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Hitachi Freedom Storage™ Lightning 9900™ V Series

FlashAccess User's Guide

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Document Revision Level

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Source Documents for this Revision

- Fls45d0d (Hitachi RSD source document)

Referenced Documents

- *Hitachi Freedom Storage™ Lightning 9900™ V Series User and Reference Guide* (MK-92RD100)
- *Hitachi Freedom Storage™ Lightning 9900™ V Series Remote Console – Storage Navigator User's Guide* (MK-92RD101)
- *Hitachi Freedom Storage™ Lightning 9900™ V Series LUN Expansion (LUSE)/Virtual LVI/LUN (VLL) User's Guide* (MK-92RD104)
- *Hitachi Freedom Storage™ Lightning 9900™ V Series ShadowImage User's Guide* (MK-92RD110)
- *Hitachi Freedom Storage™ Lightning 9900™ V Series ShadowImage - S/390® User's Guide* (MK-92RD109)

Preface

This document describes and provides instructions for performing FlashAccess operations on the Lightning 9900™ V Series (9900V) subsystem using the 9900V Storage Navigator Java™ applet program.

This document assumes that:

- The user has a background in data processing and understands direct-access storage device (DASD) subsystems and their basic functions,
- The user is familiar with the Hitachi Lightning 9900™ V Series disk array subsystem,
- The user has read and understands the *Hitachi Lightning 9900™ V Series Hitachi Remote Console – Storage Navigator User's Guide* (MK-92RD101), and
- The user is familiar with the operating system (e.g., Windows®, Solaris®) and web browser software (e.g., Internet Explorer, Netscape) on the system hosting the 9900V Storage Navigator and FlashAccess remote console software.

Note: The term "9900V" refers to the entire Lightning 9900™ V Series subsystem family, unless otherwise noted. For further information on the Lightning 9900™ V Series subsystem, please contact your Hitachi Data Systems account team, or visit Hitachi Data Systems online at http://www.hds.com.

Note: The use of the FlashAccess software and all other Hitachi Data Systems products is governed by the terms of your license agreement(s) with Hitachi Data Systems.

Note: The FlashAccess screens shown in this document were captured on a Windows® system with the Internet Explorer web browser. The FlashAccess screens may display differently on other operating systems and browsers. Please refer to the *Hitachi Lightning 9900™ V Series Remote Console - Storage Navigator User's Guide* for further information on UNIX™ operating systems and browsers.

Microcode Level

This document revision applies to 9900V microcode versions 21-03-*xx* and higher.

COMMENTS

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Make sure to include the document title, number, and revision.
Please refer to specific page(s) and paragraph(s) whenever possible.

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Thank you!

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Chapter 1 Overview of FlashAccess Operations

1.1 Overview of FlashAccess

The FlashAccess feature of the 9900V subsystem allows you to store specific data in cache memory. FlashAccess increases the data access speed for the cache-resident data by enabling read and write I/Os to be performed at host data transfer speeds (see Figure 1.1).

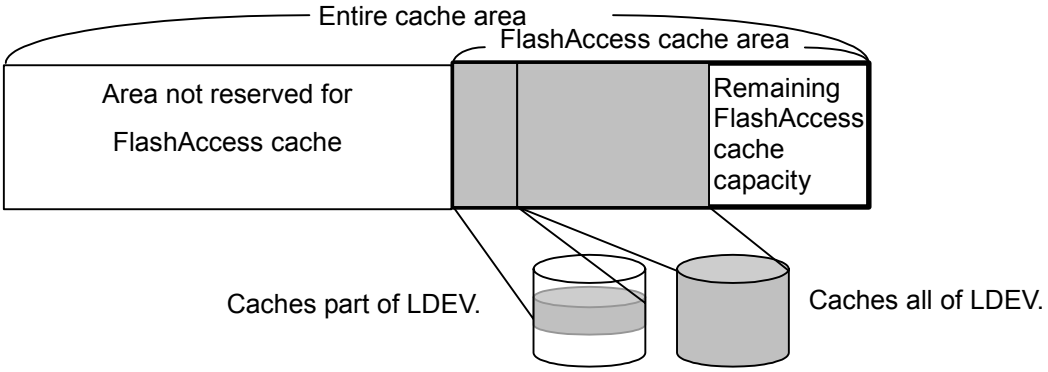


Figure 1.1 FlashAccess Cache Area (Cache Extent)

This document describes and provides instructions for FlashAccess operations using the licensed 9900V Hitachi Remote Console – Storage Navigator software. The Storage Navigator software communicates directly with the 9900V subsystems via a local-area network (LAN). The Storage Navigator software displays detailed FlashAccess information and allows you to configure and perform FlashAccess operations for the data stored on the 9900V subsystem.

FlashAccess operations support both open-system volumes (e.g., OPEN-3, OPEN-9, etc.) and S/390® mainframe volumes (e.g., 3390-3, 3390-9, etc.).

FlashAccess can be used in conjunction with Virtual LVI/LUN to achieve better performance improvements than when either of these options is used individually. If you need to store an entire mainframe or open-system volume in FlashAccess cache, you can use a small Virtual LVI/LUN volume to decrease the amount of cache required for the volume. For further information on Virtual LVI/LUN, please see *Hitachi Lightning 9900™ V Series LUN Expansion (LUSE)/Virtual LVI/LUN (VLL) User's Guide* (MK-92RD104).

Caution: The user may want to increase total subsystem cache capacity when using FlashAccess to avoid data access performance degradation for non-FlashAccess data. FlashAccess is only available on 9900V subsystems configured with at least 512 MB of cache. The Hitachi Data Systems representative configures the maximum allowable FlashAccess area when the cache is installed.

1.2 FlashAccess Modes

FlashAccess provides the following two operational modes for storing user data in cache memory:

- Priority mode (see section 1.2.1), and
- Bind mode (see section 1.2.2).

1.2.1 Priority Mode

In **Priority Mode** (normal mode), the total capacity of cache required is:

Standard cache + FlashAccess cache + Additional cache

The main advantage of FlashAccess priority mode is that read data is transferred at host data transfer speed. In priority mode the FlashAccess extents are used to hold read data for specific extents on volumes. Write data is write duplexed in normal cache and de-staged to disk using standard algorithms. Because there is no duplexed write data in the cache reserved for FlashAccess, all priority mode FlashAccess extents are 100% utilized by user read-type data.

- For open-systems volumes, one slot is 48 kB, which requires 3 cache segments (16 kB/segment). For example, 16 slots for open systems require 768 kB of reserved cache.
- For S/390® (3390) volumes, one slot is 64 kB. This requires 4 cache segments (16 kB/segment). Sixteen (16) slot images for S/390® requires 1MB of reserved cache.

  Note: Even though a slot (track) for 3390 volumes is 64 kB, because cache is divided into 16-kB segments, it will require 4 segments.

When you install the FlashAccess feature using priority mode, the amount of additional cache required depends on the number of cache extents. If you are installing 512 or fewer cache extents, you must install 512 MB × 2 of additional cache. If you are installing between 513 and 1024 cache extents, you must install 1024 MB × 2 of additional cache.

1.2.2 Bind Mode

In **Bind Mode**, the total capacity of cache required is:

Standard cache + FlashAccess cache

In bind mode the FlashAccess extents are used to hold read and write data for specific extent(s) on volume(s). Any data written to the FlashAccess bind area is not de-staged to the disk. To ensure data integrity, write data must be duplexed in the FlashAccess area, which consumes a significant amount of the FlashAccess cache.

The primary advantage of bind mode is that all targeted read and write data is transferred at host data transfer speed. In addition, the accessibility of read data is the same as FlashAccess priority mode; write operations do not have to wait for available cache segments; and there will be no backend contention caused by destaging data.

- **RAID-5.** For RAID-5 subsystems the amount of FlashAccess cache required is 3 times the space required for the user data. For RAID-5 open-systems volumes, one slot is 48 kB, which requires 9 cache segments (16 kB/segment). Sixteen (16) slots for open systems require 2.25 MB of reserved cache.

  For RAID-5 S/390® (3390) volumes, one slot is 64 kB, which requires 12 cache segments (16 kB/segment). Sixteen (16) slot images for S/390® requires 3 MB of reserved cache. ***Note:*** Even though a slot (track) for S/390® is 64 kB, because cache is divided into 16-kB segments, it will require 4 segments.

  Note: If a RAID-5 volume area is changed from priority mode to bind mode and no cache is added, then only 33% of the user data will fit in the area previously assigned for priority mode.

- **RAID-1.** For RAID-1 subsystems the amount of FlashAccess cache required is 2 times the space required for user data. For RAID-1 open-systems volumes, one slot is 48 kB, which requires 6 cache segments (16 kB/segment). Sixteen (16) slots for open systems require 1.5 MB of reserved cache.

  For RAID-1 S/390® (3390) volumes, one slot is 64 kB, which requires 8 cache segments (16 kB/segment). Sixteen (16) slot images for S/390® requires 2 MB of reserved cache.

  Note: If a RAID-1 volume area is changed from priority mode to bind mode and no cache is added, then only 50% of the user data will fit in the area previously assigned for priority mode.

FlashAccess bind data that has write attributes is normally not destaged. However, this data will be destaged in the following cases:

- During certain types of maintenance operations (e.g. cache upgrades);
- If the subsystem is powered off;
- If the volume is deleted from FlashAccess bind mode;
- If a fixed or customized volume that is partly or wholly assigned to FlashAccess is converted into free space by the Virtual LVI/LUN Volume-to-Space function.
- If a VDEV containing volumes that are assigned to FlashAccess is initialized by the Virtual LVI/LUN Volume Initialization function.

  For further information on Virtual LVI/LUN, please see the *Hitachi Lightning 9900™ V Series LUN Expansion (LUSE)/Virtual LVI/LUN (VLL) User's Guide* (MK-92RD104).

1.3 FlashAccess Cache Extents

The FlashAccess cache areas (called cache extents) have the following parameters:

- The cache extents are dynamic and can be added and deleted at any time.
- The 9900V supports a maximum of 1,024 addressable cache extents per LDEV and per subsystem.
- For mainframe volumes, each FlashAccess cache area must be defined on contiguous tracks, with a minimum size of one cache slot (or track) and a maximum size of one LVI.
- For open-systems volumes, FlashAccess cache extents must be defined in logical blocks using logical block addresses (LBAs), with a minimum size of 96 LBAs. However, in most cases users will assign an entire open-system volume for FlashAccess. If the remaining cache memory is less than 256 MB, FlashAccess is not available.
- The user has the option of prestaging the data to the resident cache area. If prestaging is not used, the data will be loaded into the FlashAccess extents when the first 'miss' occurs. If prestaging is used, performance may be affected for a short time while the data is read into FlashAccess cache. ***Note:*** Prestaging of FlashAccess data should not be performed during peak activity.
- All write I/Os to FlashAccess data are duplex writes, guaranteeing full data integrity. The FlashAccess data remains fixed in cache until the user manually deletes it. Deletion of FlashAccess extents will destage any write data to the affected volume(s).
- It is possible to expand the amount of FlashAccess cache without canceling the existing FlashAccess settings. Please call the Hitachi Data Systems Support Center for assistance.

1.4 Restrictions

The following are restrictions on the use of the FlashAccess function:

- ***Warning:*** Do not perform the ShadowImage quick restore operation or the CruiseControl migration operation on a FlashAccess volume. These operations swap the internal locations of the source and target volumes, which causes a loss of data integrity.

  For further information, please refer to the *Hitachi Lightning 9900™ V Series ShadowImage User's Guide*, the *Hitachi Lightning 9900™ V Series ShadowImage - S/390® User's Guide*, and/or the *Hitachi Lightning 9900™ V Series CruiseControl User's Guide*.

- Do not attempt to allocate FlashAccess cache beyond the allocated capacity.

- You cannot allocate Just In Time (on-demand) volumes for FlashAccess.

The following Virtual LVI/LUN (VLL) operations automatically reset FlashAccess cache:

- When a fixed or customized volume that is partly or wholly assigned to FlashAccess is converted into free space by the VLL Volume to Space function.

- When a VDEV containing volumes that are assigned to FlashAccess is initialized by the VLL Volume Initialization function.

  For further information on Virtual LVI/LUN, please refer to the *Hitachi Lightning 9900™ V Series LUN Expansion (LUSE)/Virtual LVI/LUN (VLL) User's Guide* (MK-92RD104).

Caution: You may want to increase total subsystem cache capacity when using FlashAccess to avoid data access performance degradation for non-FlashAccess data. FlashAccess is only available on 9900V subsystems configured with at least 512 MB of cache. The Hitachi Data Systems representative configures the maximum allowable FlashAccess area when the cache is installed.

Note: The FlashAccess function recognizes open-system logical blocks in 96-block increments. For example, if you enter a starting LBA as 1 and an ending LBA as less than 96, FlashAccess automatically changes the beginning LBA to 00 and the ending LBA to 95. Table 1.1 shows the LBA blocks for open systems.

Table 1.1 Logical Block Addresses for Open Systems

Starting LBA	Ending LBA		Starting LBA	Ending LBA	Notes
0	95		192000	192095	
96	191		288000	288095	
192	287		384000	384095	
288	383		480000	480095	
384	479		576000	576095	
480	575		672000	672095	
576	671		768000	768095	
672	767		864000	864095	
768	863		960000	960095	
864	959		1920000	1920095	
960	1055		2880000	2880095	
1920	2015		3661824	3661919	
2880	2975		3840000	3840095	
3840	3935		4800000	4800095	
4800	4895		4806624	4806719	OPEN-3 maximum LBA
5760	5855		4806720	4806815	
6720	6815		5760000	5760095	
7680	7775		6720000	6720095	
8640	8735		7680000	7680095	
9600	9695		8640000	8640095	
19200	19295		9600000	9600095	
29900	28895		10560000	10560095	
38400	38495		11520000	11520095	
48000	48095		12480000	12480095	
57600	57695		13440000	13440095	
67200	67295		14350944	14351039	OPEN-8 maximum LBA
71904	71999		14422944	14423039	OPEN-9 maximum LBA
72000	72095		28452864	28452959	OPEN-E maximum LBA
76800	76895		71192064	71192159	OPEN-L maximum LBA
86400	86495				
96000	96095				

Chapter 2 Preparing for FlashAccess Operations

2.1 System Requirements

FlashAccess operations involve the volumes on the 9900V subsystem(s) which contain the data to be stored in cache memory and the licensed FlashAccess software.

The FlashAccess system requirements are:

- **Hitachi Lightning 9900™ V Series subsystem.** FlashAccess supports all physical disk drive options and RAID-level configurations for the 9900V subsystem.
  - **Storage Navigator:** The Storage Navigator remote console software is required for 9900V FlashAccess operations. The FlashAccess remote console software is a component of the 9900V Hitachi Storage Navigator product.

    Note: Administrator or FlashAccess write access to the 9900V Storage Navigator software is required to perform FlashAccess operations. Users without Administrator or FlashAccess write access can only view FlashAccess information.

    Note: You must operate the 9900V Storage Navigator software in modify mode to perform FlashAccess operations. Users in view mode can only view FlashAccess information.
  - **FlashAccess option:** The FlashAccess license key code is required to enable the FlashAccess option on the 9900V subsystem (see section 2.2).

2.2 Enabling the FlashAccess Option

You must enable the FlashAccess option on the 9900V subsystem using the 9900V Storage Navigator remote console software. Each 9900V subsystem requires its own separate set of license key codes.

For instructions on using the 9900V Storage Navigator software and enabling the options, please refer to the *Hitachi Lightning 9900™ V Series Hitachi Remote Console – Storage Navigator User's Guide* (MK-92RD101).

Note: When you use Storage Navigator on UNIX® workstations or in other non-Windows® environments, certain additional operating conventions must be followed. For details, please refer to the *Hitachi Lightning 9900™ V Series Remote Console – Storage Navigator™ User's Guide* (MK-92RD101).

Disabling FlashAccess
For information on disabling the FlashAccess option, please refer to the *Hitachi Lightning 9900™ V Series Hitachi Remote Console – Storage Navigator User's Guide*.

Caution: Before disabling the FlashAccess option, release all cache extents being used by FlashAccess. If you do not, the data resident in cache will stay in cache.

2.3 Preparing for FlashAccess Operations

Before you start using FlashAccess to store your data in 9900V cache, you will need the following information:

- **LDEV ID.** You need the CU number and LDEV ID of each volume which contains data that you want to store in FlashAccess cache. The 9900V LUN Manager software displays this information for the open-systems logical units (LUs) defined on the 9900V subsystem.
- **Location of data (LBA, CCHH).** You need the location on each LDEV of the data to be stored in FlashAccess cache. For open-systems volumes, you need the starting and ending LBAs. For S/390® volumes, you need the starting and ending CCHH addresses.
- **FlashAccess mode.** You need to decide which FlashAccess mode, priority (normal) mode or bind mode, you would like to use for the data to be stored in FlashAccess cache. For information on these modes, see section 1.2.

Chapter 3 FlashAccess Panels

3.1 FlashAccess Main Panel

The FlashAccess main panel (see Figure 3.1 and Figure 3.2) displays the FlashAccess information for the connected 9900V subsystem and provides access to all FlashAccess operations. To open the FlashAccess main panel:

1. Using the 9900V Storage Navigator software, connect to and log on to the desired 9900V subsystem with Administrator access or FlashAccess write access.
2. On the Storage Navigator main panel, select modify mode to perform FlashAccess operations. Users in view mode can only view FlashAccess information.
3. Select the **FlashAccess** button ( ) to open the FlashAccess main panel. The **Apply** button (lower right of FlashAccess main panel) starts the requested operation(s) which are listed in the LDEV information table. The **Cancel** button cancels the requested operation(s) and resets the LDEV information table.

Note: For information and instructions on using the 9900V Storage Navigator Java™ applet program, please refer to the *Hitachi Lightning 9900™ V Series Hitachi Remote Console – Storage Navigator User's Guide* (MK-92RD101).

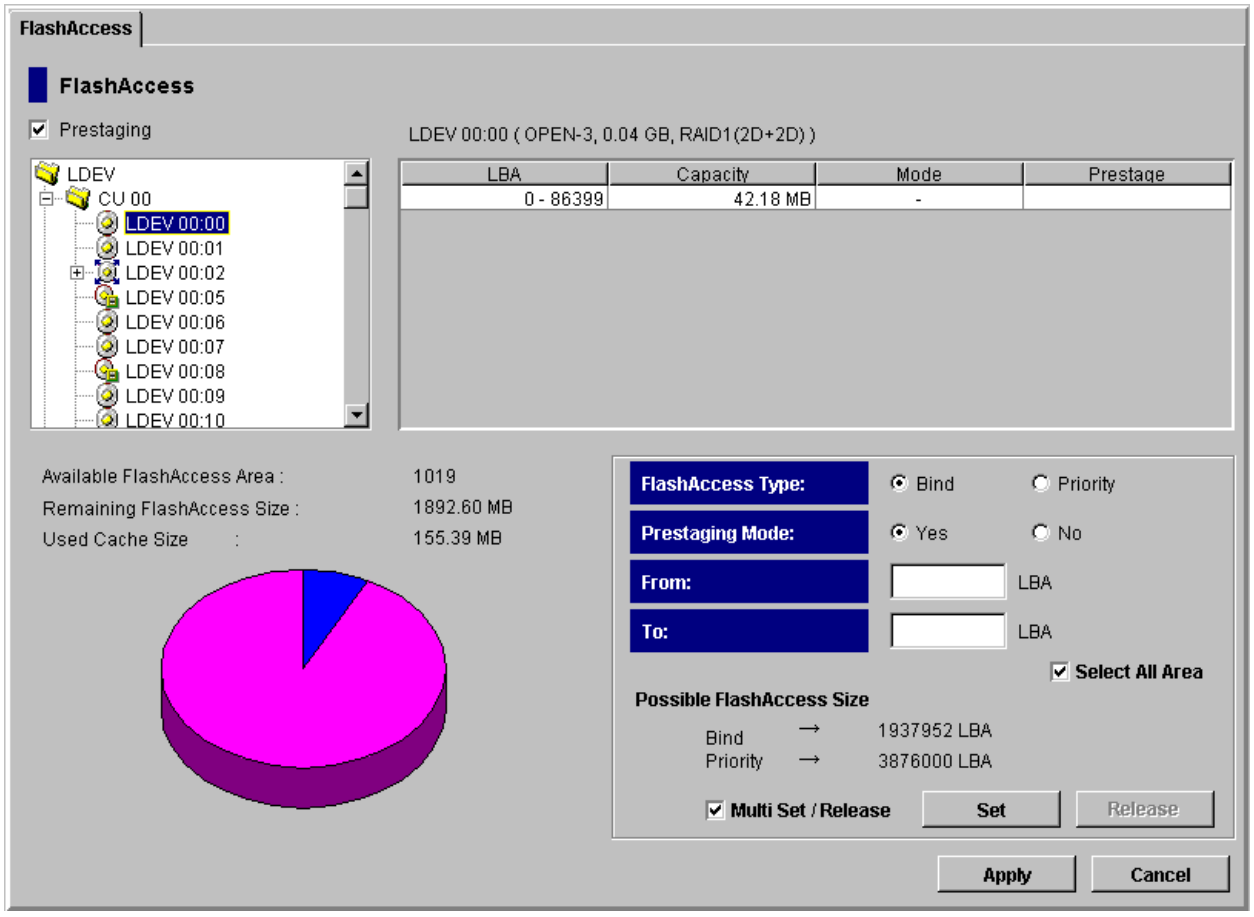


Figure 3.1 FlashAccess Main Panel Showing Open-Systems Volumes

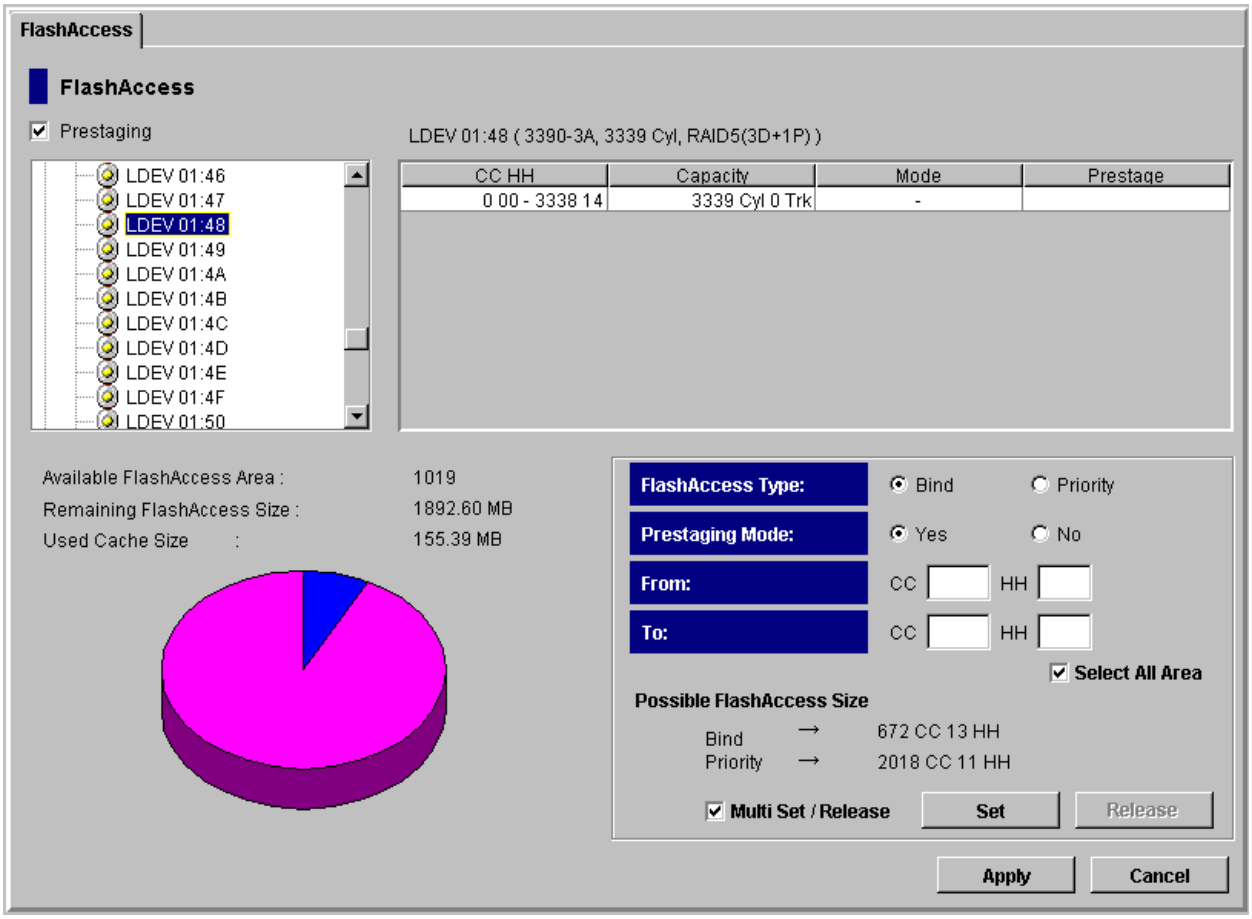


Figure 3.2 FlashAccess Main Panel Showing Mainframe Volumes

3.1.1 FlashAccess Outline

The FlashAccess outline view (see Figure 3.3), located on the upper left corner of FlashAccess main panel, displays the 9900V LDEVs available for FlashAccess operations and allows you to enable and disable the prestaging function. The outline view does not display CruiseControl reserved volumes or HPAV alias volumes, because those volumes are not available for FlashAccess operations.

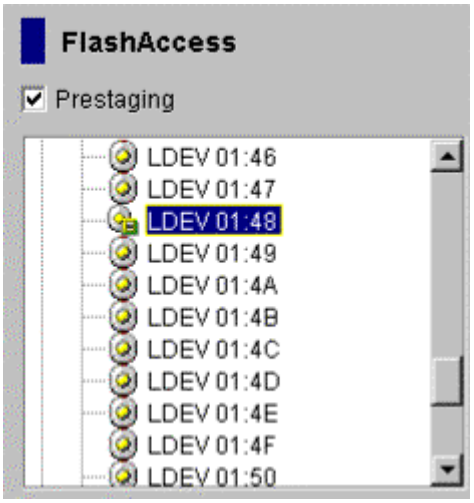


Figure 3.3 Outline View on the FlashAccess Main Panel

The FlashAccess outline view has the following features:

- The **Prestaging** checkbox allows you to enable and disable the prestaging function.
  - If you select this checkbox and select the **Apply** button, a non-prestaging operation is performed, and then a prestaging operation is performed.
  - If you clear this checkbox and select the **Apply** button, a non-prestaging operation is performed. If you select this checkbox later and select the **Apply** button, only a prestaging operation is performed.

  Note: The **Prestaging** checkbox is selected by default. The **Prestaging** checkbox is disabled (grayed out) when there is no cache, and when the **Prestaging Mode** is set to **No** for each cache extent.
- The outline view displays the 9900V volumes available for FlashAccess operations by control unit (CU) and LDEV number (e.g., LDEV 01:48 is LDEV 48 in CU 01). The icons in the outline view are:

  Indicates an open folder.

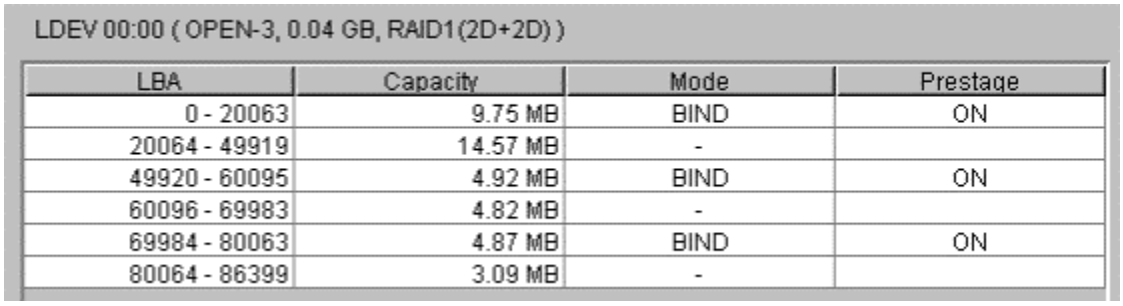
  Indicates an unopened folder.

  Indicates an LDEV for which FlashAccess is not set.

  Indicates an LDEV for which FlashAccess is set.

3.1.2 LDEV Information Table

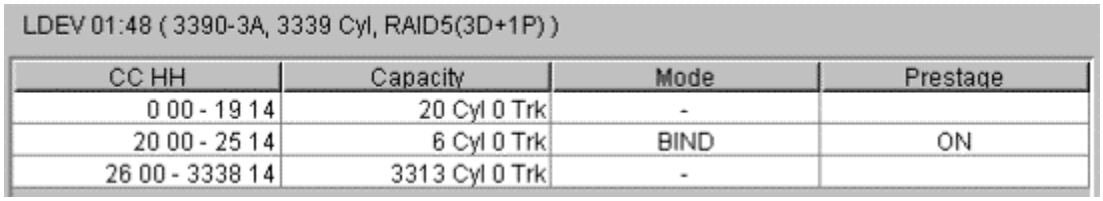
The LDEV information table (see Figure 3.4 and Figure 3.5), located on the upper right corner of FlashAccess main panel, displays the capacity (in MB for LUs, in cylinders and tracks for LVIs) and FlashAccess settings for the LDEV selected in the outline view.



LDEV 00:00 (OPEN-3, 0.04 GB, RAID1(2D+2D))

LBA	Capacity	Mode	Prestage
0 - 20063	9.75 MB	BIND	ON
20064 - 49919	14.57 MB	-	
49920 - 60095	4.92 MB	BIND	ON
60096 - 69983	4.82 MB	-	
69984 - 80063	4.87 MB	BIND	ON
80064 - 86399	3.09 MB	-	

Figure 3.4 LDEV Information Table Showing an Open-Systems LDEV



LDEV 01:48 (3390-3A, 3339 Cyl, RAID5(3D+1P))

CC HH	Capacity	Mode	Prestage
0 00 - 19 14	20 Cyl 0 Trk	-	
20 00 - 25 14	6 Cyl 0 Trk	BIND	ON
26 00 - 3338 14	3313 Cyl 0 Trk	-	

Figure 3.5 LDEV Information Table Showing a Mainframe LDEV

The LDEV information table has the following features:

- The first column, **LBA** or **CC HH**, displays the data location(s) on the LDEV by starting and ending addresses (LBAs for open-systems LDEVs, CC HH for mainframe LDEVs).
- The **Capacity** column displays the capacity of the data stored in FlashAccess cache (in MB for open-systems LDEVs, in cylinders and tracks for mainframe LDEVs).
- The **Mode** column displays the FlashAccess cache mode:
  - **PRIO** indicates priority mode.
  - **BIND** indicates bind mode.
  - A dash (**-**) indicates that the area is not allocated for FlashAccess cache.
- The **Prestage** column displays the setting for the prestaging function:
  - **Blank** indicates that the prestaging function is not set.
  - **ON** indicates that the prestaging function is set.

3.1.3 Cache Information Area

The cache information area (see Figure 3.6), located on the lower left corner of the FlashAccess main panel, displays information on the 9900V cache usage.

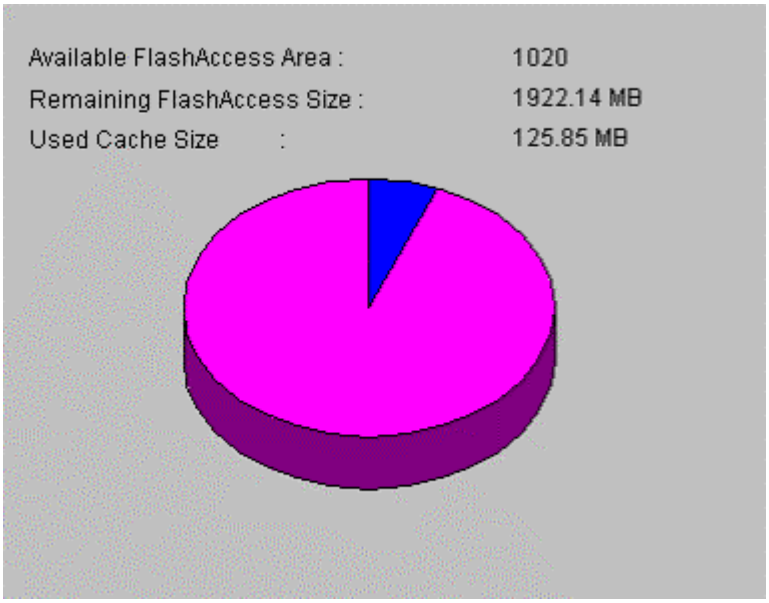


Figure 3.6 Cache Information Area on the FlashAccess Main Panel

The cache information area has the following features:

- **Available FlashAccess Area** displays the unused cache area, calculated by subtracting the number of installed FlashAccess cache extents from the maximum number of FlashAccess cache extents (1,024).
- **Remaining FlashAccess Size** displays the amount of FlashAccess cache which is available for use (pink area on the pie chart).
- **Used Cache Size** displays the amount of FlashAccess cache which is in use (blue and/or yellow areas on the pie chart).
- **Pie chart.** The colors in the pie chart are:
  - **Blue** indicates cache usage.
  - **Yellow** indicates the increase in the specified size of the cache.
  - **Pink** indicates the remaining amount of available cache.
- **Operation in progress.**
  - When a prestaging operation is in progress, the FlashAccess panel displays **Prestaging operation in progress** (see Figure 3.7).
  - When a FlashAccess operation is in progress, the FlashAccess panel displays **FlashAccess operation in progress** (see Figure 3.8).

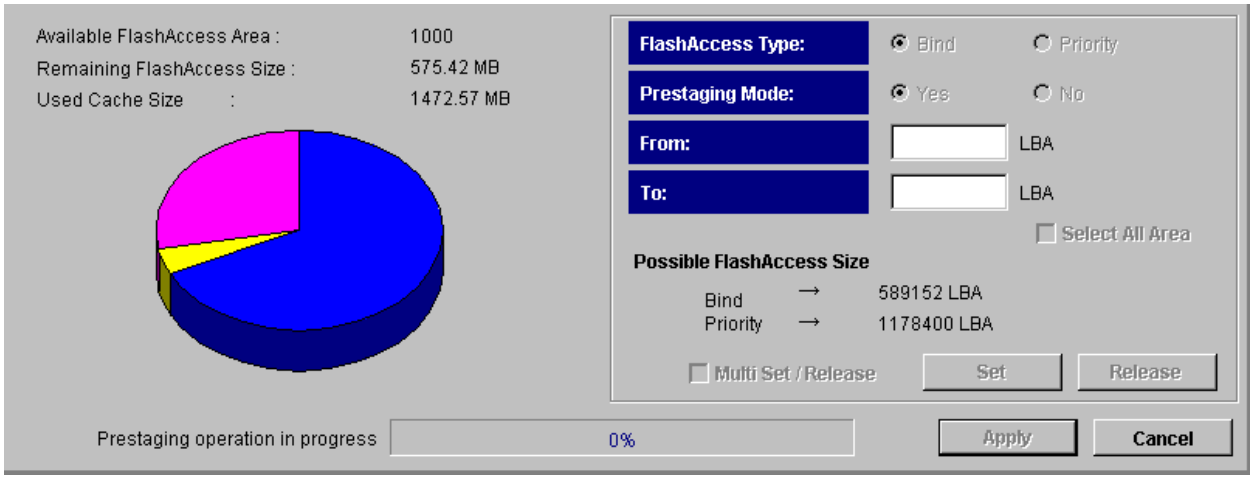


Figure 3.7 Prestaging Operation In Progress

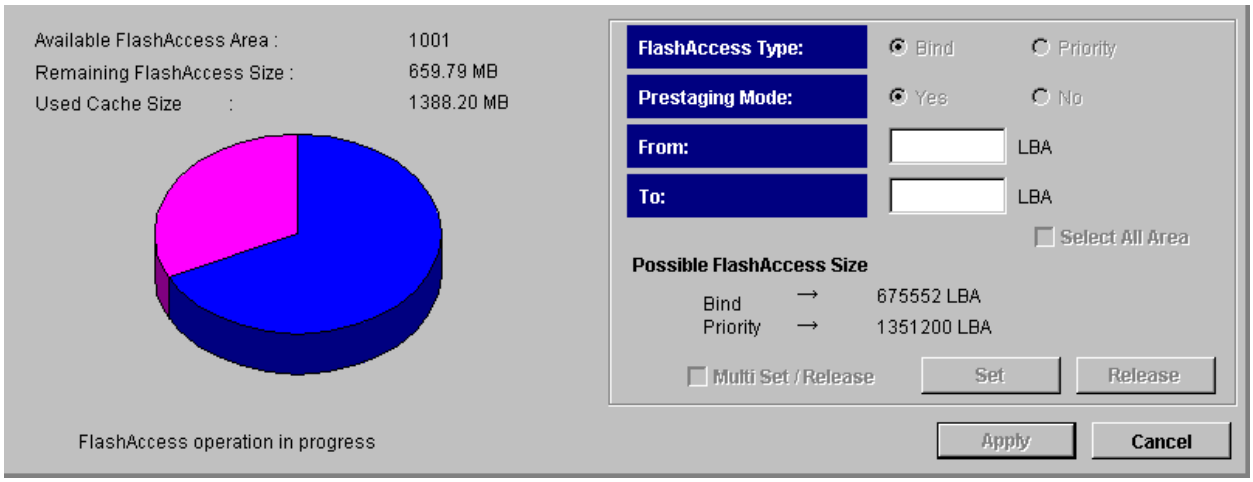


Figure 3.8 FlashAccess Operation in Progress

3.1.4 Operations Box

The operations box (see Figure 3.9 and Figure 3.10), located on the lower right corner of the FlashAccess main panel, allows you to add data to and release data from FlashAccess cache.

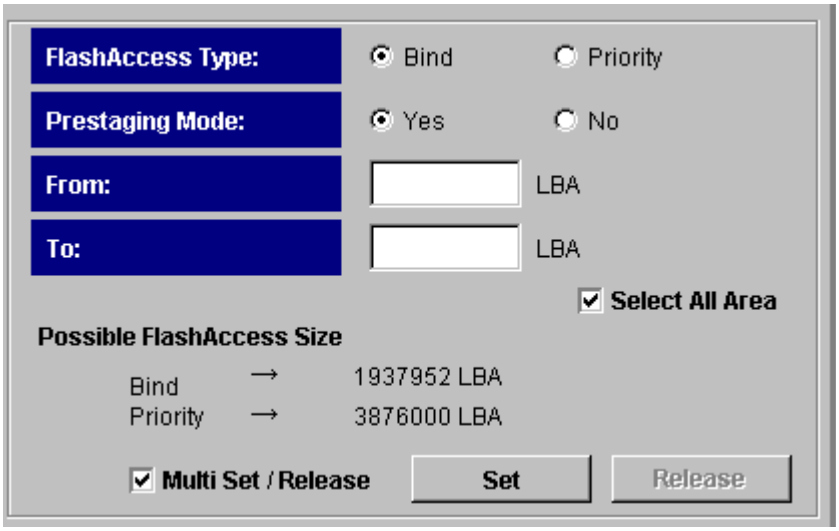


Figure 3.9 Operations Box Showing an Open Systems LDEV

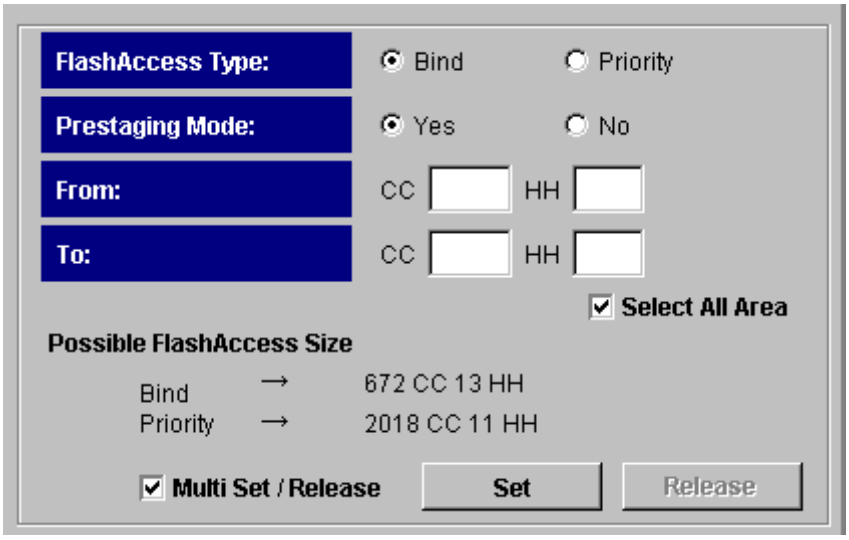


Figure 3.10 Operations Box Showing a Mainframe LDEV

The **FlashAccess Operations** box has the following features:

- The **FlashAccess Type** buttons allow you to select the mode (see section 1.2) for the data to be added to FlashAccess cache.
  - **Bind** sets bind mode.
  - **Priority** sets priority mode.

- The **Prestaging Mode** buttons allow you to enable or disable the prestaging mode.
  - **Yes** enables prestaging mode. The prestaging operation will be performed if you select the **Prestaging** checkbox and select the **Apply** button.
  - **No** disables prestaging mode.
- The **From** and **To** boxes allow you to enter the starting and ending addresses for the data to be placed in cache, specified in LBAs for open-systems LDEVs, and in CC HH numbers for mainframe LDEVs.
- The **Select All Area** checkbox allows you to select all data areas in the selected LDEV for FlashAccess cache. This checkbox can only be selected if no data areas in the selected LDEV are assigned to FlashAccess cache.

  Note: If you check the **Select All Area** box, the starting address and ending address (**From** and **To**) fields are cleared.
- **Possible FlashAccess Size** displays the cache size available for FlashAccess data.
  - **Bind** displays the available size for bind mode.
  - **Priority** displays the available size for priority mode.
- The **Multi Set / Release** checkbox allows you to request FlashAccess operations for more than one LDEV before applying the changes. If you check this box and then select **Set**, the Multi Set panel opens (see section 3.2) to allow you to place data into FlashAccess cache for more than one LDEV. If you check this box and then select **Release**, the Multi Release panel opens (see section 3.3) to allow you to release FlashAccess data from cache for more than one LDEV.

  Note: The Multi Set / Release check box does not allow you to select and cancel an individual FlashAccess data area specified for an LDEV. You must use the **Release** button to cancel an individual FlashAccess data area.
- The **Set** button adds the requested FlashAccess operation (place data in FlashAccess cache) to the LDEV information table.
- The **Release** button adds the requested FlashAccess operation (remove data from FlashAccess cache) to the LDEV information table.

3.2 Multi Set Panel

The Multi Set panel (see Figure 3.11) allows select the LDEVs for which you want to place data into FlashAccess cache. To open the Multi Set panel, select the desired options on the FlashAccess main panel, check the **Multi Set / Release** box, and then select the **Set** button.

To specify a range of data to place in FlashAccess cache, enter the starting and ending addresses in the **From** and **To** boxes, and then select **Set** to open the Multi Set panel. To place all data areas of the selected LDEVs into FlashAccess cache, check the **Select All Area** box, and then select **Set** to open the Multi Set panel.

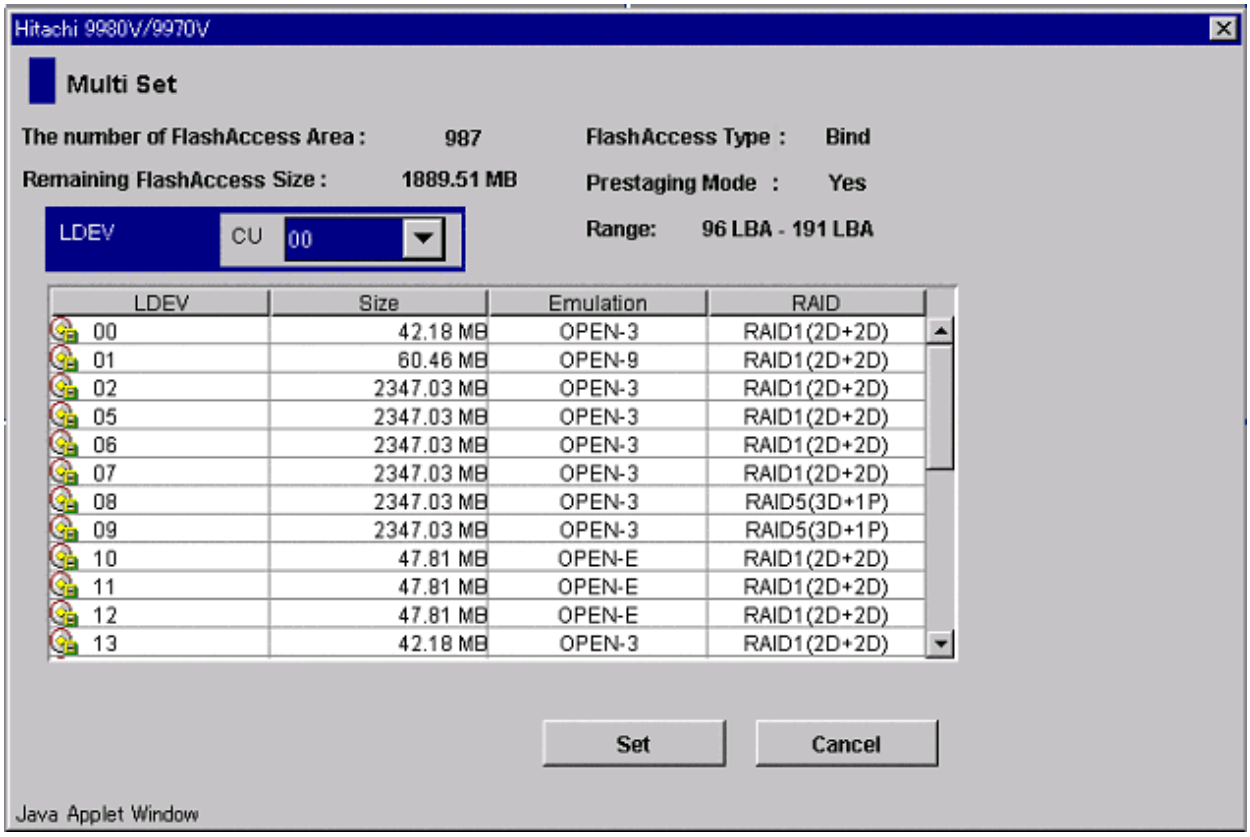


Figure 3.11 Multi Set Panel

The Multi Set panel has the following features:

- **The number of FlashAccess Area** displays the number of FlashAccess cache extents that can be created.
- The **Remaining FlashAccess Size** field displays the size of unused FlashAccess caches.
- The **FlashAccess Type** field displays the FlashAccess mode (priority or bind) specified by the FlashAccess Type option on the FlashAccess main panel.

- The **Prestaging Mode** field displays the prestaging mode (yes or no) specified by the Prestaging Mode option on the FlashAccess main panel.
- The **Range** indicates the range of data to be placed into FlashAccess cache. The data range is specified using the **From** and **To** fields on the FlashAccess main panel. **All** is displayed if the **Select All Area** box was checked on the FlashAccess main panel.
- The **CU** combo box enables you to select the desired CU image, which displays the LDEVs in that CU image in the **LDEV** information table (see below).
- The **LDEV** information table displays detailed information on the LDEVs in the selected CU image. The LDEVs that are listed are available for FlashAccess operations. Select the desired LDEVs in each CU image to place data into FlashAccess cache.
  - **LDEV** displays the LDEV number.
  - **Size** indicates the size of the LDEV.
  - **Emulation** displays the emulation type of the LDEV.
  - **RAID** displays the RAID level of the LDEV.
- The **Set** button saves the requested FlashAccess operations and closes the Multi Set panel.
- The **Cancel** button cancels the requested operations and closes the Multi Set panel.

3.3 Multi Release Panel

The Multi Release panel (see Figure 3.12) allows you to release FlashAccess data from cache for more than one LDEV. To open the Multi Release panel, check the **Multi Set / Release** box on the FlashAccess main panel, and then select the **Release** button.

Note: The **Multi Set / Release** function releases all FlashAccess cache extents for the selected LDEVs. You cannot release individual cache extents for multiple LDEVs. You must use the **Release** button to release individual FlashAccess data areas.

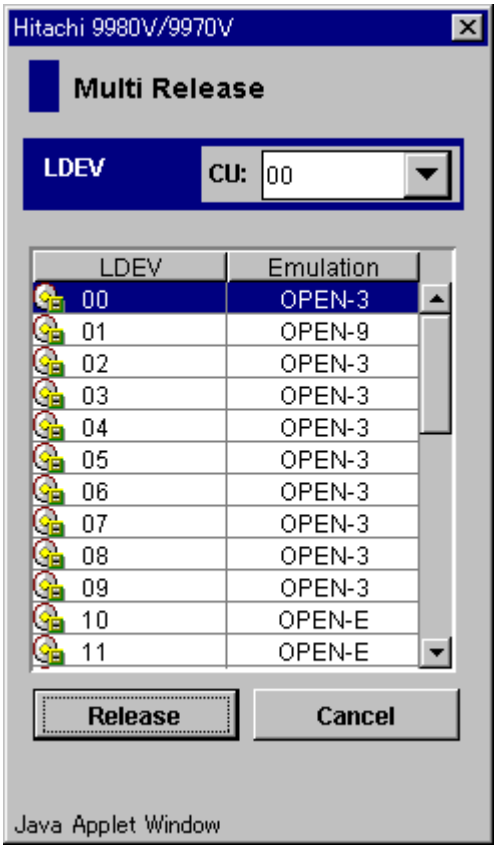


Figure 3.12 Multi Release Panel

The Multi Set panel has the following features:

- The **CU** combo box enables you to select the desired CU image, which displays the LDEVs in that CU image in the **LDEV** information table (see below).
- The **LDEV** information table displays the LDEVs in the selected CU image. The LDEVs that are listed are available for FlashAccess operations. Select the desired LDEVs in each CU image to release all data in the LDEVs from FlashAccess cache.
  - **LDEV** displays the LDEV number.
  - **Emulation** displays the emulation type of the LDEV.
- The **Release** button saves the requested FlashAccess operations and closes the Multi Release panel.
- The **Cancel** button cancels the requested operations and closes the Multi Release panel.

Chapter 4 Performing FlashAccess Operations

FlashAccess allows you to place data into FlashAccess cache and to release data from FlashAccess cache. The FlashAccess operations include:

- Placing specific data from one or more LDEVs into FlashAccess cache (see section 4.1),
- Placing all data from one or more LDEVs into FlashAccess cache (see section 4.2),
- Releasing specific data for one or more LDEVs from FlashAccess cache (see section 4.3),
- Releasing all data for one or more LDEVs from FlashAccess cache (see section 4.4).

For detailed information on the panels displayed by the 9900V FlashAccess software, please refer to Chapter 3.

4.1 Placing Specific Data from one or more LDEVs into FlashAccess Cache

Note: Use this procedure when you want to place specific data from one or more LDEVs into FlashAccess cache.

To place specific data from one or more LDEVs into FlashAccess cache:

1. Connect to the desired 9900V subsystem, and log in with Administrator or FlashAccess write access. Make sure that the Storage Navigator is in **Modify** mode.
2. In the outline view on the FlashAccess main panel (upper left), select the CU which contains the desired LDEV, and then select the desired LDEV.

   The LDEV information table displays the information for the selected LDEV. A dash (-) in the **Mode** column indicates an area not already allocated to FlashAccess cache.
3. Select the desired unallocated area in the LDEV information table. The starting and ending addresses of the selected area are displayed in the **From** and **To** fields.
4. Select the desired options on the FlashAccess main panel (lower right). You can apply these options to the selected LDEV, or to the selected LDEV and additional LDEVs.
   a) Select the desired mode (**Bind** or **Priority**) in the **FlashAccess Type** box.
   b) Select the desired **Prestaging Mode** setting (**Yes** or **No**). ***Note:*** If you want to set the prestaging function, the **Prestaging** checkbox (upper left corner of FlashAccess panel) must already be selected.
   c) Verify the starting and ending addresses of the area to be placed in FlashAccess cache in the **From** and **To** fields (see Figure 4.1). Edit as needed. Make sure that the **Select All Area** box is NOT checked.

   Caution: Make sure to select the correct options, since the options cannot be changed after data is added to cache. If you want to change between bind mode and priority mode, or enable/disable the prestaging function, you must first release the cache extent that you want to change (see section 4.3), and then place the data back into FlashAccess cache with the desired settings.
5. If you do not want to apply the same options to any other LDEVs, make sure that the **Multi Set / Release** box is not checked, select **Set**, and then select **OK** on the confirmation panel (see Figure 4.2). The requested FlashAccess operation is displayed in blue in the LDEV information table (see Figure 4.5).

   If you want to apply the same options and data range to additional LDEVs:
   a) Select the **Multi Set / Release** box on the FlashAccess main panel (see Figure 4.3), select **Set**, and then select **OK** to open the Multi Set panel. The Multi Set panel displays the data range and options selected on the FlashAccess main panel.
   b) On the Multi Set panel, select the desired CU image, and select the desired LDEV(s) (see Figure 4.4). The data range and options displayed on the panel will be applied to all selected LDEVs.
   c) Select **Set** to return to the FlashAccess main panel. The requested FlashAccess operations are displayed in blue in the LDEV information table.

6. Repeat steps (2)—(5) until all desired operations are listed.

   Note: You cannot use the **Release** button until you apply (or cancel) your requested operation(s).

7. Review the requested operation(s) on the FlashAccess main panel.
   - To start the operation(s), select **Apply** on the FlashAccess main panel, and then select **OK** on the Apply confirmation message.
   - To cancel the operation(s), select **Cancel** on the FlashAccess main panel, and then select **OK** on the Cancel confirmation message.

8. Monitor the FlashAccess main panel to make sure that the operation(s) complete successfully. The cache information area (see section 3.1.3) displays the progress of the requested operation(s).

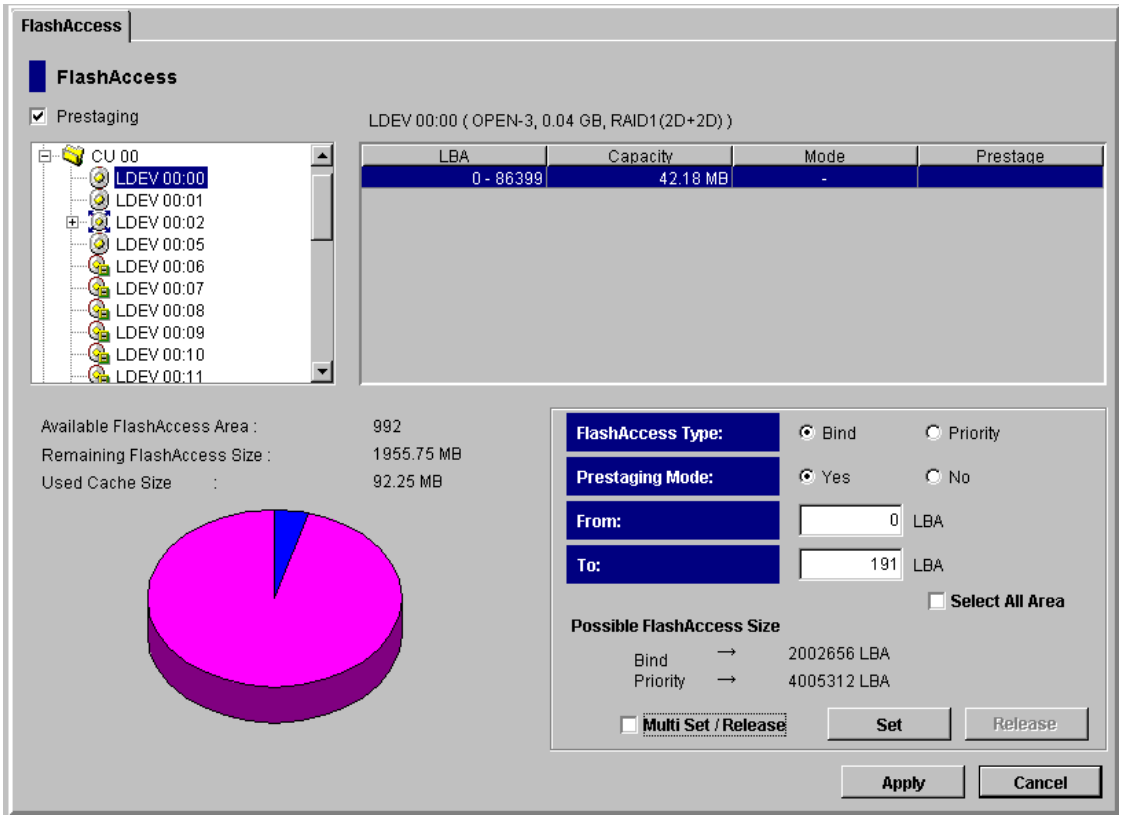


Figure 4.1 Selecting the LDEV and Specifying the Data Area and FlashAccess Options

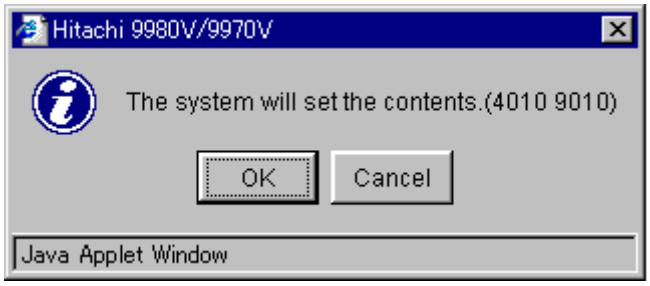


Figure 4.2 Confirmation Message for Placing Data into Cache

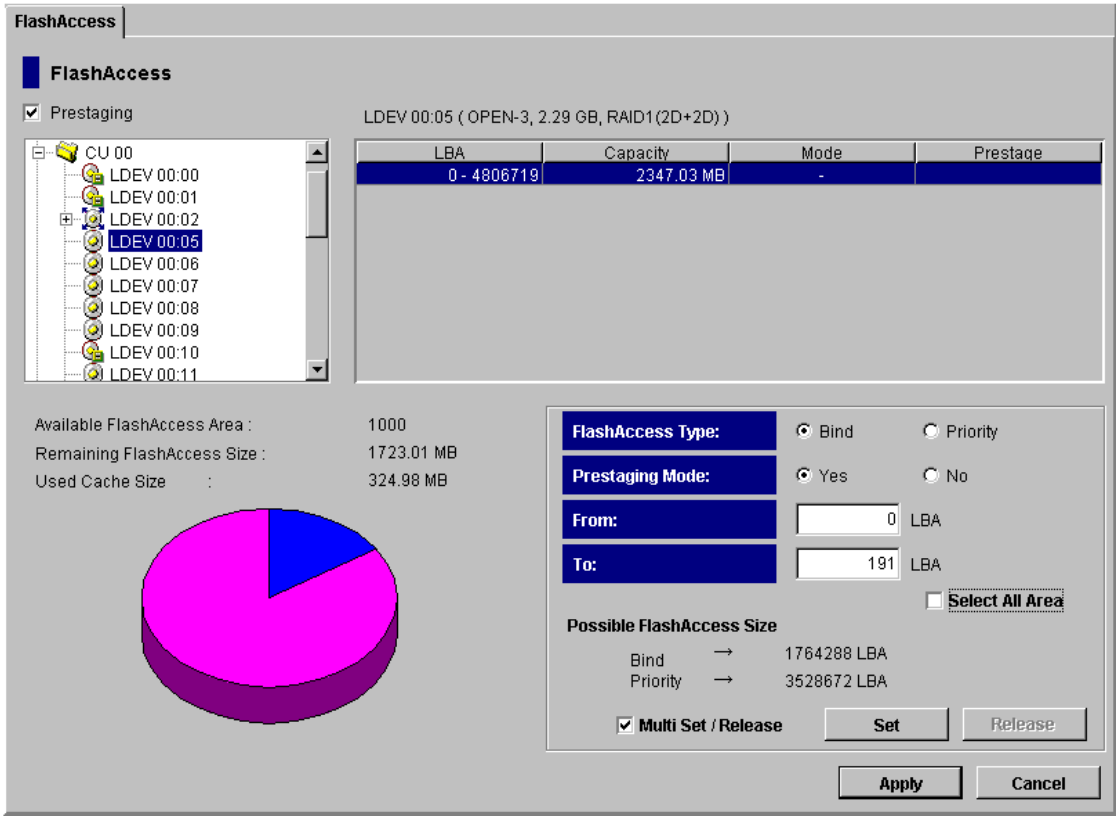


Figure 4.3 Specifying the Same Data Area and Options for Multiple LDEVs

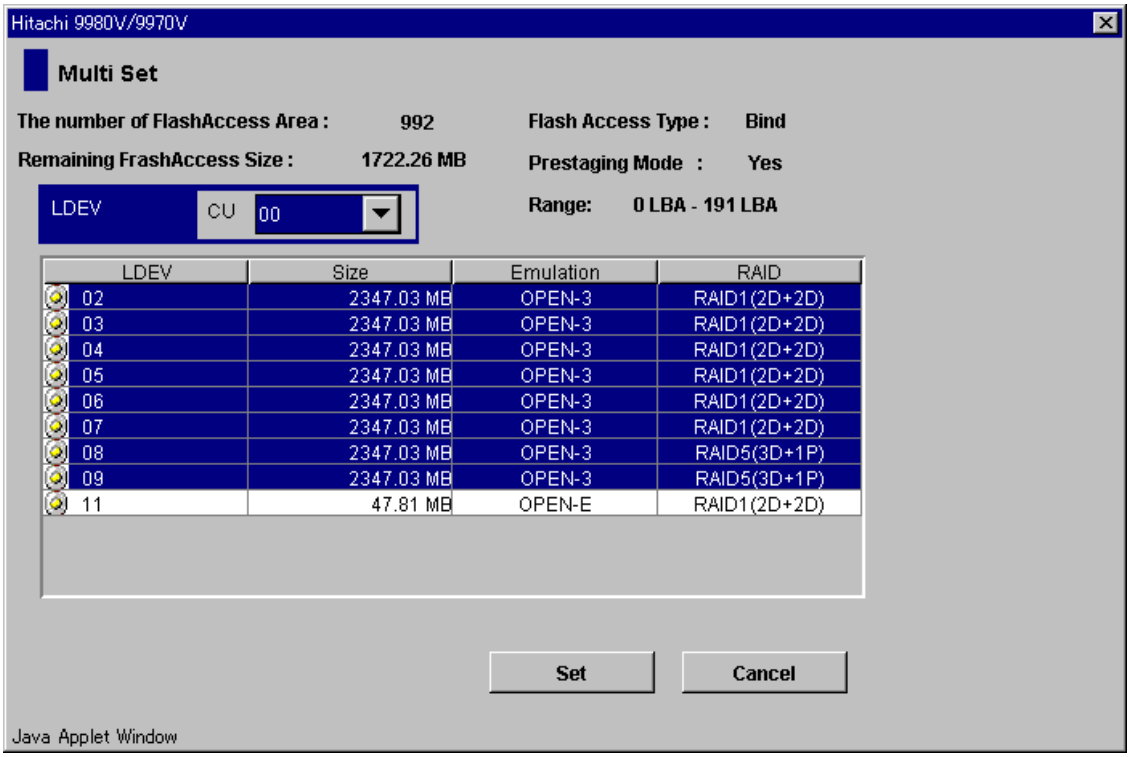


Figure 4.4 Selecting Additional LDEVs on the Multi Set Panel (Specific Data Range)

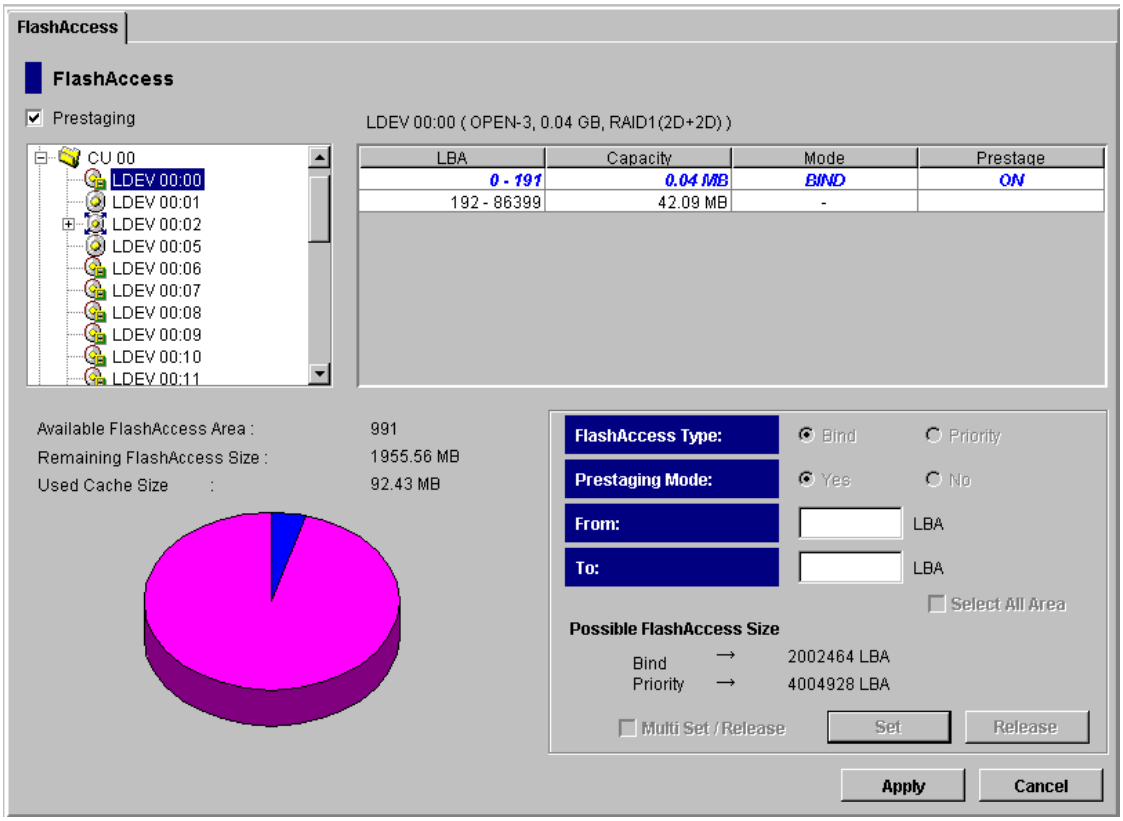


Figure 4.5 Verifying the Add Data Area Operation

4.2 Placing All Data on one or more LDEVs into FlashAccess Cache

Note: Use this procedure when you want to place ALL data on one or more LDEVs into FlashAccess cache.

To place all data on one or more LDEVs into FlashAccess cache:

1. Connect to the desired 9900V subsystem, and log in with Administrator or FlashAccess write access. Make sure that the Storage Navigator is in **Modify** mode.
2. In the outline view on the FlashAccess main panel (upper left), select the CU which contains the desired LDEV, and then select the desired LDEV.

   The LDEV information table displays the information for the selected LDEV. A dash (-) in the **Mode** column indicates an area not already allocated to FlashAccess cache.
3. Select the desired options on the FlashAccess main panel (see Figure 4.6):
   a) Select the desired mode (**Bind** or **Priority**) in the **FlashAccess Type** box.
   b) Select the desired **Prestaging Mode** setting (**Yes** or **No**). ***Note:*** If you want to set the prestaging function, the **Prestaging** checkbox (upper left corner of FlashAccess panel) must already be selected.
   c) Check the **Select All Area** box. Leave the **From** and **To** fields blank.
   d) Make sure that the **Multi Set / Release** box is NOT checked.

   Caution: Make sure to select the correct options, since the options cannot be changed after a cache extent is added. If you want to change between bind mode and priority mode, or enable/disable the prestaging function, you must first release the cache extent that you want to change (see section 4.3), and then place the data back into FlashAccess cache with the desired settings.
4. If you do not want to apply the same options to any other LDEVs, make sure that the **Multi Set / Release** box is not checked, select **Set**, and then select **OK** on the confirmation panel. The requested operation is displayed in blue in the LDEV information table (see Figure 4.9).

   If you want to apply the same options to additional LDEVs:
   a) Select the **Multi Set / Release** box on the FlashAccess main panel (see Figure 4.7), select **Set**, and then select **OK** to open the Multi Set panel. The Multi Set panel displays the data range and options selected on the FlashAccess main panel.
   b) On the Multi Set panel, select the desired CU image, and select the desired LDEV(s) (see Figure 4.8). The options displayed on the panel will be applied to all selected LDEVs.
   c) Select **Set** to return to the FlashAccess main panel. The requested FlashAccess operations are displayed in blue in the LDEV information table.
5. Repeat steps (2)—(4) until all desired operations are listed.

   Note: You cannot use the **Release** button until you apply (or cancel) your requested operation(s).

6. Review the requested operation(s) on the FlashAccess main panel.
   - To start the operation(s), select **Apply** on the FlashAccess main panel, and then select **OK** on the Apply confirmation message.
   - To cancel the operation(s), select **Cancel** on the FlashAccess main panel, and then select **OK** on the Cancel confirmation message.
7. Monitor the FlashAccess main panel to make sure that the operation(s) complete successfully. The cache information area (see section 3.1.3) displays the progress of the requested operation(s).

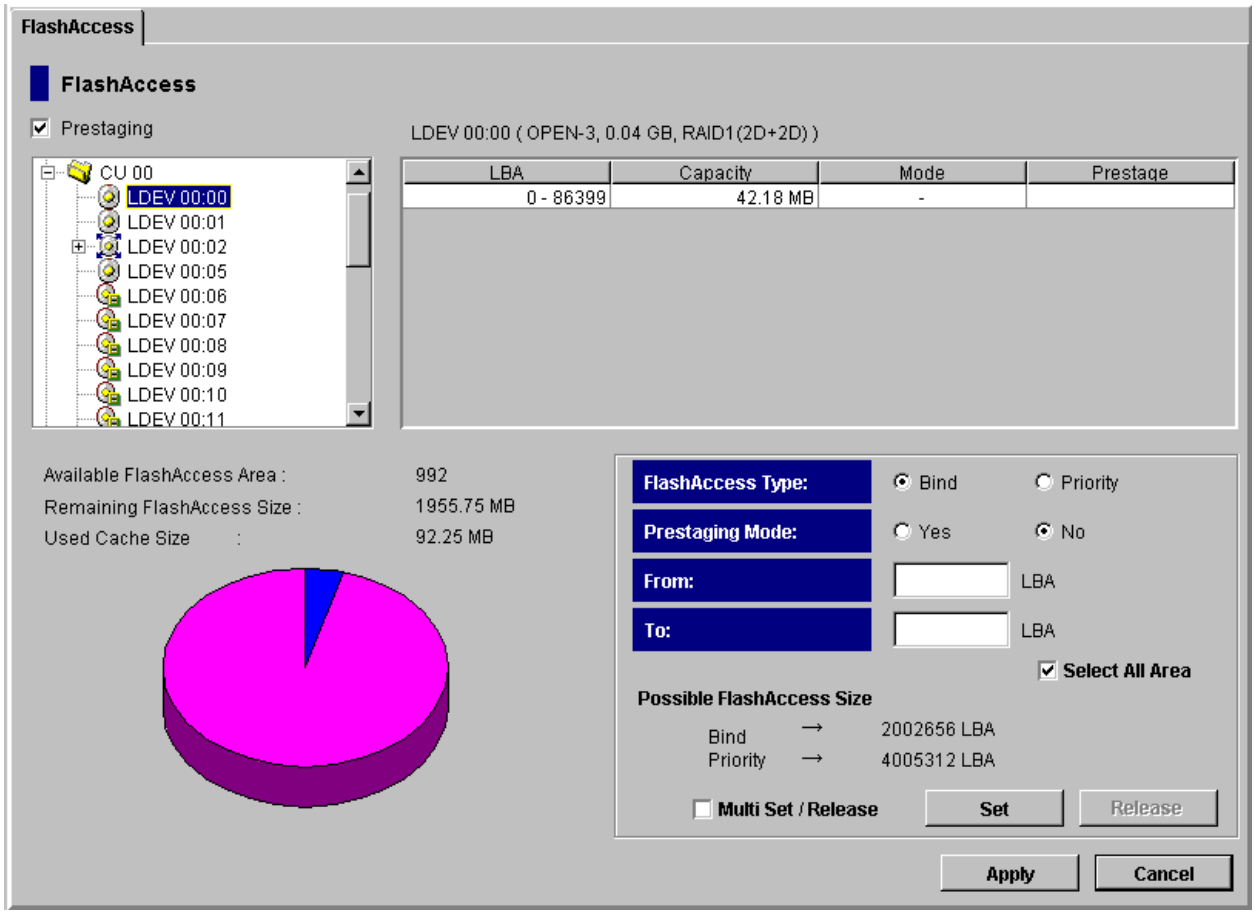


Figure 4.6 Selecting an LDEV and Specifying the Options

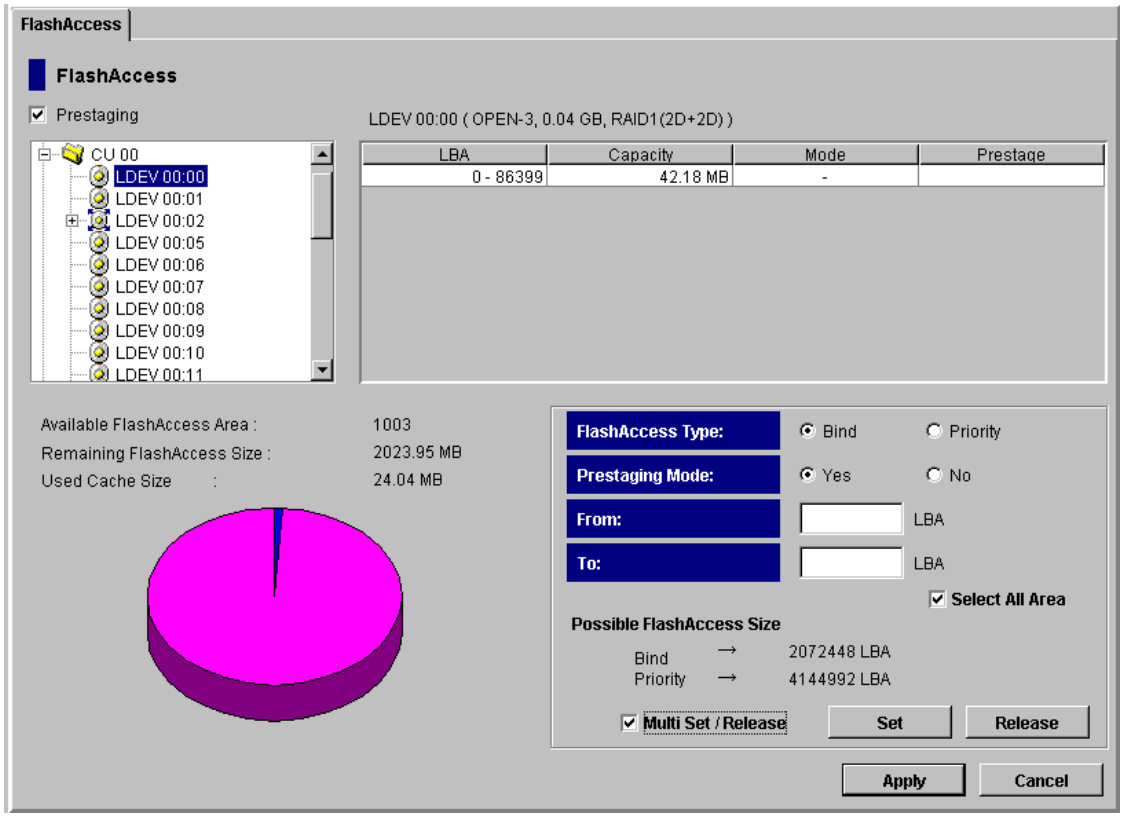


Figure 4.7 Selecting LDEV(s) to Place in FlashAccess Cache

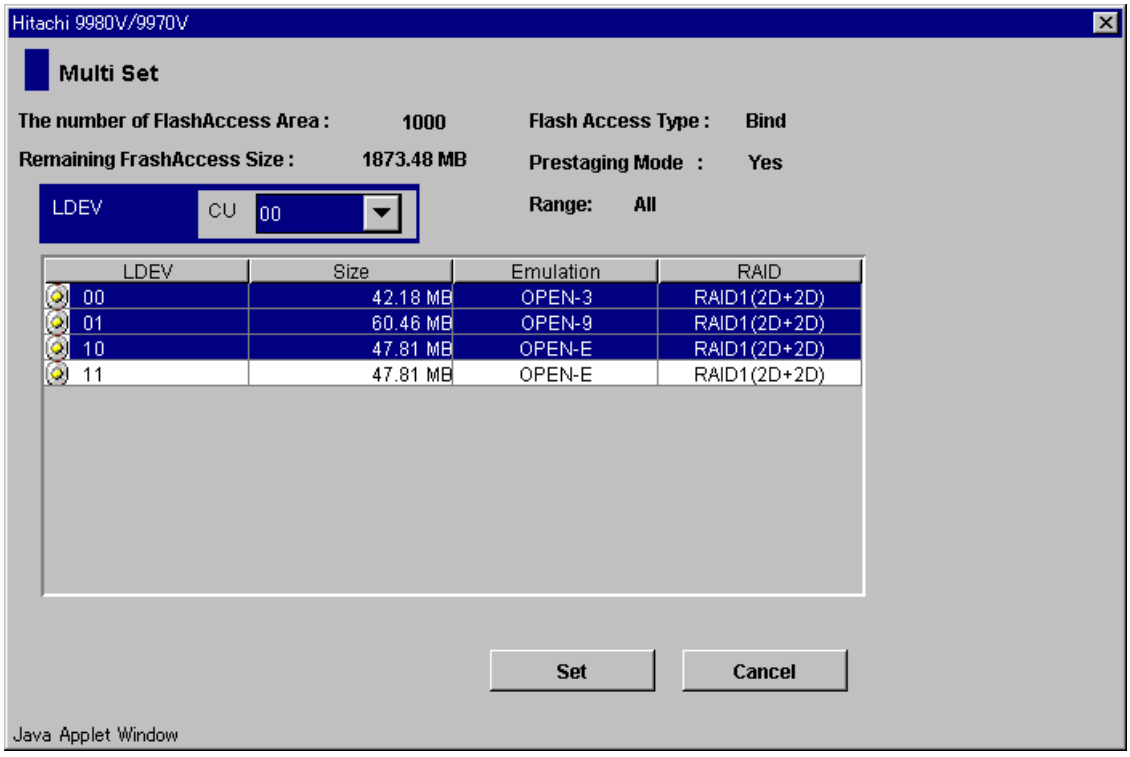


Figure 4.8 Selecting Additional LDEVs on the Multi Set Panel (All Data)

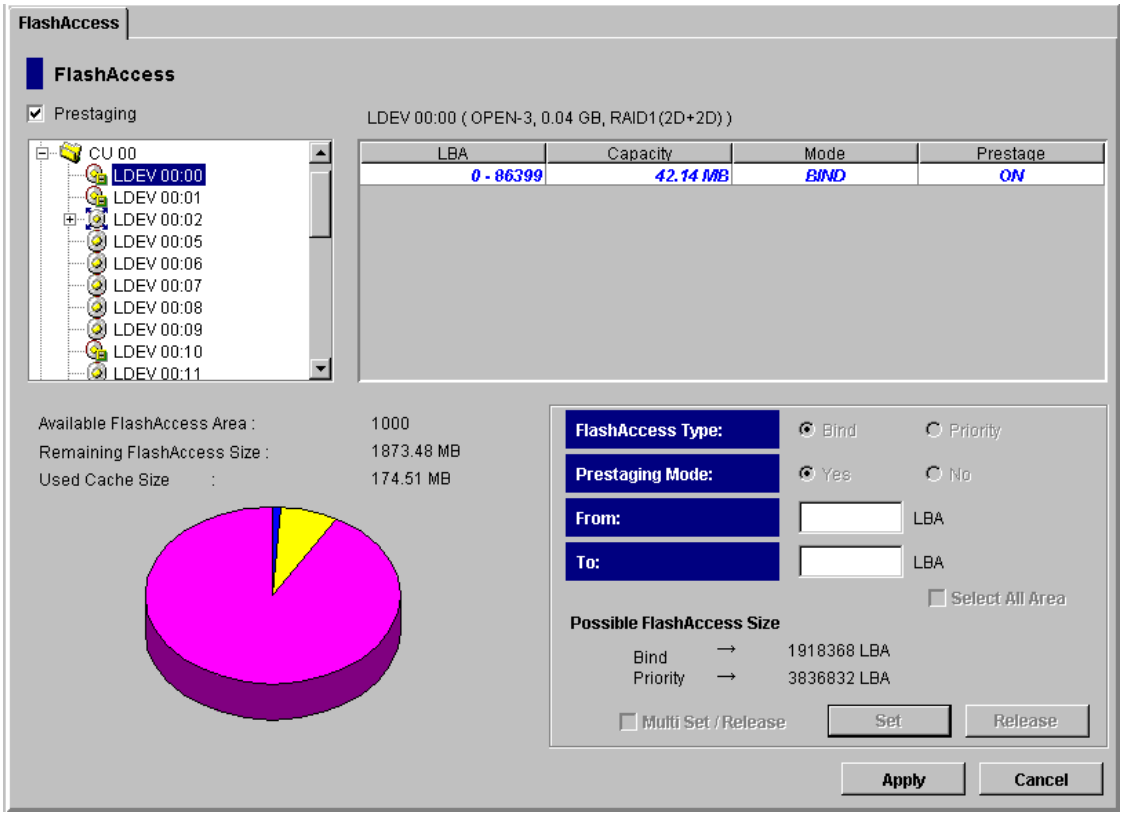


Figure 4.9 Verifying the Add LDEV Operation(s)

4.3 Releasing Specific Data From FlashAccess Cache

Note: Use this procedure when you want to release specific data area(s) on one or more LDEVs from FlashAccess cache.

To release specific data area(s) on one or more LDEVs from FlashAccess cache:

1. Connect to the desired 9900V subsystem, and log in with Administrator or FlashAccess write access. Make sure that the Storage Navigator is in **Modify** mode.
2. In the outline view on the FlashAccess main panel (upper left), select the CU which contains the desired LDEV, and then select the desired LDEV.

   The LDEV information table displays the information for the selected LDEV. The **Mode** column displays **Prio** or **Bind** for each data area that is allocated to FlashAccess cache (see Figure 4.10).
3. Select the data area(s) that you want to release from FlashAccess cache. This enables the **Release** button.
4. Select the **Release** button, and select **OK** on the confirmation message (see Figure 4.11).

   The requested operation is displayed in blue in the LDEV information table (Figure 4.12).
5. Repeat steps (2)—(4) for each LDEV for which you want to release specific data from FlashAccess cache.

   Note: You cannot use the **Set** button until you apply (or cancel) your requested operation(s).
6. Review the requested operation(s).
   - To start the operation(s), select **Apply** on the FlashAccess main panel, and then select **OK** on the confirmation message.
   - To cancel the operation(s), select **Cancel** on the FlashAccess main panel, and then select **OK** on the confirmation message.
7. Monitor the FlashAccess main panel to make sure that the operation(s) complete successfully. The cache information area (see section 3.1.3) displays the progress of the requested operation(s).

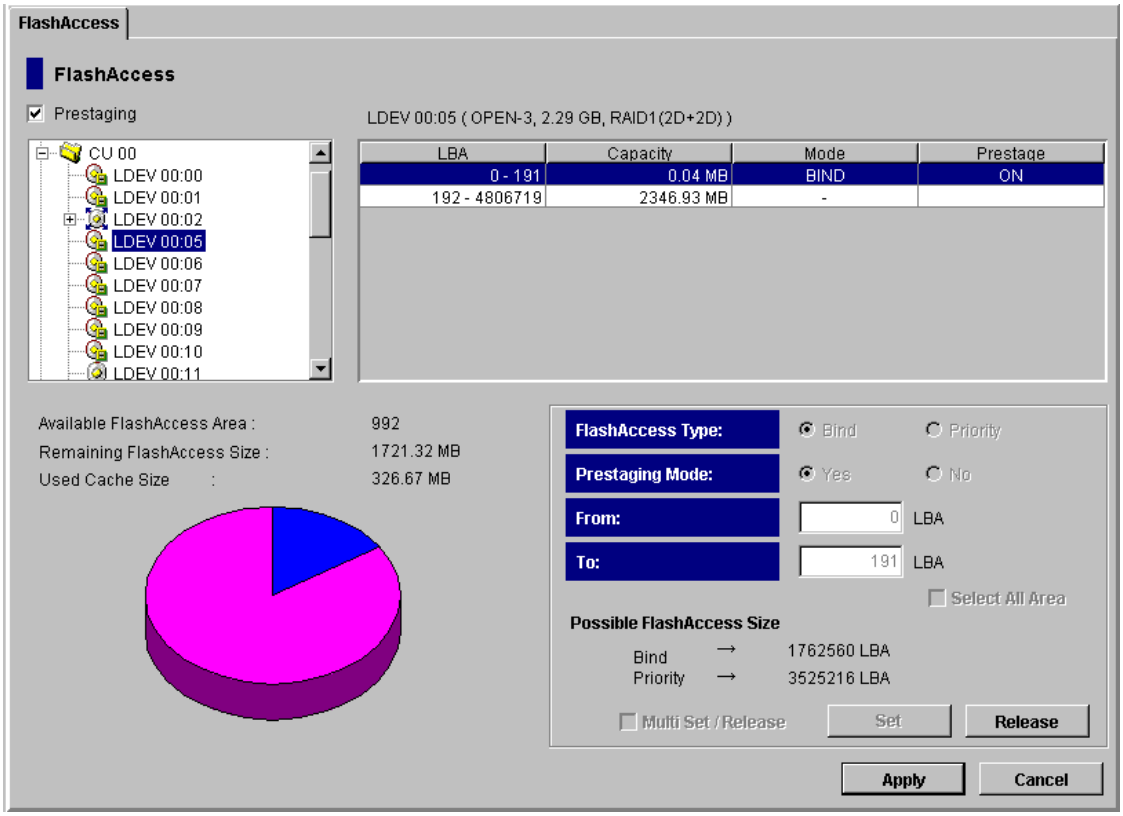


Figure 4.10 Selecting a Data Area for Release

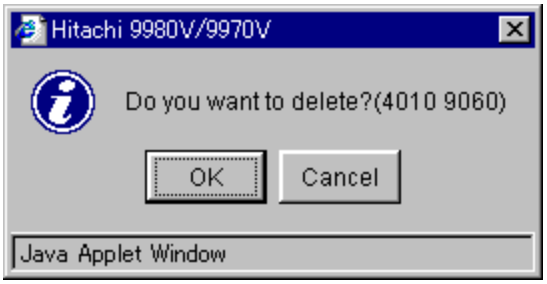


Figure 4.11 Confirmation Message for Deleting Data

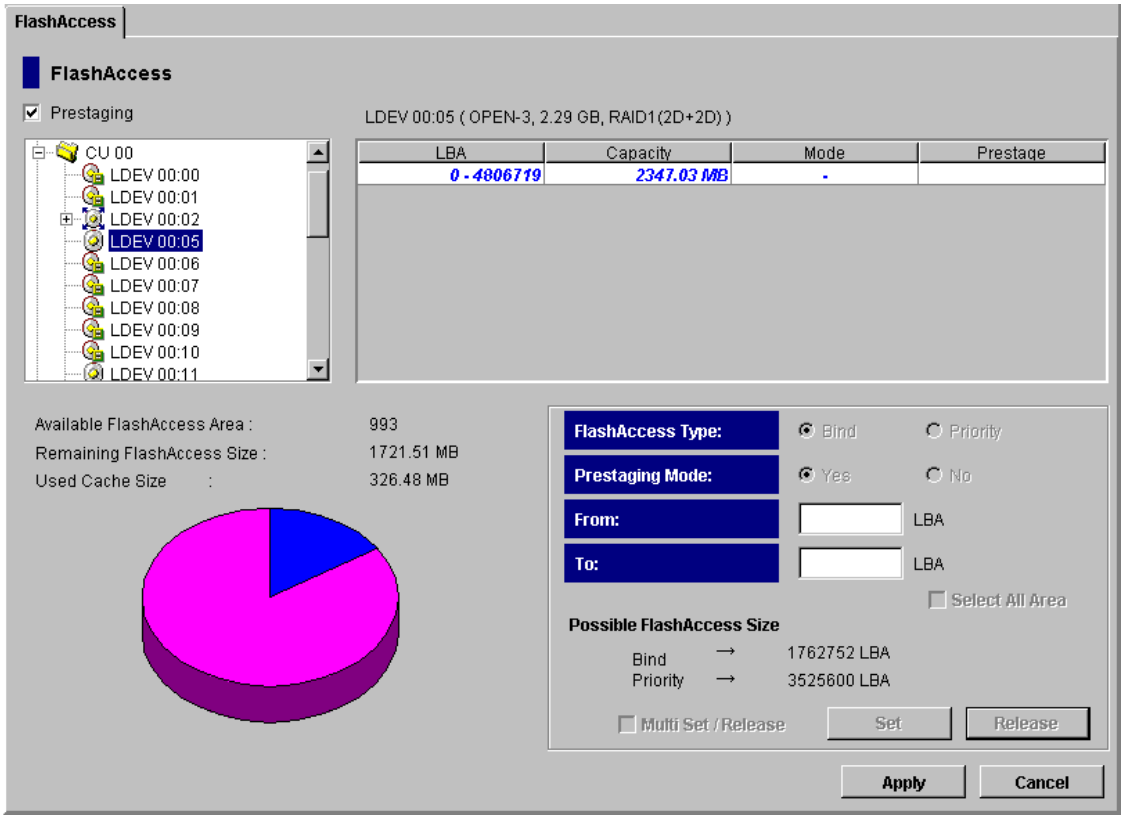


Figure 4.12 Verifying the Release Data Operation(s)

4.4 Releasing LDEV(s) from FlashAccess Cache

Note: Use this procedure when you want to release ALL data on one or more LDEVs from FlashAccess cache.

To release all data on one or more LDEVs from FlashAccess cache:

1. Connect to the desired 9900V subsystem, and log in with Administrator or FlashAccess write access. Make sure that the Storage Navigator is in **Modify** mode.
2. In the outline view on the FlashAccess main panel (upper left), select the CU which contains the desired LDEV, and then select the desired LDEV (see Figure 4.13).

   The LDEV information table displays the information for the selected LDEV. The **Release** button is enabled if the selected LDEV has data that is stored in FlashAccess cache (indicated by **Prio** or **Bind** in the **Mode** column).
3. If you do not want to release any other LDEVs from FlashAccess cache, make sure that the **Multi Set / Release** box is not checked, select **Release**, and then select **OK** on the confirmation panel. The requested operation is displayed in blue in the LDEV information table (see Figure 4.15).

   If you want to release additional LDEVs from FlashAccess cache:

   a) Check the **Multi Set / Release** box, select **Release**, and then select **OK** on the confirmation message (refer to Figure 4.11) to open the Multi Release panel.

   b) On the Multi Release panel, select the desired CU image, and select the desired LDEV(s) to release from FlashAccess cache (see Figure 4.14).

   c) Select **Release** to return to the FlashAccess main panel. The requested FlashAccess operations are displayed in blue in the LDEV information table.
4. Repeat steps (2) and (3) until all desired operations are listed.

   Note: You cannot use the **Set** button until you apply (or cancel) your requested operation(s).
5. Review the requested operation(s) on the FlashAccess main panel.

   — To start the operation(s), select **Apply** on the FlashAccess main panel, and then select **OK** on the Apply confirmation message.

   — To cancel the operation(s), select **Cancel** on the FlashAccess main panel, and then select **OK** on the Cancel confirmation message.
6. Monitor the FlashAccess main panel to make sure that the operation(s) complete successfully. The cache information area (see section 3.1.3) displays the progress of the requested operation(s).

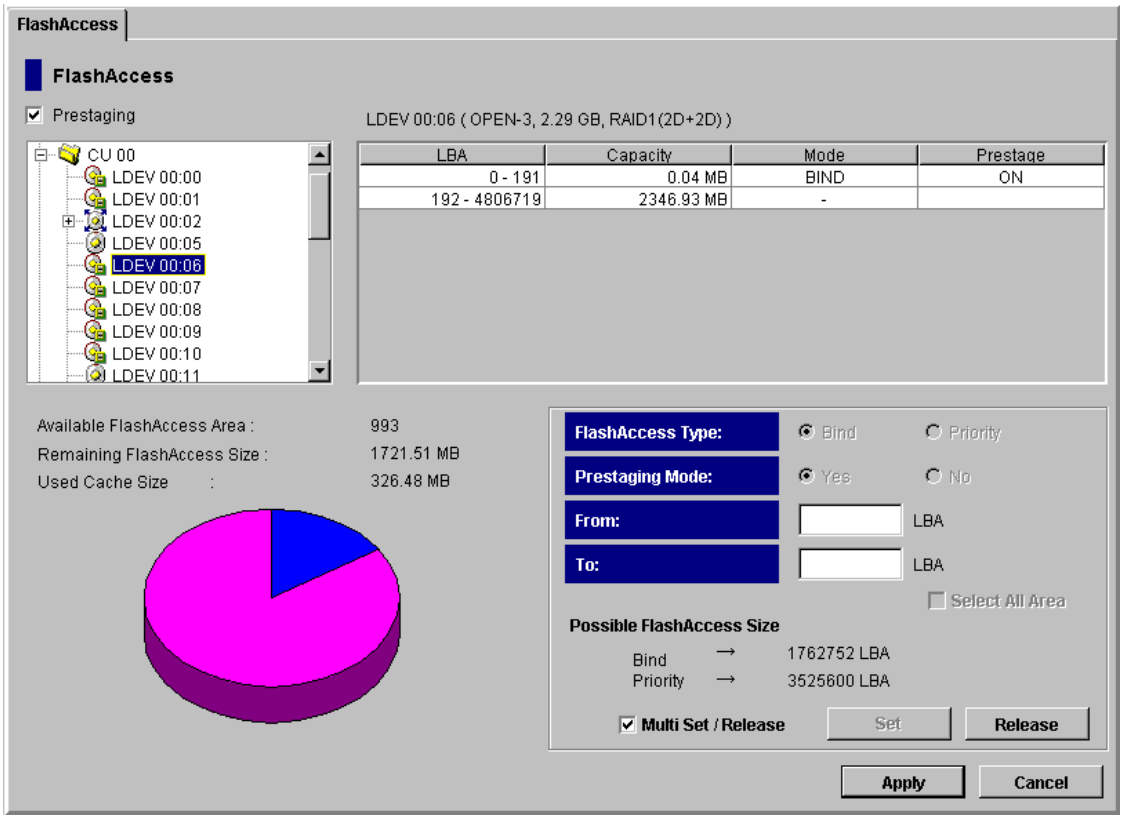


Figure 4.13 Selecting LDEV(s) to Release from FlashAccess Cache

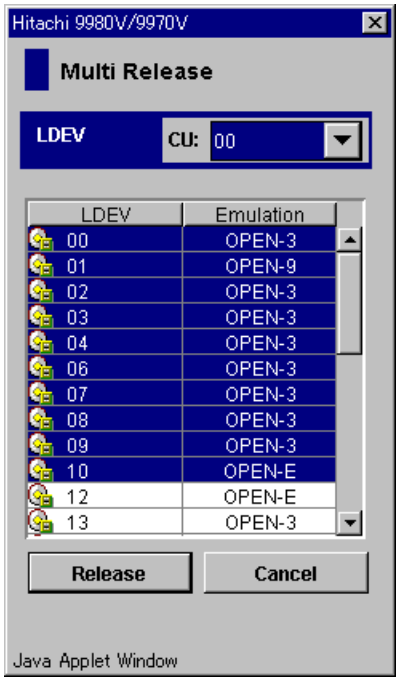


Figure 4.14 Selecting Multiple LDEVs on the Multi Release Panel

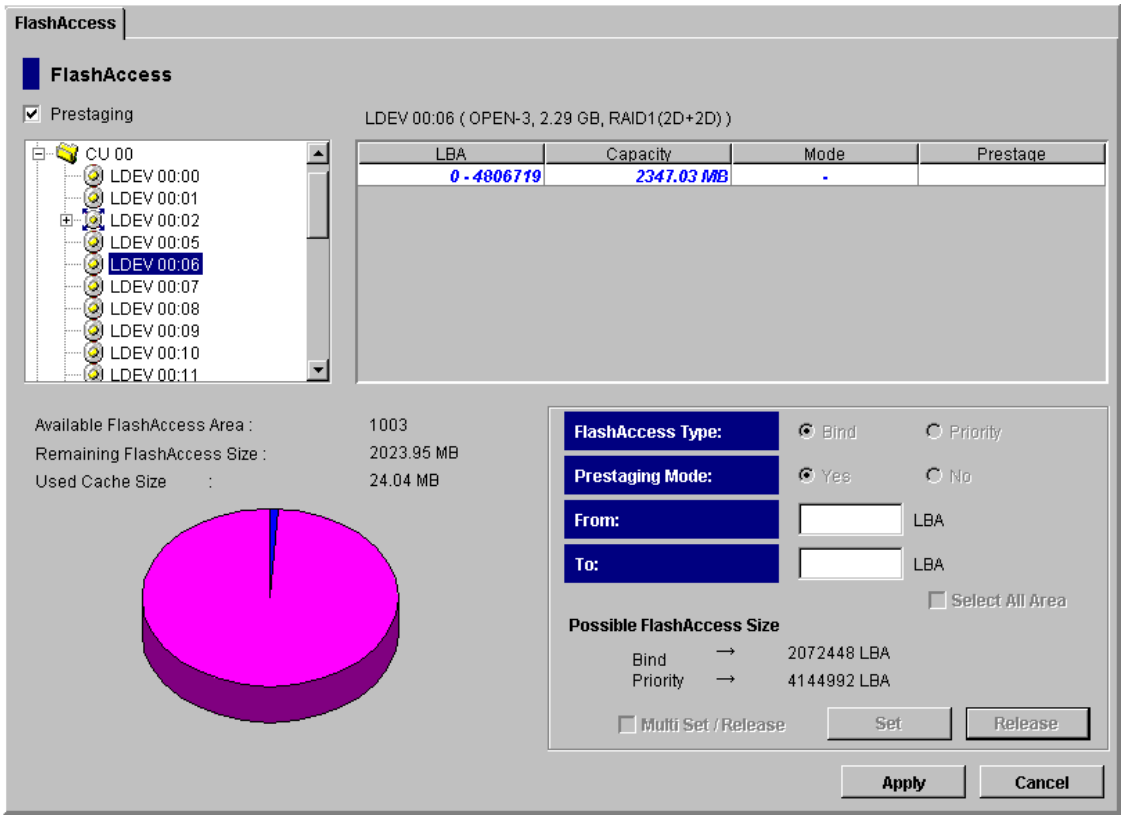


Figure 4.15 Verifying the Release LDEV Operation(s)

Chapter 5 Troubleshooting

5.1 Troubleshooting

- For troubleshooting information on the 9900V subsystem, please refer to the *Hitachi Freedom Storage™ Lightning 9900™ V Series User and Reference Guide* (MK-92RD100).
- For troubleshooting information on the Storage Navigator software, please refer to the *Hitachi Lightning 9900™ V Series Remote Console – Storage Navigator User's Guide* (MK-92RD101).
- For information on the 9900V Storage Navigator error codes, please refer to the Hitachi Freedom Storage™ Lightning 9900™ V Series Hitachi Remote Console – Storage Navigator Error Codes (MK-92RD132).

5.2 Calling the Hitachi Data Systems Support Center

If you need to call the Hitachi Data Systems Support Center, make sure to provide as much information about the problem as possible. Include the circumstances surrounding the error or failure, the 9900V Storage Navigator configuration information saved in the floppy diskette(s) by the **FD Dump Tool**, the exact content of any messages displayed on the Storage Navigator, and the severity levels and reference codes displayed on the **Status** tab of the Storage Navigator Main panel.

The worldwide Hitachi Data Systems Support Centers are:

- Hitachi Data Systems North America/Latin America
  San Diego, California, USA
  1-800-348-4357
- Hitachi Data Systems Europe
  Contact Hitachi Data Systems Local Support
- Hitachi Data Systems Asia Pacific
  North Ryde, Australia
  011-61-2-9325-3300

Acronyms and Abbreviations

CCHH	cylinder, cylinder, head, head
CU	control unit
FD	floppy disk
kB	kilobyte
LBA	logical block address
LDEV	logical device
LU	logical unit
LUN	logical unit number, logical unit
LUSE	LUN Expansion
LVI	logical volume image
MB	megabyte
prio	priority mode
RAID	redundant array of independent disks
VDEV	virtual device
VLL	Virtual LVI/LUN

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