



Hitachi Universal Storage Platform™ V

Technical Presentation 2

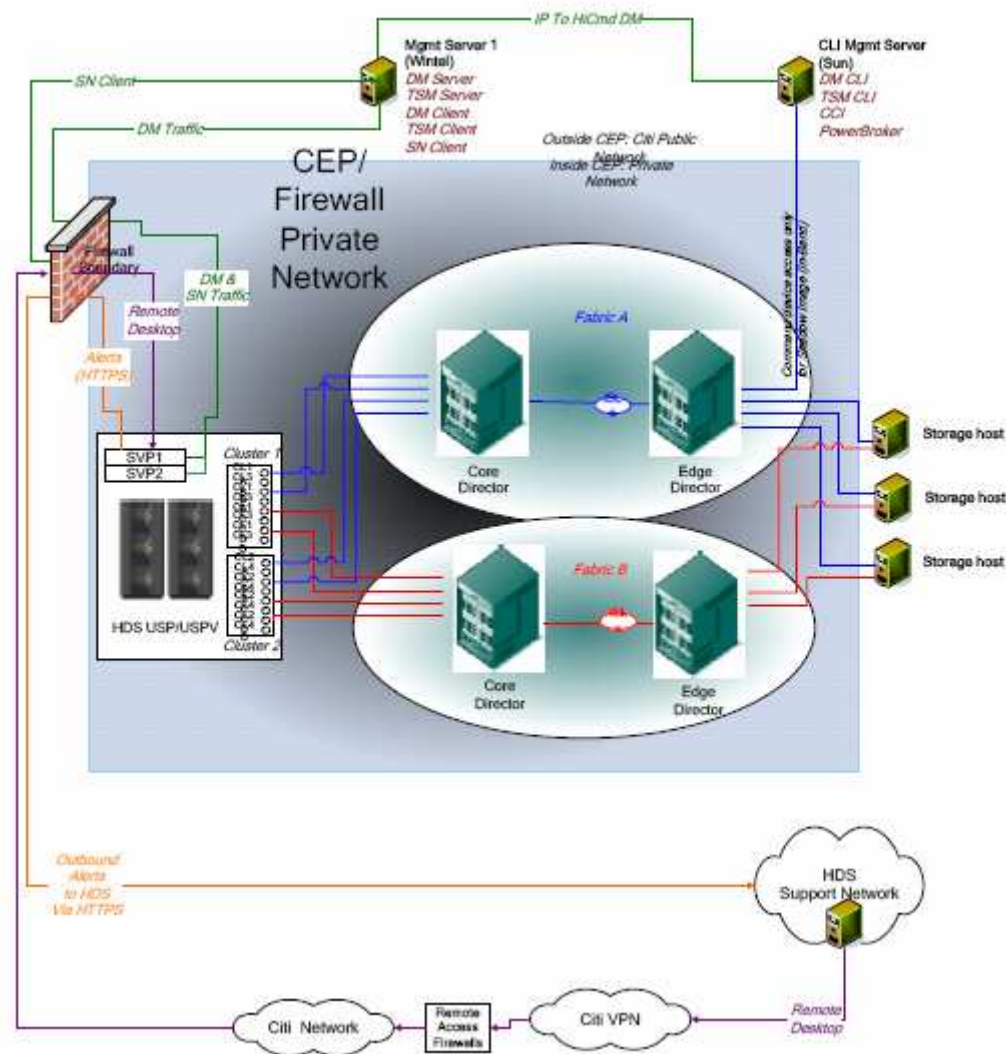
Dec 7th, 2007

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Citigroup HDS Management Server Topology



USPV Back End Director Layout

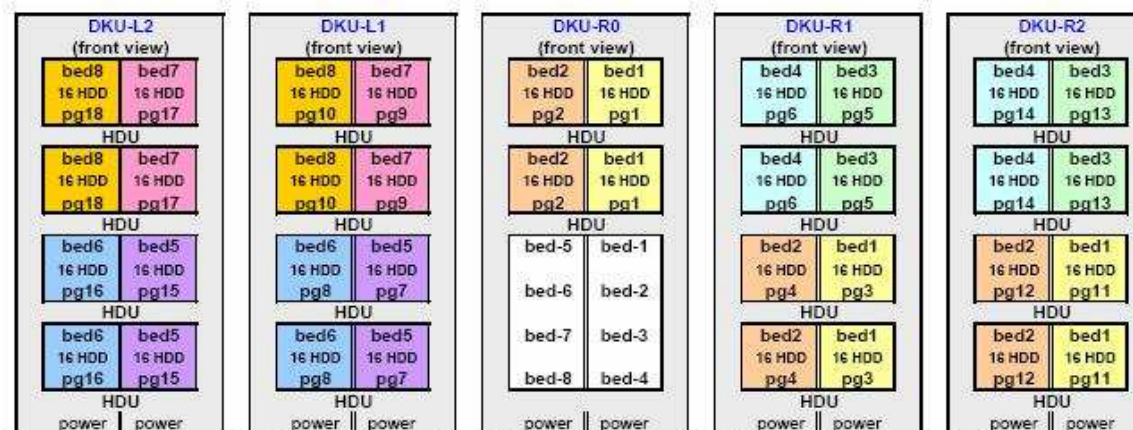


Figure 15. Front view of the USP V Frames, HDUs, with BED ownership.

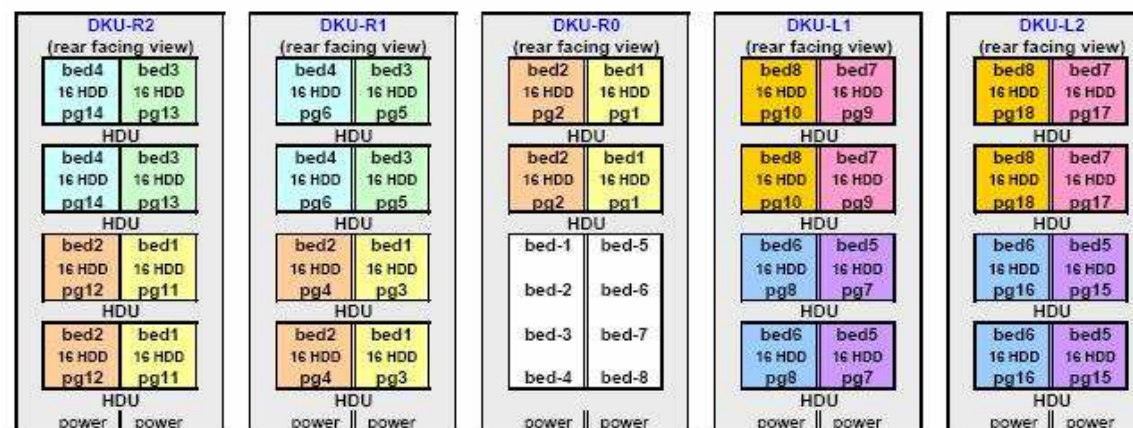


Figure 16. Rear view of the USP V Frames, HDUs, with BED ownership.

USPV Raid Group Physical Box Layout

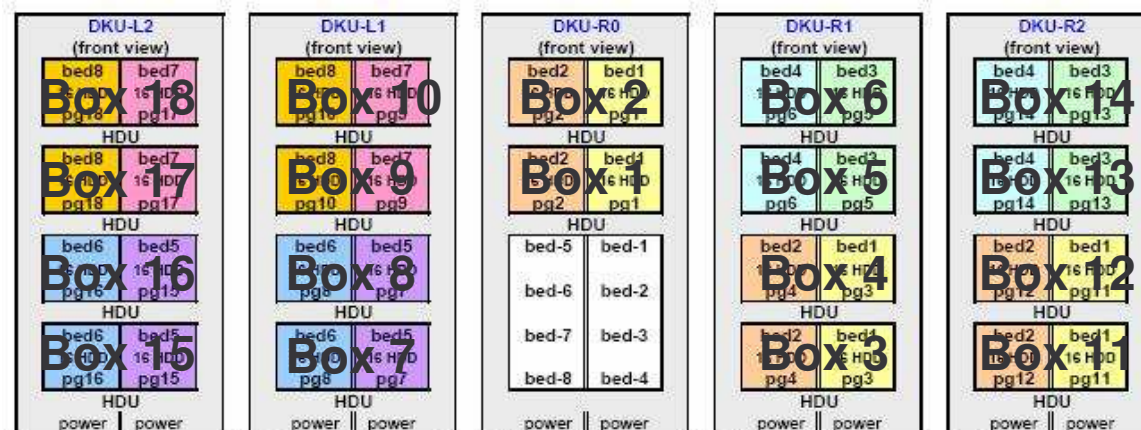


Figure 15. Front view of the USP V Frames, HDUs, with BED ownership.

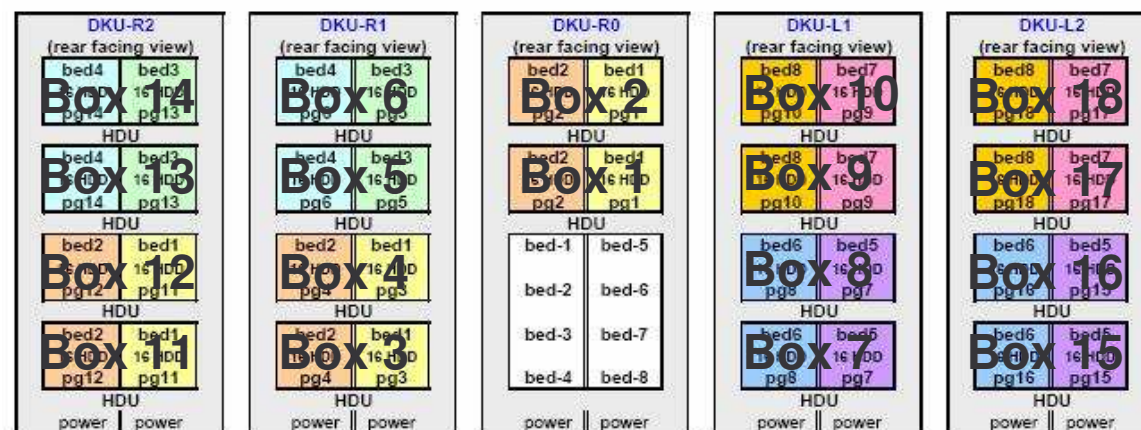


Figure 16. Rear view of the USP V Frames, HDUs, with BED ownership.

USPV Raid Group Numbering

HITACHI
Inspire the Next

Virtual LVI/LUN (VLL)

Parity Group - LDEV MB

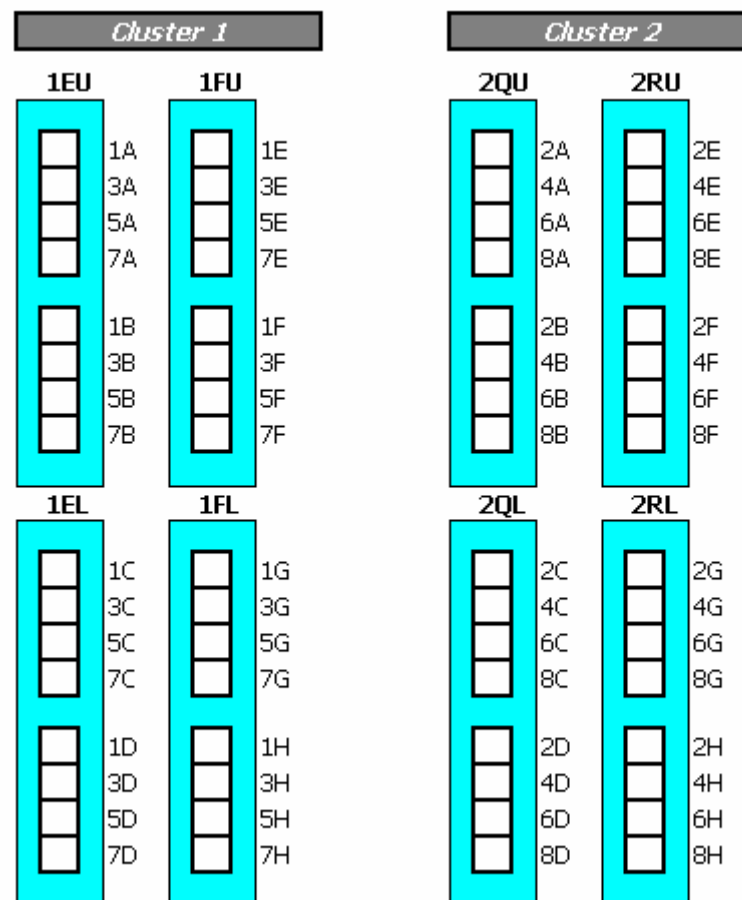
Subsystem

- Internal
 - Box1
 - Box2
 - Box3
 - Box5
 - Box7
 - Box9
 - Box10
 - Box11
 - Box13
 - Box15
 - Box17
 - Box18
 - 18-1 RAID5(3D+1P)
 - 18-1-(1)
 - 18-2 RAID5(3D+1P)
 - 18-3 RAID1(2D+2D)
- External
- C.O.W. Snapshot
- Dynamic Provisioning

No.	LDKC:CU:LDEV	Emulation	Capacity	Path
1	00:80:00	CPEN-K	1788.046 MB	
2	00:80:02	CPEN-K	1788.046 MB	
3	00:80:04	CPEN-K	1788.046 MB	
4	00:80:06	CPEN-K	1788.046 MB	
5	00:80:08	CPEN-K	1788.046 MB	
6	00:80:0A	CPEN-K	1788.046 MB	
7	00:80:0C	CPEN-K	1788.046 MB	
8	00:80:0E	CPEN-K	1788.046 MB	
9	00:80:10	CPEN-K	1788.046 MB	
10	00:80:12	CPEN-K	1788.046 MB	
11	00:80:14	CPEN-K	1788.046 MB	
12	00:80:16	CPEN-K	1788.046 MB	
13	00:80:18	CPEN-K	1788.046 MB	
14	00:80:1A	CPEN-K	1788.046 MB	
15	00:80:1C	CPEN-K	1788.046 MB	
16	00:80:1E	CPEN-K	1788.046 MB	
17	00:80:20	CPEN-K	1788.046 MB	
18	00:80:22	CPEN-K	1788.046 MB	
19	00:80:24	CPEN-K	1788.046 MB	
20	00:80:26	CPEN-K	1788.046 MB	
21	00:80:28	CPEN-K	1788.046 MB	
22	00:80:2A	CPEN-K	1788.046 MB	
23	00:80:2C	CPEN-K	1788.046 MB	
24	00:80:2E	CPEN-K	1788.046 MB	
25	00:80:30	CPEN-K	1788.046 MB	
26	00:80:32	CPEN-K	1788.046 MB	

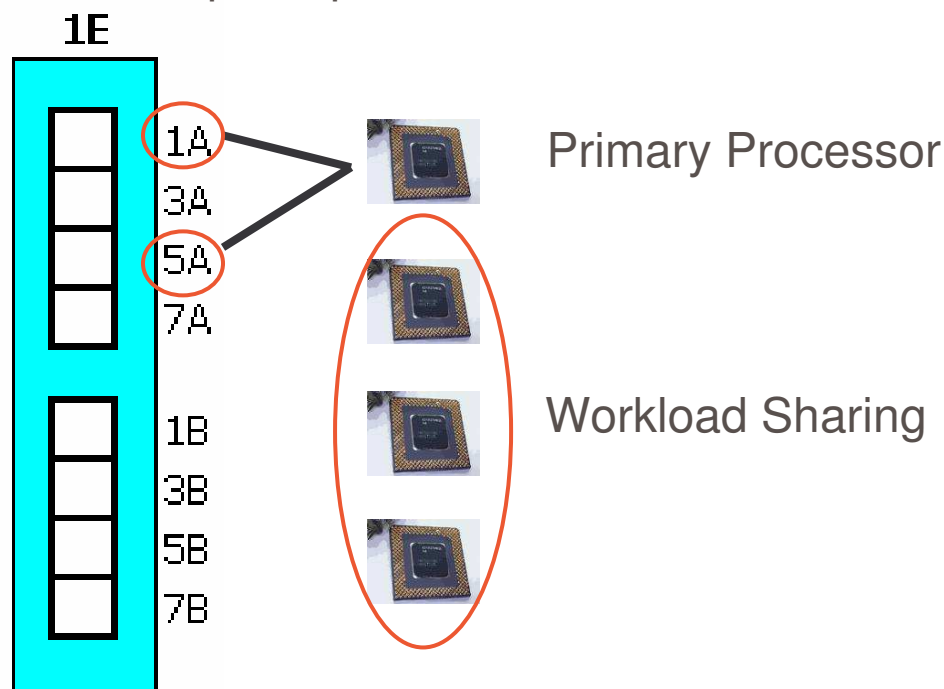
Progress Shredding Param. Export Format All Apply Cancel

USPV Front End Ports Naming



USPV Front End Processor Workload Sharing

4 Front-end processors per 8 port board



Front end processors can share workload with quiet processors on the same physical board

Workload is not offloaded if it will impact the performance of other ports on the board

Example of Front End Processor Workload Sharing

- Single LUN
- 2 SAN paths
- 50/50 read/write
- 50/50 seqn/random
- 4KB block size
- No other activity



Performance Reporter - "Processor Busy Rate - Top 10(6.0)" - Microsoft Internet Explorer

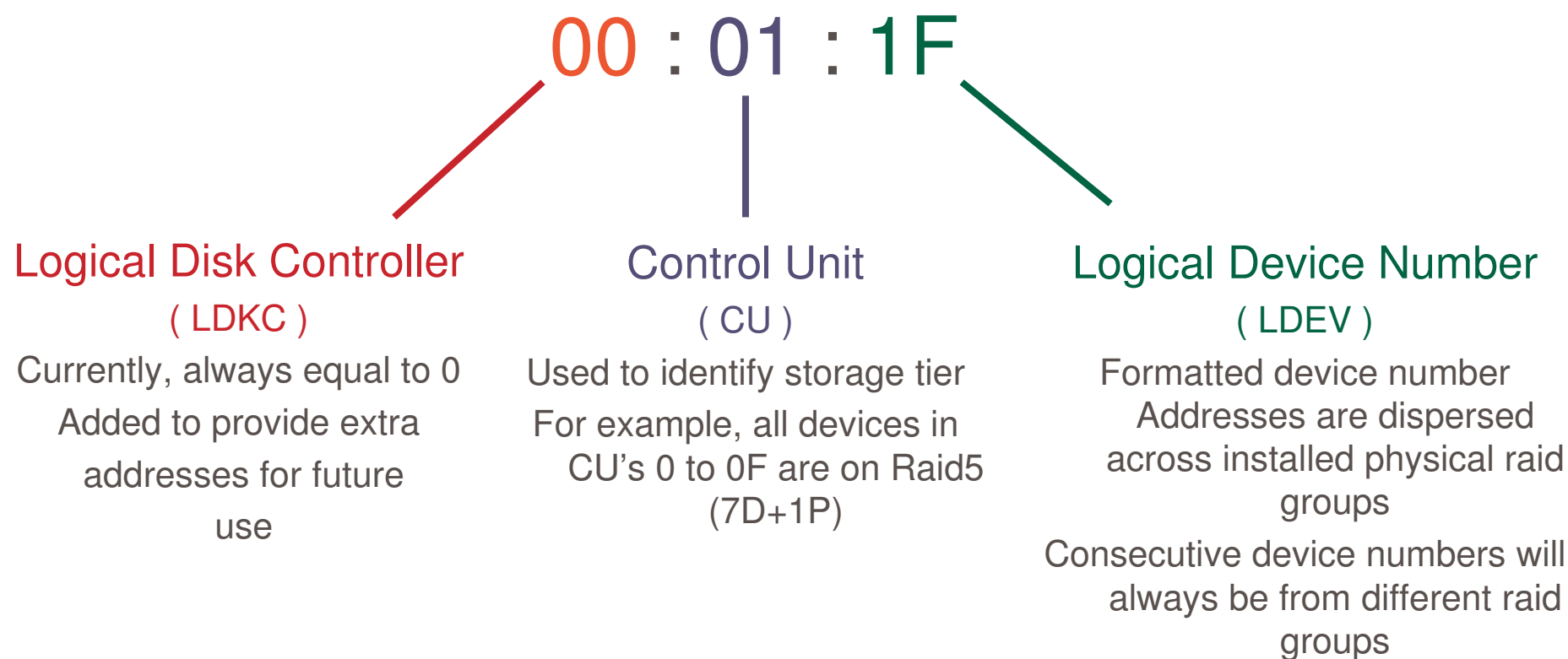
Processor Busy Rate - Top 10(6.0) : DA1USPV[loninengd58] [Bookmark](#) | [Description](#) | [Close](#) | [Help](#)

Report Properties [Show Options](#) 13 11 2007 10:14:19 (60s) GMT+00:00

☐ Graph ☐ List ☒ Table [Refresh](#) | [Stop](#)

Record Time	Adaptor ID	Processor ID	Processor Type	Processor Busy %	Record Time
13 11 2007 10:14:19	CHA-1FU	0	CHP	94.7862	13 11 2007 10:14:19
13 11 2007 10:14:19	CHA-2RU	0	CHP	94.4522	13 11 2007 10:14:19
13 11 2007 10:14:19	CHA-2RU	1	CHP	48.0779	13 11 2007 10:14:19
13 11 2007 10:14:19	CHA-1FU	2	CHP	48.0621	13 11 2007 10:14:19
13 11 2007 10:14:19	CHA-1FU	1	CHP	47.9803	13 11 2007 10:14:19
13 11 2007 10:14:19	CHA-2RU	2	CHP	47.7017	13 11 2007 10:14:19
13 11 2007 10:14:19	CHA-2RU	3	CHP	47.5936	13 11 2007 10:14:19
13 11 2007 10:14:19	CHA-1FU	3	CHP	47.1262	13 11 2007 10:14:19

USPV (LDEV) Device Addressing Scheme



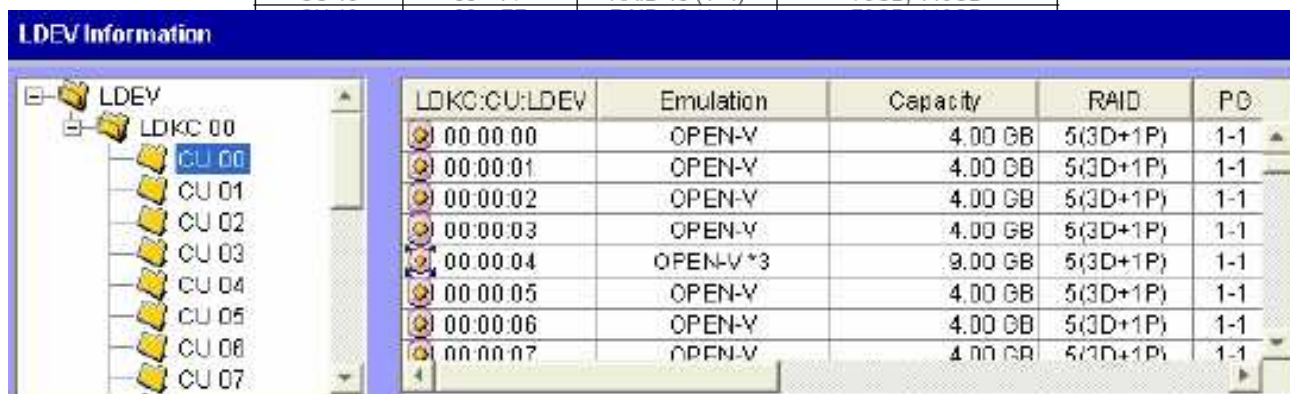
*USPV LDEV addresses are assigned by
HDS engineers at time of disk installation/formatting*

USPV (LDEV) Device Addressing Scheme

CU Prefix (Hex)	Address Range (Hex)	RAID Type	Drive Type
CU 00	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 01	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 02	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 03	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 04	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 05	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 06	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 07	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 08	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 09	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 0A	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 0B	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 0C	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 0D	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 0E	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 0F	00 – FF	RAID 5 (7+1)	73GB, 146GB, 300GB
CU 10	00 – FF	RAID 10 (4+4)	73GB, 146GB
CU 11	00 – FF	RAID 10 (4+4)	73GB, 146GB
CU 12	00 – FF	RAID 10 (4+4)	73GB, 146GB
CU 13	00 – FF	RAID 10 (4+4)	73GB, 146GB
CU 14	00 – FF	RAID 10 (4+4)	73GB, 146GB
CU 15	00 – FF	RAID 10 (4+4)	73GB, 146GB
CU 16	00 – FF	RAID 10 (4+4)	73GB, 146GB
CU 17	00 – FF	RAID 10 (4+4)	73GB, 146GB
CU 18	00 – FF	RAID 10 (4+4)	73GB, 146GB

GDSE Standards for
Device Addressing

LDEV Information

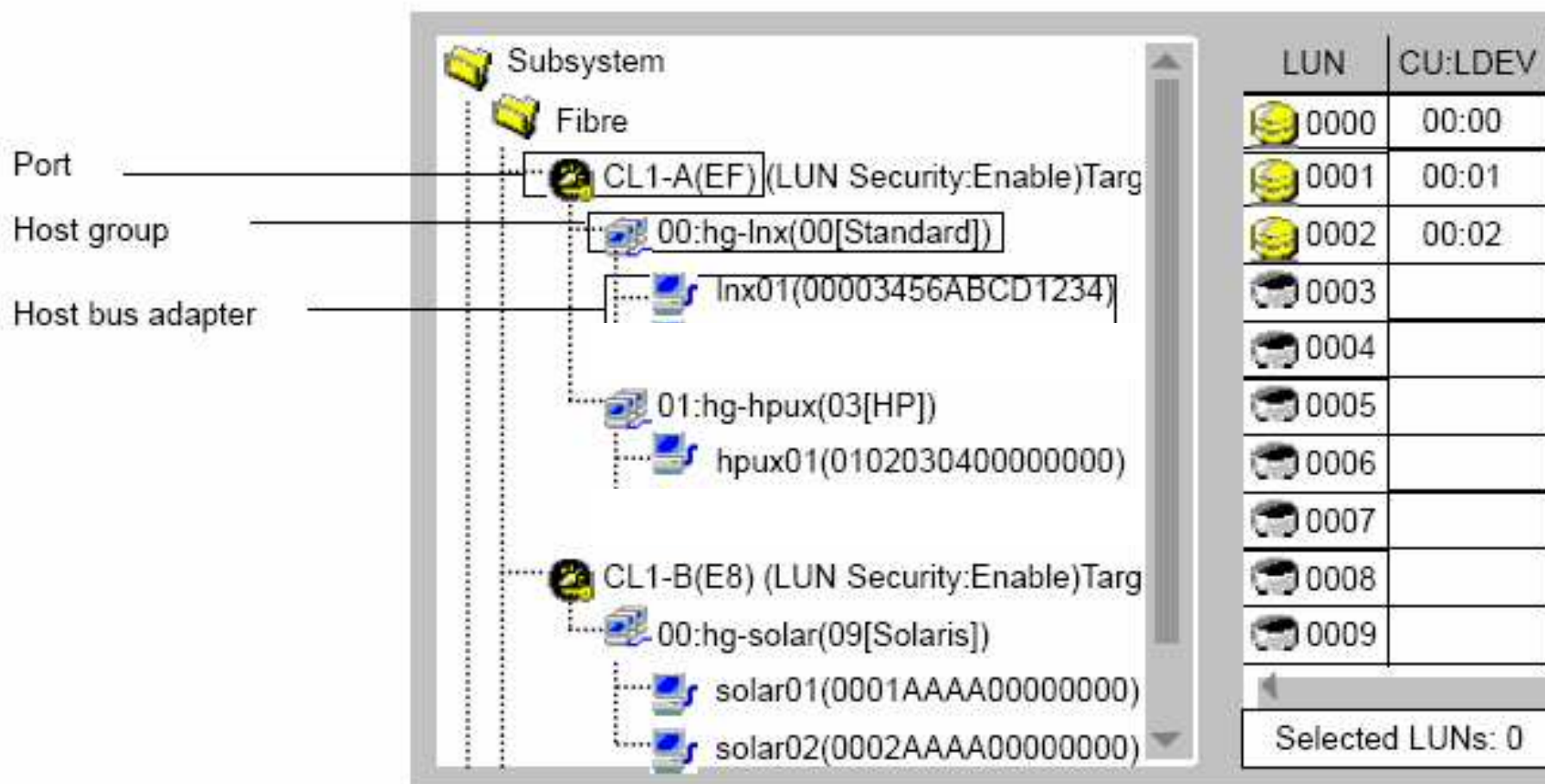


LDKC:CU:LDEV	Emulation	Capacity	RAID	PO
00 00 00	OPEN-V	4.00 GB	5(3D+1P)	1-1
00 00 01	OPEN-V	4.00 GB	5(3D+1P)	1-1
00 00 02	OPEN-V	4.00 GB	5(3D+1P)	1-1
00 00 03	OPEN-V	4.00 GB	5(3D+1P)	1-1
00 00 04	OPEN-V*3	9.00 GB	5(3D+1P)	1-1
00 00 05	OPEN-V	4.00 GB	5(3D+1P)	1-1
00 00 06	OPEN-V	4.00 GB	5(3D+1P)	1-1
00 00 07	OPEN-V	4.00 GB	5(3D+1P)	1-1

USPV View of addresses

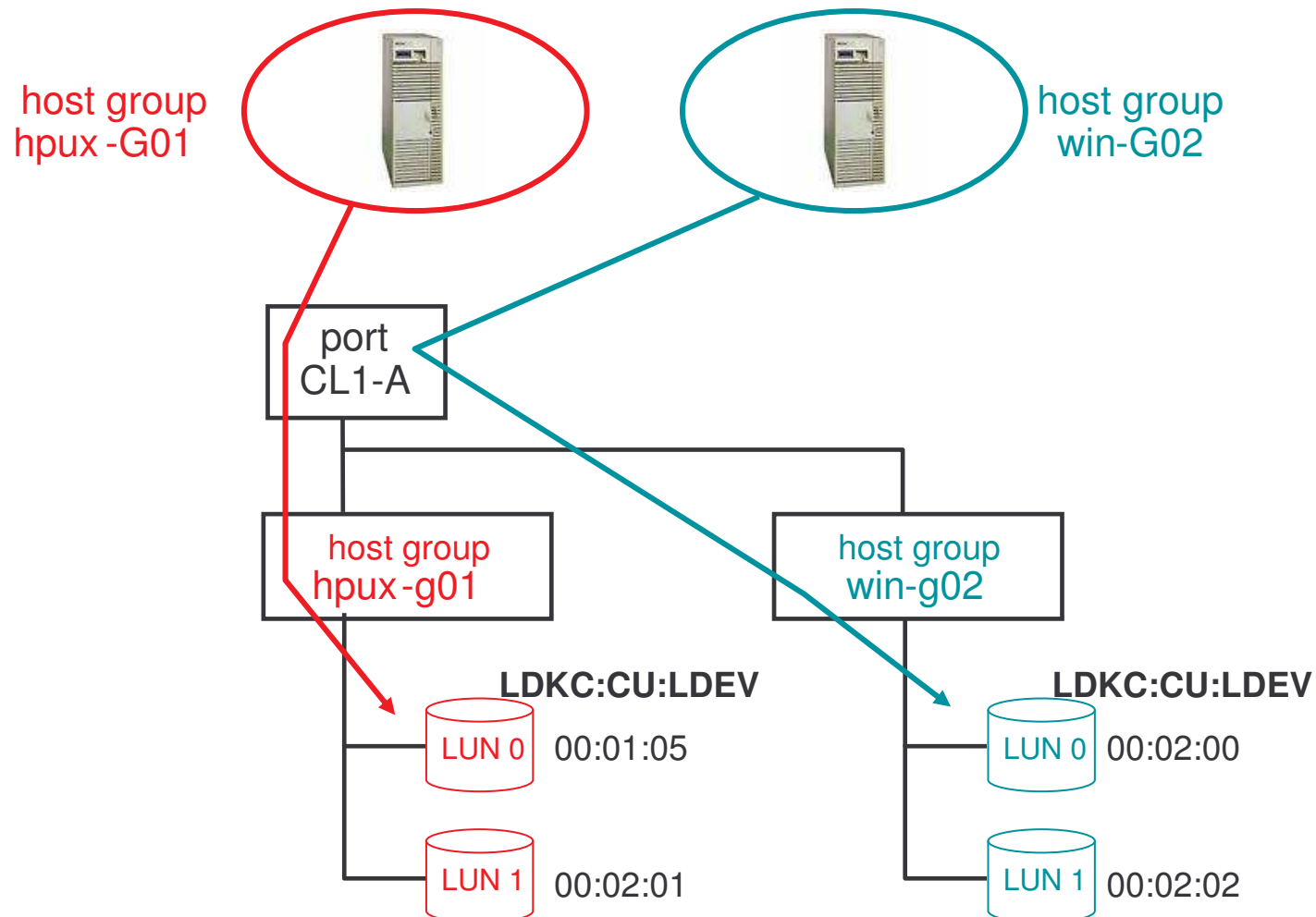
Host Storage Groups / LUN Security

- Host Storage Groups



Host Storage Groups Example

- LUN Security / Host Storage Groups Example



Hitachi Universal Storage Platform V

Summary

HITACHI
Inspire the Next

- All of your storage managed as one large virtualized storage pool, independent of physical location
- Consolidate and integrate Hitachi, EMC, IBM®, Sun, Hewlett-Packard, and other storage into one multitiered storage architecture
- Exploit the Universal Storage Platform V software with all externally attached storage systems
 - Add the USP V's enterprise storage capabilities to midrange or other legacy storage systems
- Match tiers of storage to application requirements
 - All tiers leverage the functionality of the Universal Storage Platform V
 - Data can be moved, copied, and replicated from any tier to any other tier within this universal pool
 - And all of this managed with a single, consistent, interface



Questions/Discussion