SSD OPTIONAL FUNCTION SECTION

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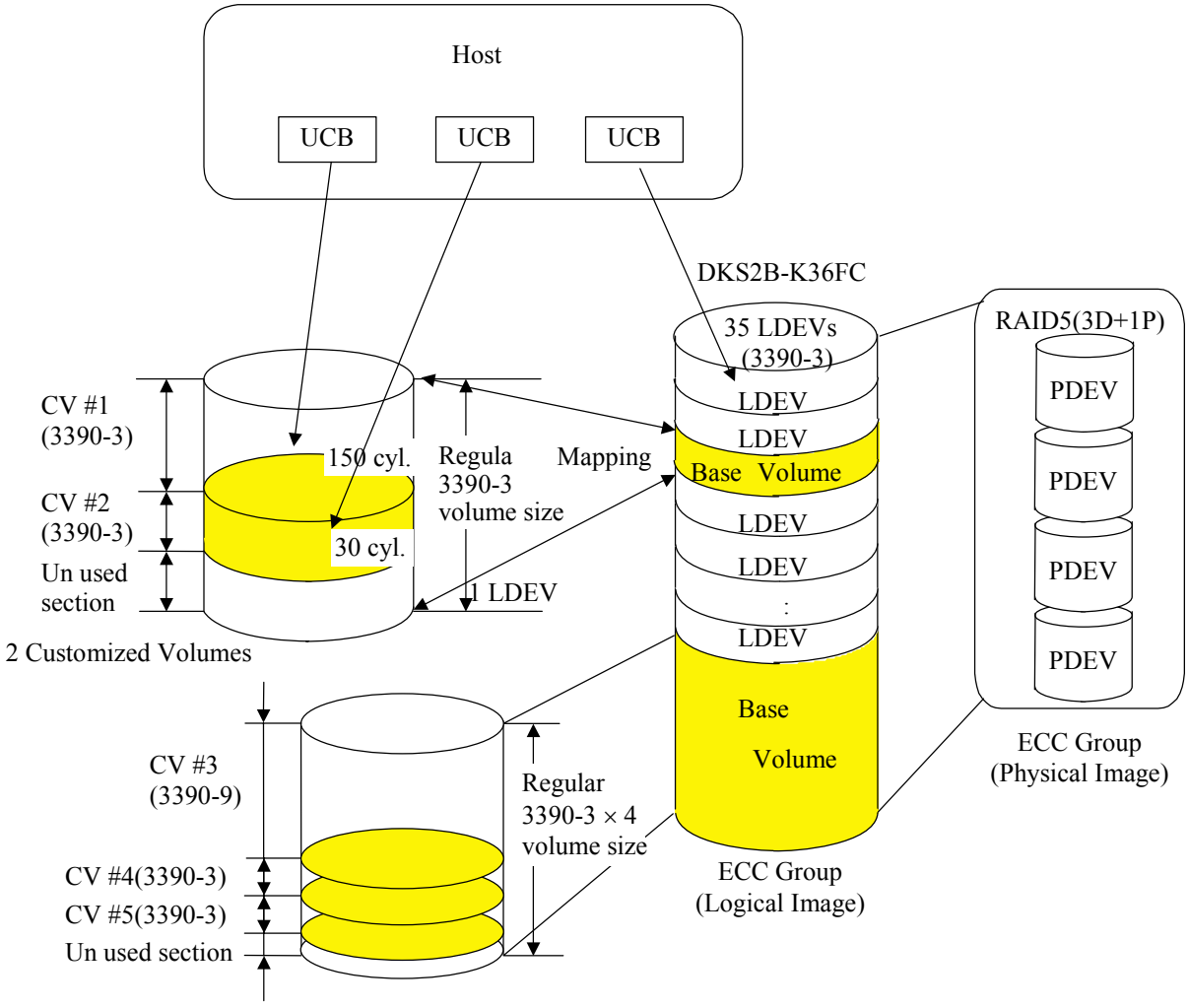
1. Customized Volume Size (CVS) Option

1.1 Outline

As regards the main frame host, the multiplicity of an I/O request is restricted to one per volume because UCBs are mutually exclusive.
Therefore, when two or more files to which I/Os are applied frequently exist in the same volume, a contention for the logical volume occurs. If this occurs, the files mentioned above are stored separately in different logical volumes and an action is taken to avoid contention for access. (Or means to prevent I/Os from generation is required.)
However, the work for adjusting the file arrangement giving consideration to the accessing characteristic of the file will be a burden on users of the DKC and it is not welcomed by them.
To solve this problem, the Customized Volume Size (CVS) option is provided. (Hereinafter, it is abbreviated to CVS.)
The CVS provides a function for freely defining the logical volume size. By doing this, even in a storage system with the same capacity, the number of volumes can be increased easily. As a result, a file with a high I/O frequency can be easily allocated to an independent volume. That is to say, the trouble to consider a combination of stored files in a volume can be saved.

1.2 Features

- The contention for UCB in the mainframe host can be avoided, and the waiting time (IOSQ time) from the IO starting command of the OS to the IO issuance by the UCB can be reduced.
- The capacity of the ECC group can be fully used.
- By combining with the Dynamic Cache Residence (DCR) option, high performance equivalent to that of a semiconductor storage device can be realized.



1.3 Specifications

The CVS option consists of a function to provide variable capacity volumes and a function to provide free arrangement of volumes on the ECC group.

(a) Function to provide variable capacity volumes
This function can create the capacity volume as required by the users.

(b) Emulation type intermix on the ECC group
As regard the DKC610I, the logical volume type in the ECC group is restricted to the same type only. However, the CVS option enables the different emulation types of volumes to coexist in one ECC group.

Table 1.3-1 CVS Specifications

Parameter	Mainframe system	Open system	
Track format	3380,3390	OPEN-3, OPEN-8, OPEN-9, OPEN-E	OPEN-V
Emulation type Note: The emulation types followed by an asterisk (*) can only be used with Fujitsu Mainframe systems. Do not use these emulation types if you are not using Fujitsu Mainframe systems.	3380-3, 3380-3A, 3380-3B, 3380-3C, 3380-F*, 3380-K*, 3380-KA*, 3380-KB*, 3380-KC* 3390-3, 3390-3A, 3390-3B, 3390-3C, 3390-3R, 3390-9, 3390-9A, 3390-9B, 3390-9C, 3390-L, 3390-LA, 3390-LB, 3390-LC, 3390-M, 3390-MA, 3390-MB, 3390-MC NF80-F*, NF80-K*, NF80-KA*, NF80-KB*, NF80-KC*	OPEN-3, OPEN-8, OPEN-9, OPEN-E	OPEN-V
Ability to intermix emulation type	Depends on the track geometry	Depends on the track geometry	Depends on the track geometry
Maximum number of volumes (normal and CVS) per VDEV	2,048 for RAID5 (7D+1P) or RAID6 (6D+2P) 1,024 for other RAID levels	2,048 for RAID5 (7D+1P) or RAID6 (6D+2P) 1,024 for other RAID levels	2,048 for RAID5 (7D+1P) or RAID6 (6D+2P) 1,024 for other RAID levels
Maximum number of volumes (normal and CVS) per storage system	131,072	131,072	131,072
Minimum size for one CVS Volume	1 user cylinder (+ Control cylinders)	36,000 KB (+ Control cylinders)	48,000KB (+ 50 cylinders)
Maximum size for one CVS Volume	See Table 1.3-2	See Table 1.3-3	See Table 1.3-3
Size increment	1 user cylinder	1 MB	1 MB (1 user cylinder)
Disk location for CVS Volume	Anywhere	Anywhere	Anywhere

Note1:

(1) Mainframe volume

Number of physical cylinder allocated on ECC group is calculated by following formula.

Physical mapping onto ECC group(track) =

User logical cylinders(A) × 15 + Additional control cylinder(B) × 15 + Adjustment(C)

∴ 1 cylinder = 15 tracks

where, (A) is specified value through SVP/Web Console, (B) is defined from below chart depending on emulation type.

The value of (C) depends on (A) + (B) and (C) has the value such as ranging from 0 to 47, 0 to 55.

i) RAID5 (3D + 1P)

$$((C) = \uparrow \frac{((A)+(B)) \times 15}{24} \uparrow \times 24 - ((A)+(B)) \times 15$$

ii) RAID5 (7D + 1P)

$$((C) = \uparrow \frac{((A)+(B)) \times 15}{56} \uparrow \times 56 - ((A)+(B)) \times 15$$

iii) RAID1

$$((C) = \uparrow \frac{((A)+(B)) \times 15}{16} \uparrow \times 16 - ((A)+(B)) \times 15$$

iv) RAID6 (6D + 2P)

$$((C) = \uparrow \frac{((A)+(B)) \times 15}{48} \uparrow \times 48 - ((A)+(B)) \times 15$$

∴ ↑ ↑ means round up to the next integer.

e.g. ↑3.96↑ = 4

(2) Open volume

You can set the data by Mbytes or Logical Blocks. You can also set by Cylinders in case of OPEN-V. And the Program will assign the actual value as the following expression. The maximum OPEN-V capacity depends on that of Vdev size.

Except for OPEN-V

X = (your setting size) × 1024 ÷ 720 (if there is remainder, add 1 to X.)

Y = (X × 96 × 15 × 512) ÷ 1024 ÷ 1024

OPEN-V

X = (your setting size) × 16 ÷ 15 (if there is remainder, add 1 to X.)

Y = (X × 128 × 15 × 512) ÷ 1024 ÷ 1024

Note: X is a value of converting capacity into number of cylinders. Y is a value of converting value into number of mega bytes.
In case of open volume, physical mapping onto ECC group(track) is also calculated by the expression of (1).

Incase of set by Logical Blocks, the value is assigned as actual size directly.

Table 1.3-2 CV capacity by Emulation types (for Mainframe System)

Emulation type	Minimum CV capacity (Cyl)	Maximum CV capacity (Cyl)	Number of control cylinder (Cyl)
3380-3	1	3,339	7
3380-3A	1	3,339	7
3380-3B	1	3,339	7
3380-3C	1	3,339	7
3380-F	1	3,339	22
3380-K	1	2,655	7
3380-KA	1	2,655	7
3380-KB	1	2,655	7
3380-KC	1	2,655	7
3390-3	1	3,339	6
3390-3A	1	3,339	6
3390-3B	1	3,339	6
3390-3C	1	3,339	6
3390-3R	1	3,339	6
3390-9	1	10,017	25
3390-9A	1	10,017	25
3390-9B	1	10,017	25
3390-9C	1	10,017	25
3390-L	1	32,760	23
3390-LA	1	32,760	23
3390-LB	1	32,760	23
3390-LC	1	32,760	23
3390-M	1	65,520	53
3390-MA	1	65,520	53
3390-MB	1	65,520	53
3390-MC	1	65,520	53
NF80-F	1	3,983	22
NF80-K	1	2,655	7
NF80-KA	1	2,655	7
NF80-KB	1	2,655	7
NF80-KC	1	2,655	7

Table 1.3-3 CV capacity by Emulation types (for Open System)

Emulation type	Minimum CV capacity (Cyl)	Maximum CV capacity (Cyl)	Number of control cylinder (Cyl)
OPEN-V	48,000KB	3,221,159,680KB (2.99TB)	0KB (0Cyl)
OPEN-3	36,000KB (50Cyl)	2,403,360KB	5,760KB (8Cyl)
OPEN-8	36,000KB (50Cyl)	7,175,520KB	19,440KB (27Cyl)
OPEN-9	36,000KB (50Cyl)	7,211,520KB	19,440KB (27Cyl)
OPEN-E	36,000KB (50Cyl)	14,226,480KB	13,680KB (19Cyl)

Note: CVS functions are not applicable to OPEN-L volumes.

NOTICE:
When you set HMDE volumes to customized volumes and reset them to the normal volume again, these volumes could not be set as HMDE volumes. Please refer to the following table.

Emulation Types for HMDE volumes	Emulation types after changing from Customized volume to normal volume
3390-3A	3390-3
3390-3B	
3390-3C	

If you want to reset these volumes as HMDE, please call technical support division to set them to HMDE volumes by SVP.

1.4 Maintenance functions

Features of the maintenance functions of the CVS option is that they allow execution of not only the conventional maintenance operations instructed by the SVP but also the maintenance operations instructed from the Storage Navigator. (See Item No. 2 to 5 in Table 1.4-1.)
Unlike the conventional LDEV addition or reduction, the operation for the ECC group is made unnecessary, so that the volumes can be operated from the Storage Navigator.

Table 1.4-1 Maintenance Function List

Item No.	Maintenance function	CE	User	Remarks
1	Concurrent addition or deletion of CVs at the time of addition or deinstallation of ECC group	✓	—	Same as the conventional addition or deinstallation of LDEVs
2	Addition of CVs only	✓	✓	Addition of CVs in the free area
3	Conversion of normal volumes to CV	✓	✓	
4	Conversion of CV to normal volumes	✓	✓	
5	Deletion of CVs only	✓	✓	Only the optional CVs are deleted and incorporated into the free area.No deinstallation of ECC group is involved.

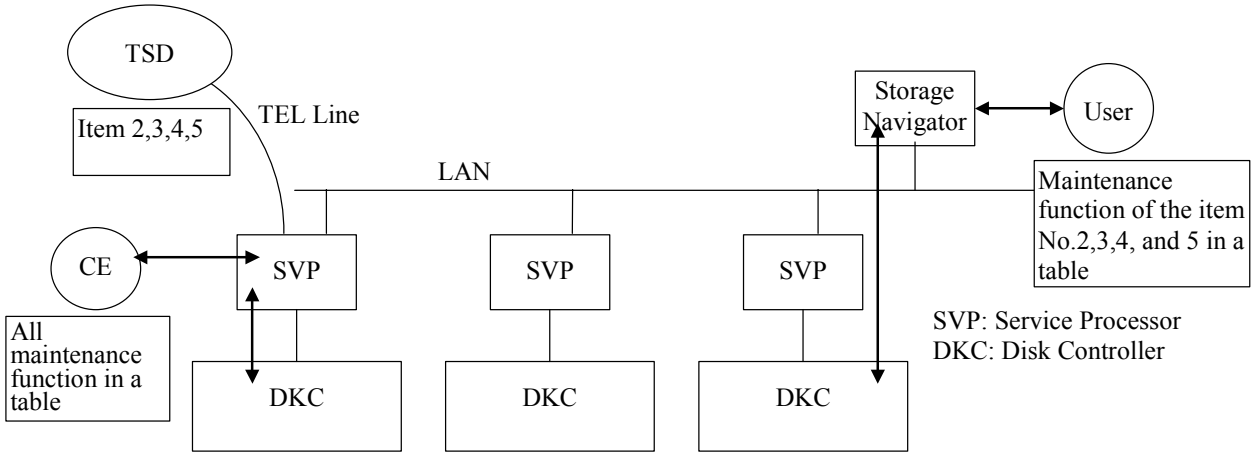


Fig. 1.4-1 Maintenance Execution Route when CVS Is Used

2. Dynamic Cache Residence (DCR) Option

2.1 Outline

Because cache capacity is usually smaller than the total HDD capacity in RAID subsystem, cache cannot be keep all data at the same time which is stored whole HDDs in the subsystem.
Cache management control cache extent so as to allocate more capacity to more frequently accessed data to enbed this gap by LRU algorithm.
By this control, data with a low access frequency is hard to remain in the cache, de-staged into HDDs, therefore the more frequent accesses to physical HDDs occur, decrease the access performance and unpredictable response time appear.
The DCR option provides a function for making data being resident on the cache and realize high access performance.
DCR is a function to make the specified data resident in the specific Cache area in DKC. This will enable the host to always execute Cache hit of the specified data and access it at high speed.

2.2 Features

- Feature of the DCR consist of two modes, one is called “PRIOrity mode(hereinafter,it is abbreviated to PRIO)” and the other “BIND mode(hereinafter,it is abbreviate to BIND)”. PRIO is a basic mode(100% Read Hit) of this feature, which fits typical user needs and BIND is supplementary for special customer(100% Read/Write Hit. Replace SSD) needs.

- To use the DCR, addition of the cache memory is required for the service as a “DCR cache”.

- DCR supports PreStaging function. The PreStaging is a function which read data on Logical Volume onto cache by receiving Storage Navigator or SVP instructions.

2.2.1 PRIO

[Processing]

- When a read command to the data which is assigned as DCR extent is issued and first meet "miss" in cache, the data is staged into cache by usual staging mechanism.
  The data remains in the DCR cache permanently for future access to guarantee read-hit performance even after data is transferred to the host, regardless usually cache LRU management.
  If a write command is issued to the data remaining in the cache in the way above, the data is updated with an out-of-DCR cache segment provided for write data duplication, and the data is de-staged into the HDD. Then the cache segment for write data duplication is returned to the out-of-DCR cache segment group.
  In this case, new data is left in the cache extent together with old data.

[Performance impact]

- Theoretically, because above de-staging into HDD is processed by usual asynchronous de-staging mechanism, succeeding host access has a possibility to meet the same cache slot collision by locking both the host access and asynchronous de-staging process.
  However in that case, by minimizing the collision time implemented in micro-code, performance impact will be negligible for usual customer jobs.
- In the case the subsystem cache becomes overloaded, a performance degradation occurs because the non-DCR cache segment must be used for the data assurance during a period between write data reception and de-staging operation completion.

Note:
When the operation of deleting the resident cache-data is performed during host I/O execution, the host I/O execution conflict with the procedure in which the data is transferred to disk drives (de-staging) may happen. It may cause the response performance degradation.

To avoid the response performance degradation, please limit the total capacity of data released by one operation.

- If the Host timeout period is more than 11 seconds, the amount of acceptable releasing cache is limited to 3Gbyte or less.
  OPEN system: The amount of acceptable releasing cache is limited to 3Gbyte or less.
  Mainframe system: The number of acceptable releasing cylinders is limited to 3000 or less.
- If the Host timeout period is less than 10 seconds, it is limited to 1Gbyte or less.
  OPEN system: The amount of acceptable releasing cache is limited to 1Gbyte or less.
  Mainframe system: The number of acceptable releasing cylinders is limited to 1000 or less.

Note:
If the setting or the release of the DCR extent is performed to a lot of LDEVs when there is I/O from Host, the response performance degradation of HOST I/O may occur.
To avoid the response performance degradation, limit the number of LDEVs to be set or released by one operation to 1.

[Maximum DCR capacity]

- Addition of the “DCR cache” is required for the DCR, and a number of disk tracks equivalent to the capacity of the added “DCR cache” is the maximum number definable for the DCR.
  Besides, STR recommends to keep the standard cache capacity for the non-DCR portion as a minimum out-of-DCR cache, to avoid considerable performance degradation for original data because of the newly installed DCR (Standard Cache capacity is decided by the subsystem capacity).
  To keep this rule, when the customer want to install DCR feature for the subsystem, he needs to install additional cache capacity as a DCR area is taken out of pre-defined standard cache capacity.
  Table 2.2.1-1 indicates the additional cache capacity as a DCR area out of pre-defined standard cache capacity.
  The additional cache capacity requires out-of-DCR cache capacity.
  Table 2.2.1-1 is the relationship between number of using extents and additional cache capacity.

Table 2.2.1-1 Necessary addition of cache memory

	Number of Priority Mode extents			
	1 ~ 4096	4097 ~ 8192	8193 ~ 12288	12289 ~ 16384
Additional Standard cache memory capacity	2048MB × 2	4096MB × 2	6144MB × 2	8192MB × 2

Caution

A required cache capacity in PRIO mode:
standard cache capacity + DCR cache capacity + the above cache capacity

A required cache capacity in BIND mode:
standard cache capacity + DCR cache capacity

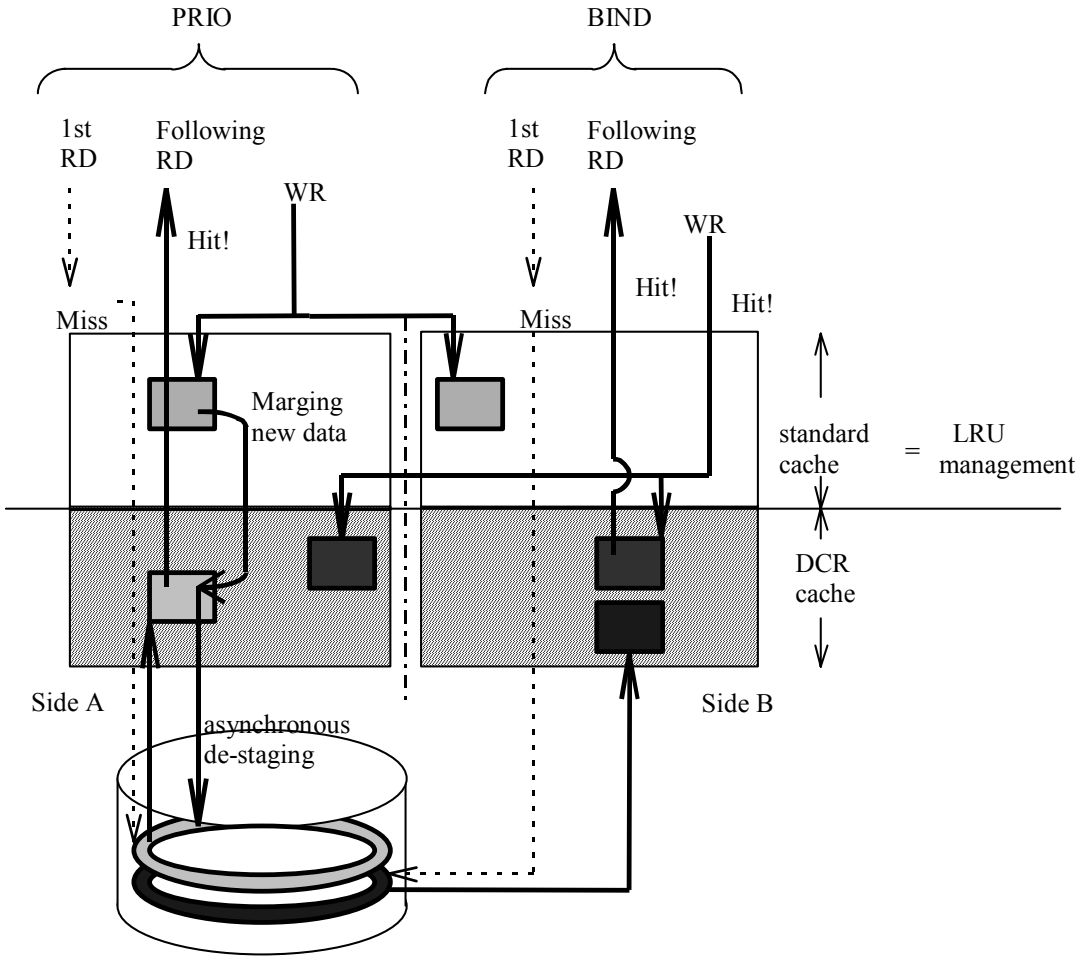


Fig. 2.2.1-1 Processing for DCR Extent

2.2.2 BIND

[Processing]

- As described above, there is a possibility that a responding performance degradation occurs in the PRIO mode because of a collide slot lock between the host access and asynchronous de-staging process or a waiting for the cache segment to be empty caused by an overload of the subsystem cache.
  This is a negligibly small impact on the performance in the typical user environment, however, in some environments, if any, in which the performance is very critical and the maximum response time must be assured, the above factors to degrade the response may be the issues.

[Performance impact]

- In BIND, the difference for PRIO, not only read data but also being all write data for the assigned DCR extent are resident in cache, no de-stage process occurred by any write command. Thus, by protecting any asynchronous de-stage process for the DCR data, read operation become a perfectly hit process.
- However, as a compensation for the perfect hit performance, the cache, which is three times larger than that in the PRIO mode for RAID5/RAID6 and two times larger for RAID1, is used.

Note:
When the operation of deleting the resident cache-data is performed during host I/O execution, the host I/O execution conflict with the procedure in which the data is transferred to disk drives (de-staging) may happen. It may cause the response performance degradation.

To avoid the response performance degradation, please limit the total capacity of data released by one operation.

- If the Host timeout period is more than 11 seconds, the amount of acceptable releasing cache is limited to 3Gbyte or less.
  OPEN system: The amount of acceptable releasing cache is limited to 3Gbyte or less.
  Mainframe system: The number of acceptable releasing cylinders is limited to 3000 or less.
- If the Host timeout period is less than 10 seconds, it is limited to 1Gbyte or less.
  OPEN system: The amount of acceptable releasing cache is limited to 1Gbyte or less.
  Mainframe system: The number of acceptable releasing cylinders is limited to 1000 or less.

Note:
If the setting or the release of the DCR extent is performed to a lot of LDEVs when there is I/O from Host, the response performance degradation of HOST I/O may occur.
To avoid the response performance degradation, limit the number of LDEVs to be set or released by one operation to 1.

[Maximum DCR capacity]

- User data can be set 1/3 of cache capacity for BIND in case of RAID5/RAID6, or 1/2 of that in case of RAID1.

2.2.3 Assignment of DCR extent and guard logic

- BIND/PRIO modes can be assigned for each DCR extent individually.
  For example, the user want to assign 1GB cache for PRIO and 256MB cache for BIND, DKC allocate the extents in additional cache area by 1GB for PRIO and 256MB times 3 equals 0.75GB for BIND. Total 1.75GB cache should be additionally installed. The user can assign repeatedly many DCR extents with choosing each mode for each extent. Say, 1GB for PRIO + 512MB for PRIO + 256MB for BIND + 128MB for BIND comes to 2.6GB total DCR area necessary. The real capacity of cache needs adjusting to the cache unit to be added.
- SVP micro-code accepts many extents allocated for DCR. A minimum of 4GB must remain unallocated to DCR.
  In other words, DKC checks that the remaining cache capacity after DCR allocation is over 4GB, if the addition of DCR breaks the remaining 4GB boundary, the SVP rejects the allocation of DCR extents with an error message.
- From that point, the user theoretically can assign all cache capacity except 4GB for DCR regardless of their configurations, STR strongly recommend the user should keep standard cache capacity out of DCR dependant on the configuration according to the manuals. Guard boundary by SVP is only 4GB for all configurations.
- For the outline and the setting operation procedure of the DCR cache, see page SSDOPT02-140.

2.2.4 DCR PreStaging

• The processor reports SIMs when the PreStaging abnormal end.
(following Table)

Error		REF CODE			SIM	Level	Host report	Remarks
		22	23	13	28			
DCR status	PreStaging abnormal end	48	21	xx	FE	Service	No	xx: abnormal end reason code

x‘E1’, x‘10’ : No DCR PP
x‘E2’, x‘20’ : Subsystem busy
x‘E4’, x‘40’ : Staging time over
x‘E5’, x‘50’ : Cache or SM blockade
x‘E6’, x‘60’ : LDEV warning
x‘E7’, x‘70’ : Staging failure
x‘E8’, x‘80’ : P/S OFF
x‘E9’ x‘90’ : PreStaging canceled
x‘EA’, x‘a0’ : Cache over loaded
x‘EB’, x‘b0’ : Some MP’s blockade

- In the case the subsystem cache becomes overloaded, a resulting performance degradation occurs during a PreStaging execution. We strongly recommend issuing a PreStaging request to stage data onto cache at the timing of normal load, or SIM REF CODE = 4821a0 may be reported resulting in failure.
- DKC rejects PreStaging requests during PreStaging execution. Please retry PreStaging requests after PreStaging termination.

If you specify the DCR setting on the volume during the quick formatting, do not use the prestaging function. If you want to use the prestaging function after the quick formatting processing completes, first you need to release the setting and then specify the DCR setting again, with the prestaging setting enabled this time. For information about the quick formatting, see the “Virtual LVI/LUN and Volume Shredder User’s Guide”.

2.3 Specifications

Table 2.3-1 Specifications of the Function

Item No.	Item	Description
1	Maximum number of areas to be made resident	For the PRIO and BIND modes together: 4096 areas/logical volume 16384 areas/subsystem
2	Unit of area specified to be resident	Mainframe : 1 track, Open : 96 logical blocks*2 (512 logical blocks in case of OPEN-V)
3	Minimum/Maximum size of extent	1 track/logical volume size
4	Online change of resident area	Allowable (from the SVP and remote console)
5	Addition of cache capacity	Mandatory(Program Product: Charged with cache)
6	Maximum usable cache capacity*1 as DCR	Capacity of the cache memory added as the DCR cache. The "standard cache capacity" must be ensured by the rule.

*1: Convert as follows:
For the 3390 emulation: 1 track = 66KB
For the OPEN-3/8/9/E/L emulation: 1 track (96 logical block) = 66KB
For the OPEN-V emulation: 1 track (512 logical block) = 264KB

*2: In the case of open volume, the DCR program recognizes logical blocks in 96 block increments (512 block increments for OPEN-V).

- If DCR function is used for OPEN-3, OPEN-8, OPEN-9, OPEN-E, OPEN-L or OPEN-V, whole volume should be specified for DCR.
  It is because file of open system does not correspond to RAID track structure.

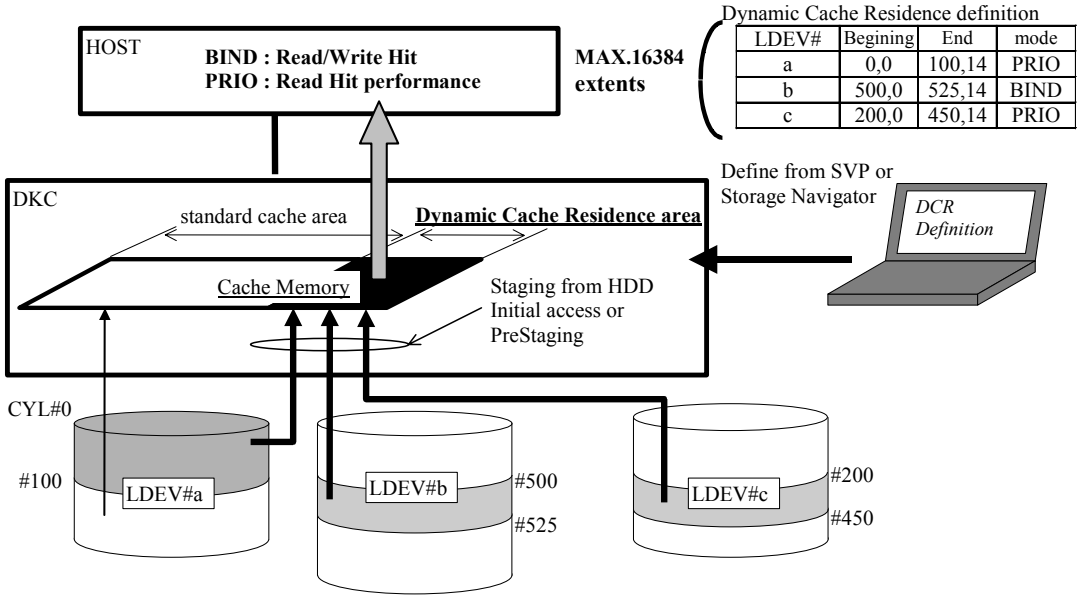


Fig. 2.3-1 Conceptual Diagram of DCR

2.4 Maintenance functions

The characteristic of the maintenance function of the DCR option is that the maintenance operation is possible from not only the SVP instruction but also Storage Navigator. (Refer to Table 2.4-1.)

Table 2.4-1 Maintenance Function List

Item No.	Maintenance operation	TSD	CE	User	Description
1	Addition of the DCR area	—	✓	✓	• Adds the DCR area. • Unit of the area to be specified by the SVP is a track.
2	Deletion of the DCR area	—	✓	✓	• Deletes the continuous DCR area.
3	Change of the DCR area	—	✓	✓	• Changes the DCR area size.
4	Status display of the DCR area	—	✓	✓	• Displays the specifications of the DCR area.
5	Addition and de-installation of the DCR cache	—	✓	—	• Because insertion and pulling off of the cache module into/from the DKC is required
6	Indication of DCR PreStaging	—	✓	✓	• Indicates the DCR PreStaging.

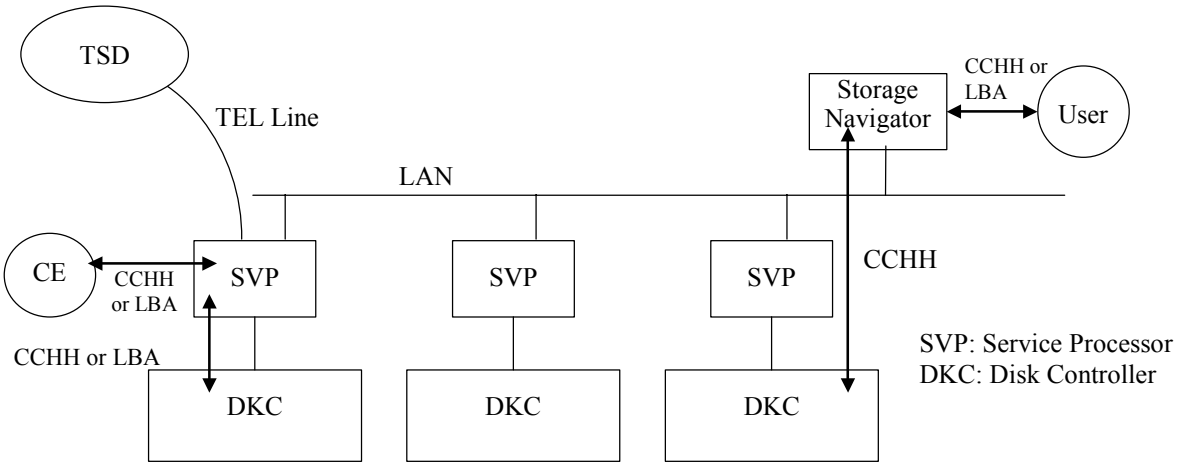


Fig. 2.4-1 Maintenance Execution Route when DCR Is Used

2.5 Notes on maintenance when DCR is used

When performing the following maintenance, it is attended with a temporary regression of the cache memory or shared memory. Since this regression disables retention of the cache capacity required for the DCR, the DCR function is automatically suppressed for a while until the maintenance is completed.
A service person is required to obtain an approval of a user before starting the maintenance because there is a high possibility that the DCR function suppression may result in a degradation of responding performance.

(1) Cache replacement
(2) Addition and de-installation of the cache (including addition and de-installation of the DCR cache)
(3) Addition of the ECC Gr. and LDEV requiring addition of the SM because of the addition of the CU
(4) Addition and de-installation of the SM
(5) Cluster maintenance

We recommend that CE or Customer should execute the following action after DKC power supply restoration or equipment restoration, when the DKC power supply is down by power failure or mistake during “DCR area” release.
(Because it is a high possibility that the action may result in a degradation of responding performance, CE should execute the following action on a customer’s authority.)

Action : (1) CE or Customer should release all DCR areas in a DCR area released Volume.
(2) CE or Customer should set up again all DCR areas with the exception of the released DCR area in the DCR area released Volume.

Reason : When DKC power is off during “DCR area” release, it is possible that DKC left a release DCR data on Cache.
DKC does not faulty operation by leaving “released DCR data” use a excessive cache memory.
We recommend that CE or Customer should execute the above-mentioned action after DKC restoration, because DKC perfectly execute the “DCR area” release process.

2.6 Effects of DKC failures on DCR

The DCR function is automatically suppressed when any of the following failures occurs. The suppression continues until the regressed operation owning to the maintenance is canceled in the cases of Items (1) to (3) or continues until an automatic recovery of the shared memory by the microprogram is terminated normally in the case of Item (4).

(1) Cache failure

(2) Shared memory failure

(3) One-side cluster down

(4) One-side shared memory blockade (SIMRC = FFEE)

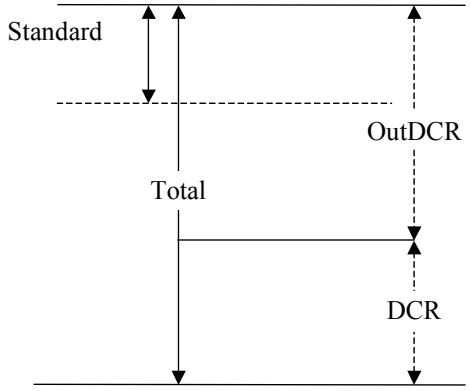
2.7 Automatic cancellation of DCR

The DCR setting of a volume to be de-installed by the functions of Deletion of CVs (LDEV), Conversion of CV to normal volume, and Conversion of normal volume to CV is automatically canceled as a part of the de-installation processing by the SVP microprogram.

2.8 Explanation of DCR cache and procedure for setting operation

2.8.1 Explanation

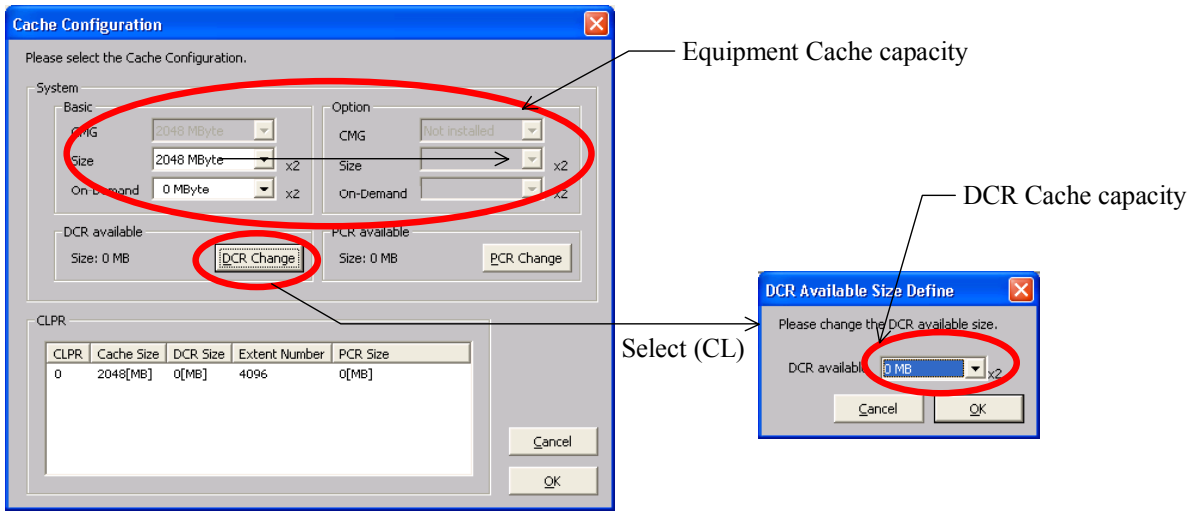
- A cache module must be defined and installed for the DCR before using the DCR.
- The DCR extent can be set only for the defined "DCR cache capacity."
- The "out-of-DCR cache capacity" must be retained more than "standard cache capacity" which is defined in accordance with the disk capacity in order to assure the performance in the non-DCR area.
- Therefore, DCR extent definition more than "DCR cache capacity" is rejected according to the SVP guarding logic. Also, the "DCR cache capacity" definition lower than the minimum "standard cache capacity" (2GB × 2) is also rejected.



Total : Equipment Cache capacity
OutDCR : Out-Of-DCR Cache capacity
DCR : DCR cache capacity
Standard : Standard Cache capacity

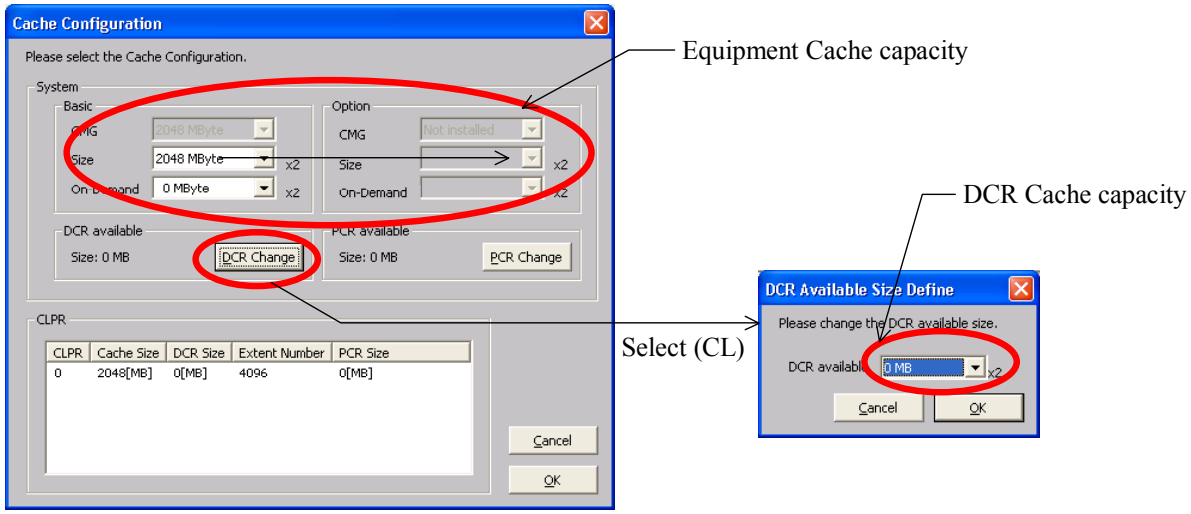
2.8.2 Setting operation procedure

(1) Setting DCR cache capacity in Define Config & Install sequence
Set the DCR cache capacity in the equipment cache capacity.



Note: Set the DCR cache capacity so that it is less than the “equipment cache capacity minus standard cache capacity.”

(2) Adding operation of DCR cache capacity in cache addition sequence
When adding the cache, set the DCR cache capacity in the equipment cache capacity after the addition.

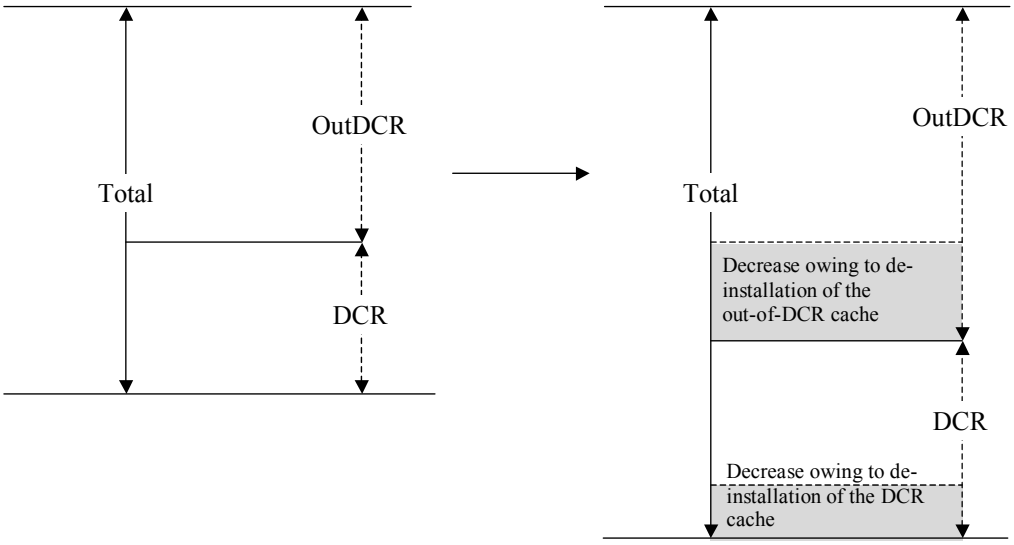


For example, to change a status with the cache of 2.0 GB × 2 installed and 256 MB × 2 of it set to the DCR cache to a status with the cache of 4.0 GB × 2 installed and 512 MB × 2 of it set to the DCR cache by adding the cache of 2.0 GB × 2,

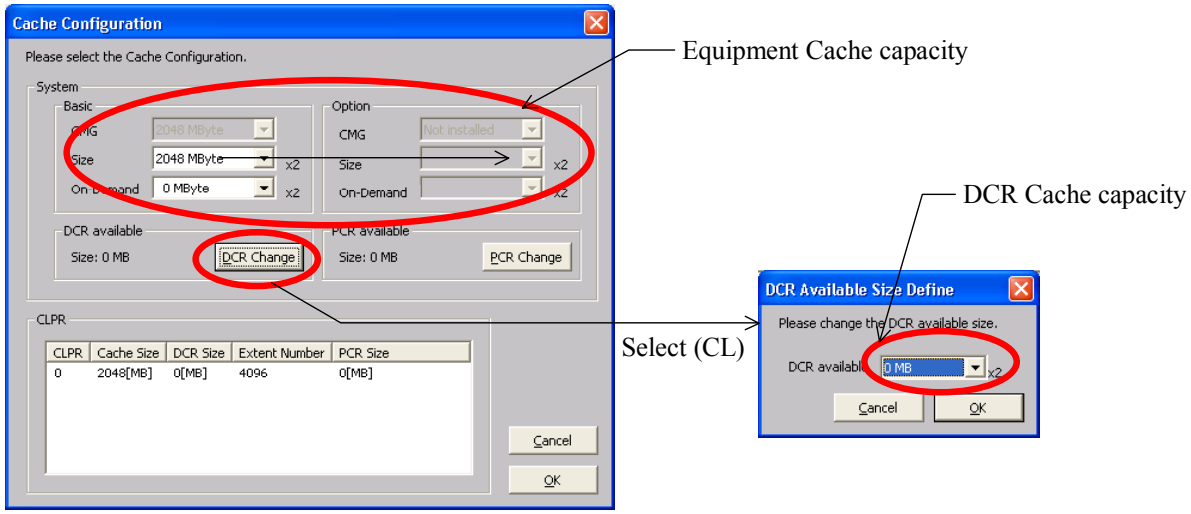
① set the equipment cache capacity to 4.0 GB × 2 in the “Cache Configuration” dialog box, and

② press the “Change...” button to open the “DCR Available Size” dialog box and set the DCR cache capacity to 512 MB × 2.

The DCR cache capacity can be set up to the cache capacity to be added. In the above example, the DCR cache capacity can be set up to 768 MB × 2 by adding 512 MB × 2.



(3) DCR cache capacity decreasing operation in cache de-installation sequence
When de-installing the cache, set a capacity to be left as the DCR cache in the equipment cache capacity.



For example, to change a status with the cache of 4.0 GB × 2 installed and 512 MB × 2 of it set to the DCR cache to a status with the cache of 2.0 GB × 2 installed and 256 MB × 2 of it set to the DCR cache by de-installing the cache of 2.0 GB × 2,

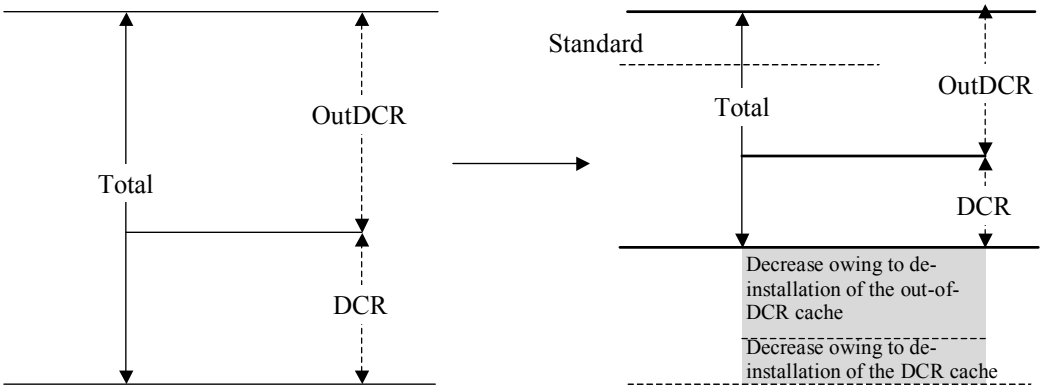
① set the equipment cache capacity to 2.0 GB × 2 in the "Cache Configuration" dialog box, and

② Press the "Change..." button to open the "DCR Available Size" dialog box and set the DCR cache capacity to 256 MB × 2.

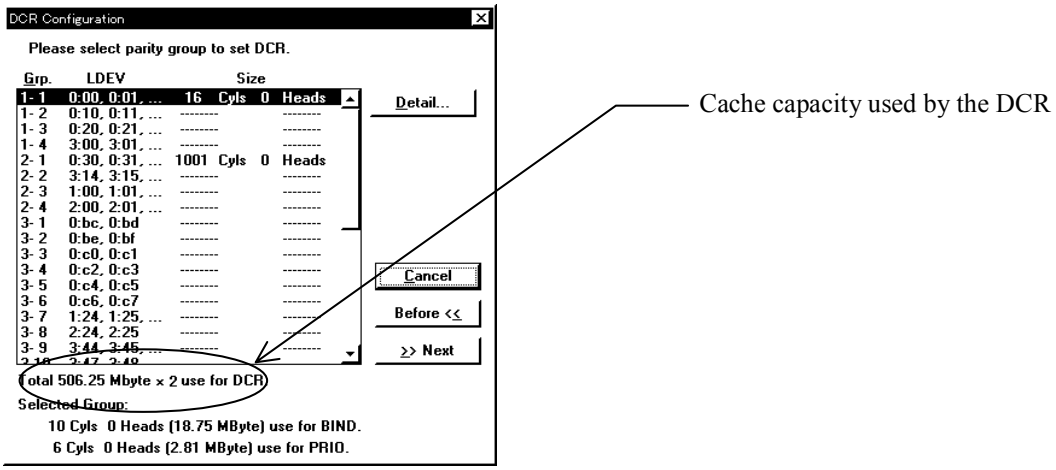
The maximum decreasable capacity of the DCR cache is equal to the capacity of the installed cache to be de-installed. The maximum decreasable capacity of the DCR cache capacity in the above example is 2.0 GB × 2. As a result, the DCR cache capacity after the de-installation becomes 0 MB × 2.

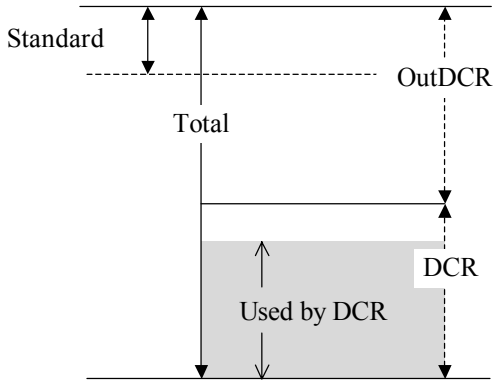
Notes :

- In the case in which the de-installation of the DCR cache causes the capacity used by the DCR (See on page SSDOPT02-180) actually defined as the DCR extent to be above the DCR cache capacity, the cache de-installing process is suspended by the SVP guarding logic. Before executing the DCR cache de-installation, cancel the DCR setting to decrease the actual capacity used by the DCR.
- It is required to avoid de-installation of the out-of-DCR cache which causes its capacity to be below the standard cache capacity.



- The “cache capacity used by the DCR” actually used as the DCR extent is displayed on the DCR Configuration screen in [SVP] - [Install] - [Refer Configuration] for confirmation.





2.8.3 Notes at the time of operation

From a cash manager utility, while carrying out DCR setup / release, please do not perform DCR operation (a display is included) of SVP/WebConsole simultaneously.

When the Volume is in quick formatting, please do not set and release DCR from Cache Manager Utility until the operation is completed. For information about the quick formatting, see the “Virtual LVI/LUN and Volume Shredder User’s Guide”.