---- Fan Information ----
Location    Status
0           Normal

---- Battery Information ----
Location    Status
0           Normal

---- AC Power Information ----
Location    Status
Unit0,AC0    Normal
Unit0,AC1    Normal
Unit1,AC0    Nothing
Unit1,AC1    Nothing
Unit2,AC0    Nothing
Unit2,AC1    Nothing
Unit3,AC0    Nothing
```

```
Unit3,AC1    Nothing
Unit4,AC0    Nothing
Unit4,AC1    Nothing
Unit5,AC0    Nothing
Unit5,AC1    Nothing
Unit6,AC0    Nothing
Unit6,AC1    Nothing
Unit7,AC0    Nothing
Unit7,AC1    Nothing
Unit8,AC0    Nothing
Unit8,AC1    Nothing
Unit9,AC0    Nothing
Unit9,AC1    Nothing

---- Battery Backup Information ----
Location    Status
0           Normal
1           Normal

---- Loop Information ----
Path  Loop  Status
0     0     Normal
0     1     Normal
1     0     Normal
1     1     Normal

---- ENC Information ----
Location    Status
Unit0,ENC0  Normal
Unit0,ENC1  Normal
Unit1,ENC0  Nothing
Unit1,ENC1  Nothing
Unit2,ENC0  Nothing
Unit2,ENC1  Nothing
Unit3,ENC0  Nothing
Unit3,ENC1  Nothing
Unit4,ENC0  Nothing
Unit4,ENC1  Nothing
Unit5,ENC0  Nothing
Unit5,ENC1  Nothing
Unit6,ENC0  Nothing
Unit6,ENC1  Nothing
Unit7,ENC0  Nothing
Unit7,ENC1  Nothing
Unit8,ENC0  Nothing
Unit8,ENC1  Nothing
Unit9,ENC0  Nothing
Unit9,ENC1  Nothing
```