



**Hitachi Freedom Storage™
Thunder 9500™ V Series**

**LUN Size Expansion (LUSE) 9500V
User's Guide**

Notice: No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or stored in a database or retrieval system for any purpose without the express written permission of Hitachi Data Systems Corporation.

Hitachi Data Systems reserves the right to make changes to this document at any time without notice and assumes no responsibility for its use. Hitachi Data Systems products and services can only be ordered under the terms and conditions of Hitachi Data Systems' applicable agreements. All of the features described in this document may not be currently available. Refer to the most recent product announcement or contact your local Hitachi Data Systems sales office for information on feature and product availability.

This document contains the most current information available at the time of publication. When new and/or revised information becomes available, this entire document will be updated and distributed to all registered users.

Trademarks

Hitachi Data Systems is a registered trademark and service mark of Hitachi, Ltd., and the Hitachi Data Systems design mark is a trademark and service mark of Hitachi, Ltd.

Freedom Storage and Thunder 9500 are trademarks of Hitachi Data Systems Corporation.

HP and HP-UX are registered trademarks of the Hewlett-Packard Company.

AIX is a registered trademark of the International Business Machines Corporation.

Microsoft, Windows, Windows NT, and the Windows logo are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

IRIX is a trademark or registered trademark of the Silicon Graphics Inc. in the United States.

Sun and Solaris are trademarks or registered trademarks of Sun Microsystems, Inc.

All other brand or product names are or may be trademarks or service marks of and are used to identify products or services of their respective owners.

Notice of Export Controls

Export of technical data contained in this document may require an export license from the United States government and/or the government of Japan. Please contact the Hitachi Data Systems Legal Department for any export compliance questions.

Document Revision Level

Revision	Date	Description
MK-92DF610-P	October 2002	Preliminary Release
MK-92DF610-0	November 2002	Revision 0, supersedes and replaces MK-92DF610-P
MK-92DF610-1	January 2003	Revision 1, supersedes and replaces MK-92DF610-0
MK-92DF610-2	April 2003	Revision 2, supersedes and replaces MK-92DF610-1

Source Documents Used in this Revision

The following source documents were used to produce this user's guide:

- LUN Concatenation User's Guide (LUNConcatenation_OE) dated 08/04/02.
- LUN Concatenation User's Guide DF600 (LUNConcatenation_OE) dated 09/06/02.
- LUN Size Expansion (LUSE) 9500V User's Guide (RSD review of MK-92DF610-1a, dated 02/05/03).
- LUN Size Expansion (LUSE) 9500V User's Guide (RSD review of MK-92DF610-1, dated 03/31/03).

Changes in this Revision

- In Table 1.2, item 25, changed RAID 0+1 to RAID 1+0.
- Updated Figure 3.7.
- Revised sections A.6, A.7, A.8. Moved Password: manager-password up in example.

Referenced Documents

- *9500V User and Reference Manual* (MK-92DF601)
- *Resource Manager 9500V User's Guide for GUI* (MK-92DF605)
- *Resource Manager 9500V User's Guide for CLI* (MK-92DF603)

Preface

Before using LUN Size Expansion (LUSE), read the operating procedures and notices included in this guide.

This document assumes that:

- The user has a background in data processing and understands direct-access storage device subsystems and their basic functions.
- The user is familiar with the Disk array subsystem.
- The user has read and understands the Resource Manager 9500V User's Guide for GUI (MK-92DF605) and/or the Resource Manager 9500V User's Guide for CLI (MK-92DF603).

Note: For additional information on the 9500V subsystem features and functions, please contact your Hitachi Data Systems account team, or visit Hitachi Data Systems online at <http://www.hds.com>.

Note: The use of Hitachi Resource Manager, the LUN Size Expansion (LUSE) software, and all other Hitachi Data Systems products is governed by the terms of your license agreement(s) with Hitachi Data Systems.

Note: The screens shown in this document were captured on a Windows® system with the Internet Explorer web browser. The screens may display differently on other operating systems and browsers. Please refer to the *Resource Manager 9500V User's Guide for GUI* (MK-92DF605) for further information on other operating systems and browsers.

Note: The term "9500V" refers to the entire Hitachi Freedom Storage™ Thunder 9500™ V Series subsystem family, unless otherwise noted.

COMMENTS

Please send us your comments on this document: doc.comments@hds.com.

Make sure to include the document title, number, and revision.

Please refer to specific page(s) and paragraph(s) whenever possible.

(All comments become the property of Hitachi Data Systems Corporation.)

Thank you!

Contents

Chapter 1	Overview of LUN Size Expansion (LUSE) 9500V	1
1.1	System Management Notes.....	4
1.2	Functional Specifications and Restrictions	5
Chapter 2	Preparing for LUN Size Expansion (LUSE) 9500V Operations (GUI).....	9
2.1	Installing and Uninstalling.....	9
2.1.1	Installing	9
2.1.2	Uninstalling.....	11
2.2	Enabling or Disabling LUSE	13
Chapter 3	Performing LUN Size Expansion (LUSE) 9500V Operations (GUI)	15
3.1	Creating a New Logical Unit	15
3.2	Expanding the Last Logical Unit in a RAID Group.....	15
3.3	Unifying LUs	16
3.4	Separating Unified LUs.....	19
3.5	Separating the Last LU from the Unified LU	20
3.6	Confirming the Status of the Unified LUs.....	21
Chapter 4	Troubleshooting	23
4.1	Troubleshooting.....	23
4.2	Calling the Hitachi Data Systems Technical Support Center.....	23
Appendix A	Operations Using CLI	25
A.1	Installing	25
A.2	Uninstalling.....	26
A.3	Enabling or Disabling.....	27
A.4	Creating a New Logical Unit	28
A.5	Expanding the Last Logical Unit in a RAID Group.....	28
A.6	Unifying LUs	29
A.7	Separating Unified LUs.....	30
A.8	Separating the Last LU from the Unified LU	31
	Acronyms and Abbreviations.....	33
	Index.....	35

List of Figures

Figure 1.1	Conventional LU Expansion Feature	1
Figure 1.2	LUN Size Expansion 9500V with LUSE Feature.....	2
Figure 2.1	Array System Viewer Panel (Component Status Page)	10
Figure 2.2	Parameter Panel (Unlocked: Enable).....	11
Figure 2.3	Parameter Panel (Unlocked: Disable)	14
Figure 3.1	Array System Viewer Panel (Component Status Page)	16
Figure 3.2	Array System Viewer Panel (Logical Status Page)	17
Figure 3.3	Unify Logical Units Panel	17
Figure 3.4	Web Information Message Example for Unification of Logical Units.....	18
Figure 3.5	Web Information Message Example for Separating the Unified Logical Units ...	19
Figure 3.6	Web Information Message Example for Separating the Last Logical Unit	20
Figure 3.7	Property Panel	22

List of Tables

Table 1.1	System Management Procedure for Operational Systems	4
Table 1.2	Function Specifications and Restrictions (continues on the following pages)....	5
Table 1.2	Function Specifications and Restrictions (continued).....	6
Table 1.2	Function Specifications and Restrictions (continued).....	7
Table 3.1	Icons for Unified LUs	21

Chapter 1 Overview of LUN Size Expansion (LUSE) 9500V

The 9500V Series provides excellent scalability features for times when existing storage capacity needs to be increased. One of these scalability features is the ability to increase the size of a LUN. This is accomplished by concatenating LUNs using the LUN Size Expansion (LUSE) 9500V software product or by expanding the size of the last LUN in a raid group.

Once the license key is properly installed, you can use the LUN Size Expansion (LUSE) feature to unify any two LUs, even LUs that have already been unified regardless of RAID group differences. This allows you to combine LUs that have insufficient capacity with unused LUs. It also facilitates scalability when the Thunder 9500V is upgraded with additional disk drives or expansion modules. If desired, you can later break apart unified LUs.

When expanding the last LU in a raid group, the LU size cannot be expanded when the size exceeds the unused area of the RAID group. Figure 1.1 shows how the last LUN in a raid group can be expanded.

Unified LUs or the expanded last LU in a raid group are recognized as a single LU by the server.

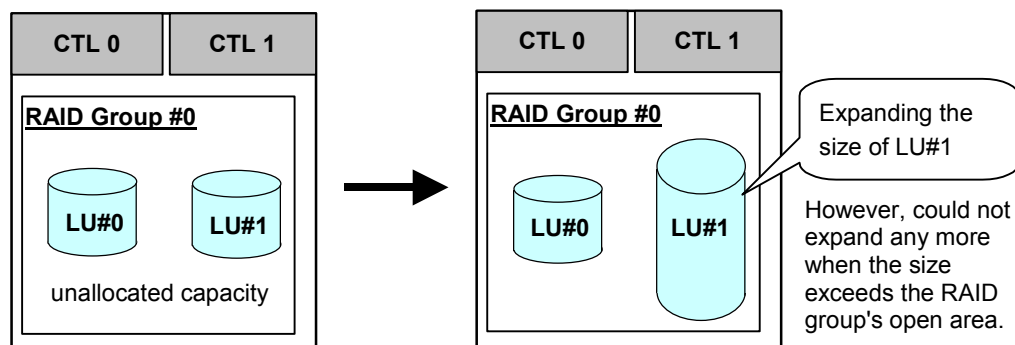
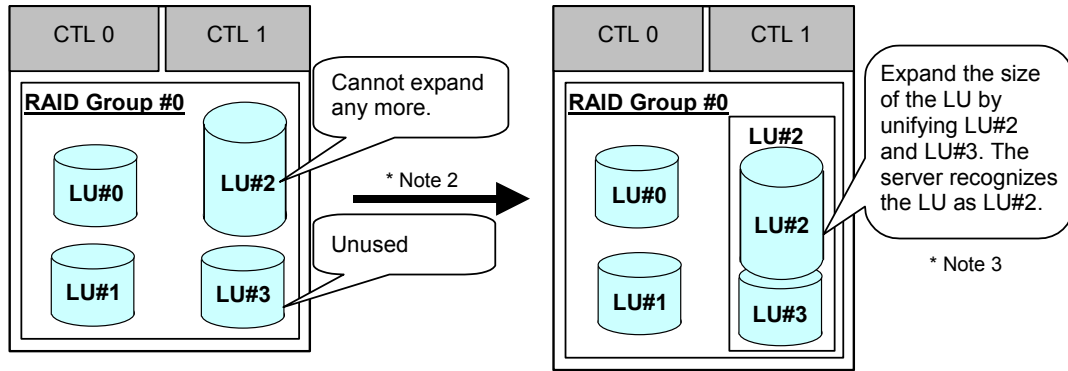
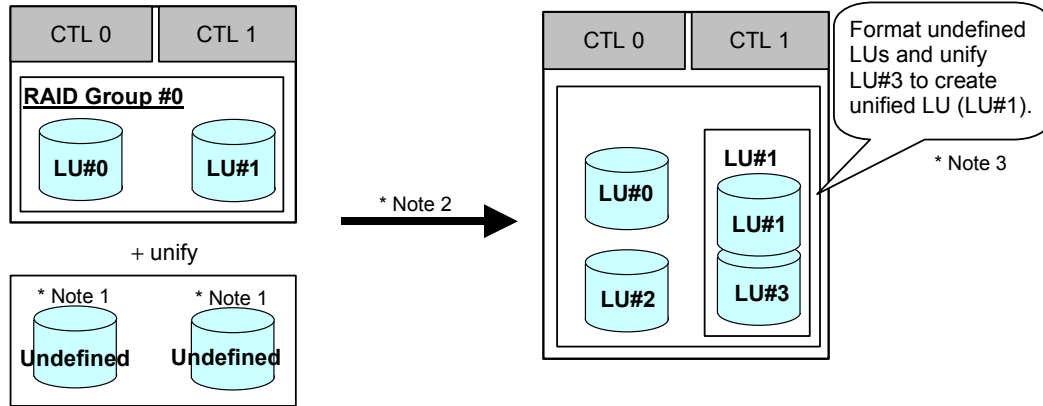


Figure 1.1 Conventional LU Expansion Feature

LUN Expansion using unused LUs



LUN Expansion when the Thunder 9500 is upgraded with additional disk drives or an expansion module.



Note 1: Undefined LUs must be formatted before LUN Expansion.

Note 2: Backup the LU data from the server before LUN Expansion.

Note 3: Proceed with the following after unifying the LUs:

1. Format the file system of the server. Some servers may need to reboot the system, depending on the operating system.
2. For details, see section 1.1.

Figure 1.2 LUN Size Expansion 9500V with LUSE Feature

In addition to unification of two LUs, the LUN Size Expansion 9500V feature enables you to re-unify a unified LU, and release the unification of LUs (separating a unified LU into separate LUs, or separating only the last LU from the unified LU). For details on the LUN Size Expansion 9500V feature specifications, see section 1.2.

The LUN Size Expansion (LUSE) 9500V feature operations can be performed from the Resource Manager 9500V via GUI or CLI. Command execution for unified LUs is identical to command execution for general LUs. You can also verify unified LU information when a failure occurs.

If you are using the GUI version of the Resource Manager 9500V to perform LUN Size Expansion (LUSE) 9500V operation, refer to Chapter 2 and Chapter 3. If you are using the CLI, refer to Appendix A.

1.1 System Management Notes

When performing the unification of LUs, servers format the LU or reboot the system differently depending on the operating system. Follow the procedures shown below when unifying the LUs.

Table 1.1 System Management Procedure for Operational Systems

Procedure	Solaris™	IRIX®	HP-UX®	AIX®	Windows® 2000
1. Backup the LU data from the server.	√	√	√	√	√
2. Format the LU you want to unify in order to erase the label that was given when the operating system first recognized the LU.	√ Note 1	√ Note 1	—	—	—
3. Unify the LUs from the subsystem.	√	√	√	√	√
4. Reboot the server to hide the messages for the internal LUs (SubLUs), and to re-recognize the LUs.	√	√	√	√	—
5. Restore the LU backup data.	√	√	√	√	—
6. Create an extended partition (disk) for the LU.	—	—	—	—	√

Note 1: LUs cannot be formatted if you have selected the "Drive Detach Mode" option in the System Parameter Wizard of the Resource Manager 9500V. De-select the option, reboot the subsystem and format the LUs.

1.2 Functional Specifications and Restrictions

Table 1.2 lists the functional specifications and restrictions of the LUN Size Expansion (LUSE) 9500V feature.

Table 1.2 Function Specifications and Restrictions (continues on the following pages)

No.	Item	Specification
1	User interface	<ul style="list-style-type: none"> - Microprogram - Resource Manager 9500V
2	Number of logical units	Maximum of 512 logical units can be unified. Numbers of the logical units that can be recognized from the server is less than 512.
3	LU unification	<ul style="list-style-type: none"> - A formatted logical unit, AND two internal LUs (per operation) with different parity width (mD+nP) can be unified. - An LU that enables the server to see the information is called a <i>MainLU</i>, and an LU that cannot be seen from the server due to unification is called a <i>SubLU</i>. MainLU and SubLU can be specified when unifying the LU. - An already unified LU can be re-unified again. - After LU unification, SubLUs cannot be accessed from the server (the server cannot recognize SubLUs). - LUs that are being used by the server cannot be size expanded. - LUs cannot be unified when microcode is being changed online.
4	LU configuration	The configuration of the logical unit can be browsed from the Resource Manager 9500V.
5	LU statuses	The Disk Array subsystem provides a Web Server Function that displays the operation result of the logical units in a message format. Since the Web Server Function displays information about the logical unit via a browser, the status of the logical unit (and the operation result) can be easily confirmed.
6	LU size expansion	When you have unified the last defined LU, it cannot be size extended (cannot perform the conventional LU expansion to the last defined LU after unification).
7	LU blockage	When the internal logical unit blockage occurs, the status of the unified LU becomes unformatted. In such cases, all the internal logical units that have been separated from the unified LU also become unformatted.
8	LU attribute	<ul style="list-style-type: none"> - The attributes of the MainLU (LUN security, LU mapping, RAID level, LU related information of SNMP, and statistical information) will be inherited as the attributes of the unified LU. - The capacity of a unified LU is a value obtained by adding the capacity of the internal LUs.
9	LU size to be reported to the host	For AIX only. When unifying an LU, whose size is set to adjust automatically by the subsystem, unification is performed within the adjusted size.
10	LUN mapping	Mapping to the unified LU is set by specifying a MainLU.
11	Separating the last LU	You can separate the logical unit (SubLU) that was last combined to the unified LU. This is useful when the user made an operational mistake.
12	Number of internal LUs in a unified LU	Unified LU is composed of two internal LUs. When re-unifying a unified LU, the numbers of the internal LU will be from 2 to 512.

Table 1.2 Function Specifications and Restrictions (continued)

No.	Item	Specification
13	Status of the unified LU	<ul style="list-style-type: none"> - LUs in Normal or Regression (degenerated) status can be unified. - LUs in Alarm or Unformat (blocked or unformatted) status cannot be unified (recover the Alarm status, format the LU, and then unify the LU).
14	Re-unifying a unified LU	<ul style="list-style-type: none"> - You can re-unify a unified LU by specifying it as a MainLU. - You cannot re-unify a unified LU by specifying it as a SubLU. If you want to specify an already unified LU as SubLU, release the unification and separate all logical units. And then, unify each LU to the MainLU. - Maximum size of unified LU is 2 TB. When re-unification is executed to such LU, a message is reported from the Resource Manager 9500V.
15	Separating a unified LU into separate LUs	<ul style="list-style-type: none"> - You can release the unification of the LUs and separate it into individual LUs (e.g., if a unified LU is composed of three internal LUs, releasing the unification ends up separating into three individual LUs). - You cannot specify a specific LU to be separated from the internal LUs that composes a unified LU.
16	Data assurance of the LUs to be unified	<ul style="list-style-type: none"> - When expanding the size or unifying LUs, data must be backed up previously from the server. - After expanding the size or unifying LUs, the file system of the server must be formatted and the backed up data must be restored.
17	Formatting the unified LU	<ul style="list-style-type: none"> - Format to the unified LU is also performed to all the internal LUs in sequence. - When the internal LU blockage/degeneration (Alarm/Regression) occurs while formatting, the status of the unified LU becomes blocked/degenerated at the time when formatting completes.
18	Blockage (Alarm status) of the unified LU	When a blockage occurs in the internal LU of the unified LU and the status changes to Unformat, the unified LU will also be in blocked (Alarm) status (when “ Drive Detach Mode ” is specified, the internal LU and the unified LU also becomes blocked and will be in Unformat status due to a double malfunction of the disk drive, for instance.
19	Rebooting the server	Reboot the server when changing the LU size (in order to make the LU attribute information become effective on the server’s operating system).
20	Access from the server	<ul style="list-style-type: none"> - When unifying the LUs, the access from the server is permitted to LUs excluding the LUs that are being unified. - When accessing a SubLU that is being unified, the response from the server will be “Check Condition (LU undefined).”
21	Statistical information	<ul style="list-style-type: none"> - Information of the MainLU will be displayed in the Resource Manager 9500V as the information of the unified LU. - Unlocking (enabling) the LUN Size Expansion (LUSE) 9500V feature enables the Resource Manager 9500V to display the statistical information of each SubLU.
22	Trace	<ul style="list-style-type: none"> - The execution of the LU unification and releasing the unification will be collected as trace data. - The command information to the unified LUN will be collected to the host’s command device trace data.
23	Controller in charge	When the controller in charge is different, change the controller, reboot the subsystem and then unify the LUs. Unified LUNs must all be owned by the same controller (i.e., the controller in charge).

Table 1.2 Function Specifications and Restrictions (continued)

No.	Item	Specification
24	Disk drive blockage	When the status of the internal LU is degenerated (Regression) due to disk drive blockage, the unified LU will also be degenerated.
25	RAID level	<ul style="list-style-type: none">- RAID 5, RAID 1+0, RAID 1 and unification of LUs between different RAID groups can be performed.- You can mix RAID groups (a confirmation message will be displayed whenever unifying the LUs).- You cannot unify a LU with RAID 0.

Chapter 2 Preparing for LUN Size Expansion (LUSE) 9500V Operations (GUI)

This chapter provides procedures for preparing for LU operations using the GUI version of the Resource Manager 9500V. This section includes the following:

- Installing the LUN Size Expansion (LUSE) 9500V Feature (required, see sections 2.1 and 2.1.1)
- Enabling or disabling the LUN Size Expansion (LUSE) 9500V Feature

Note: Procedures for installing the LUN Size Expansion (LUSE) 9500V feature using CLI are available in Appendix A.

2.1 Installing and Uninstalling

LUN Size Expansion (LUSE) 9500V is installed and uninstalled using Resource Manager 9500V. To install this function, the key code provided with the optional feature is required.

Note: Before installing or uninstalling, make sure that the array unit is in normal operating mode (for details, refer to the *Resource Manager 9500V User's Guide for GUI* (MK-92DF605)). If a failure such as a controller blockade has occurred, installation and uninstallation operations cannot be performed.

2.1.1 Installing

To install the LUN Size Expansion (LUSE) 9500V feature using the GUI version of Resource Manager 9500V:

1. Start the Resource Manager 9500V and change the operation mode to **Management Mode** (administrator mode). For details, refer to the *Resource Manager 9500V User's Guide for GUI* (MK-92DF605).
2. Register the subsystem (array unit) in which you will install the LUN Size Expansion (LUSE) 9500V feature and connect to the subsystem. For details, refer to the *Resource Manager 9500V User's Guide for GUI* (MK-92DF605).

The Array System Viewer panel appears and displays the connected subsystem (see Figure 2.1).

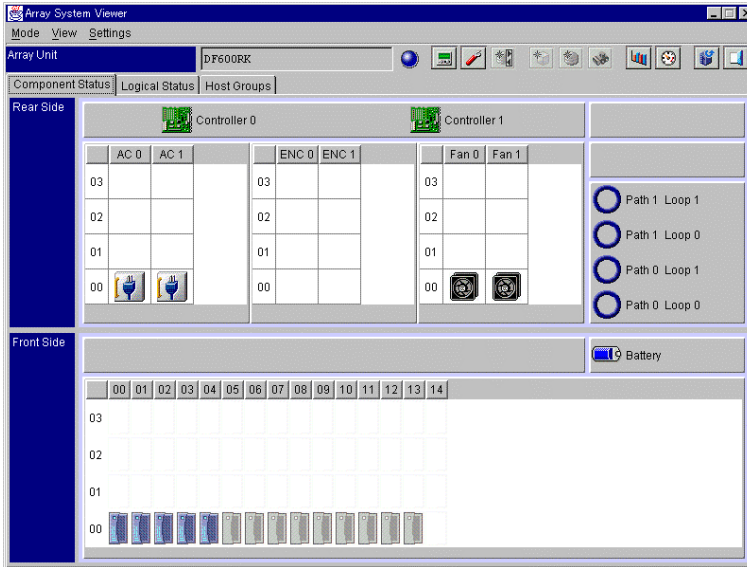



Figure 2.1 Array System Viewer Panel (Component Status Page)

To install the LUN Size Expansion (LUSE) feature:

Note: LUSE is an optional feature requiring a license key. For information on acquiring this feature, contact your Hitachi Data Systems representative.

1. From the **Settings** menu, select **Configuration Settings**. Alternatively, from the tool bar, select the **Configuration Settings**  button.
2. On the resulting Parameter panel, select the **Options** tab.
3. From the resulting **Options** page, unlock the optional feature by using the following (see Figure 2.2):
 - a) Enter a key code in the text box.
 - b) Click the **Unlock** button.
 - c) A message appears requesting confirmation to unlock LUN Size Expansion (LUSE) 9500V. Click the **OK** button.
 - d) In the **Option Name** field, **LUSE-9500V (LUN-EXPANSION)** is displayed and the status is **Enable**.

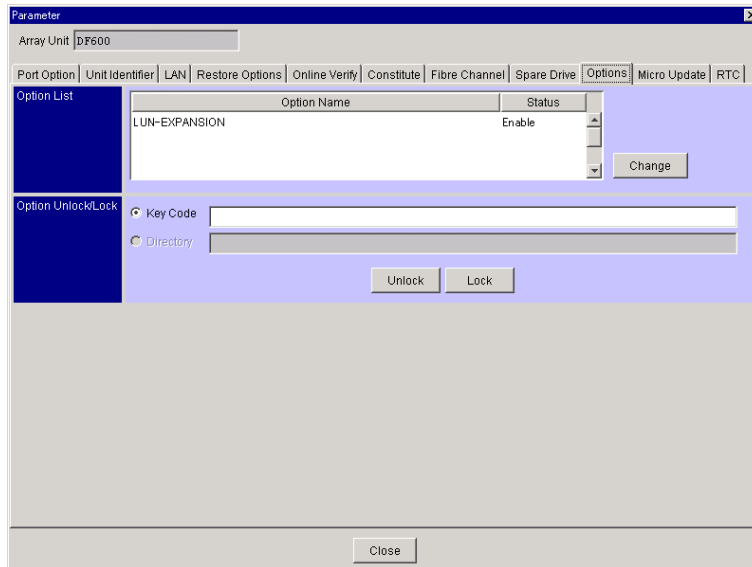


Figure 2.2 Parameter Panel (Unlocked: Enable)

The installation of the LUN Size Expansion (LUSE) 9500V feature is now complete. To perform other operations, connect to the subsystem again and open the Array System Viewer panel.

2.1.2 Uninstalling

When the LUN Size Expansion (LUSE) 9500V feature is uninstalled, it is not available (locked) until it is opened by the key code.

Note: The following condition must be satisfied in order to uninstall the LUN Size Expansion (LUSE) 9500V feature.

- All unified LUs must be separated.


Note: Expanded LUs can be unexpanded and then expanded again.

Note: The status of the LUs and the specification of command devices are not significant factors in this process.

To uninstall LUN Size Expansion (LUSE) 9500V:

LUN Size Expansion (LUSE) 9500V is uninstalled by using Resource Manager (for details, refer to the *Resource Manager 9500V User's Guide for GUI* (MK-92DF605)).

To uninstall LUN Size Expansion (LUSE):

1. Start the Resource Manager 9500V and change the operation mode to **Management Mode** (administrator mode).
2. Register the subsystem (array unit) in which you will uninstall the LUN Size Expansion (LUSE) 9500V feature and connect to the subsystem.
The Array System Viewer panel (refer to Figure 2.1) appears and displays the connected subsystem.
3. From the **Settings** menu, select **Configuration Settings**. Alternatively, from the tool bar, select the **Configuration Settings**  button.
4. On the resulting **Parameter** panel, select the **Options** tab (refer to Figure 2.2).
5. From the resulting **Option** page, lock the LUN Size Expansion (LUSE) feature by doing the following:
 - a) Enter a key code in the text box.
 - b) Click the **Lock** button.
 - c) A message appears requesting confirmation to lock LUN Size Expansion (LUSE) 9500V. Click the **OK** button.

The LUN Size Expansion (LUSE) 9500V feature is now uninstalled (locked). To perform other operations, connect to the subsystem again and open the Array System Viewer panel.

2.2 Enabling or Disabling LUSE


The LUN Size Expansion (LUSE) feature can be set to enable or disable after installation. This allows the LUSE feature to be activated or deactivated without the necessity of using the key code.

Note: The following condition must be satisfied in order to uninstall the LUN Size Expansion (LUSE) feature.

- All unified LUs must be separated.

Note: The status of the LUs and the specification of command devices are not significant factors in this process.

To enable/disable LUN Size Expansion (LUSE):

1. Start the Resource Manager 9500V and change the operation mode to **Management Mode** (administrator mode). For details, refer to the *Resource Manager 9500V User's Guide for GUI* (MK-92DF605).
2. Register the subsystem (array unit) in which you will change the status of the LUN Size Expansion (LUSE) 9500V feature and connect to the subsystem.
The Array System Viewer panel (refer to Figure 2.1) appears and displays the connected subsystem.
3. From the **Settings** menu, select **Configuration Settings**. Alternatively, from the tool bar, select the **Configuration Settings**  button.
4. On the resulting Parameter panel, select the **Options** tab.
The **Options** page (see Figure 2.3) is displayed in front.
5. From the **Option Name** field, select **LUSE-9500V (LUN-EXPANSION)** and then select the **Change** button.
6. A message appears confirming that you want to change the status (enable or disable). Click the **OK** button.

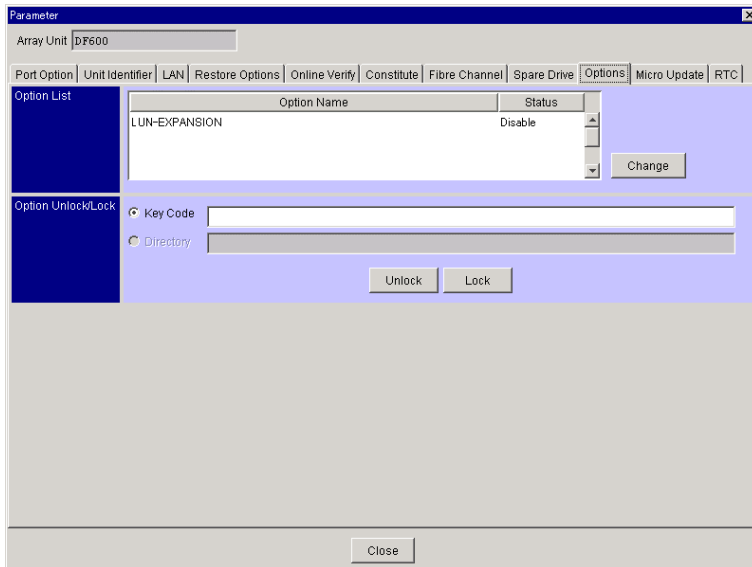


Figure 2.3 Parameter Panel (Unlocked: Disable)

The status of the LUN Size Expansion (LUSE) 9500V feature is now changed (enabled/ disabled). To perform other operations, connect to the subsystem again and open the Array System Viewer panel.

Chapter 3 Performing LUN Size Expansion (LUSE) 9500V Operations (GUI)

This chapter explains how to execute the LUN Size Expansion (LUSE) 9500V feature using the GUI version of the Resource Manager 9500V. This section includes the following:

- Creating a New Logical Unit (see section 3.1)
- Expanding LUs (see section 3.2)
- Unifying LUs (see section 3.3)
- Separating Unified LUs (see section 3.4)
- Separating the Last LU from the Unified LU (see section 3.5)
- Confirming the Status of Unified LUs (see section 3.6)

3.1 Creating a New Logical Unit

More than two LUs are required for unification of LUs. If you don't have a free LU available to use for LUN Size Expansion, create the LU according to your needs. For your convenience, the procedure for creating a LU is summarized below.

To create a new LU:

1. In the **Array Viewer** panel, from the Logical Status page, select the RAID group where you want to create the LU.
2. From the **Settings** menu, select Logical Unit, then select Settings.
3. On the **Logical Unit Property** panel, enter the capacity for the LU in Size, then select the **OK** button.

The LU size is set.

4. A message is displayed when the process is complete. Click the **OK** button.
You will return to the Array System Viewer panel. The LU you created will be displayed.
5. Format the LU.

For details on creating or formatting the LU, refer to the *Resource Manager 9500V User's Guide for GUI* (MK-92DF605).

3.2 Expanding the Last Logical Unit in a RAID Group

You can expand the size of the last LU in a raid group without unifying LUs, using the conventional process. For details, refer to the *Resource Manager 9500V User's Guide for GUI* (MK-92DF605).

3.3 Unifying LUs

Multiple LUs can be combined together to create a **unified LU**.

A unified LU consists of MainLU and SubLU. Once unified, it is recognized as a MainLU from the server. You can combine more LUs (SubLUs) on a unified LU (MainLU); this is referred to as: **Re-unifying LUs**.

Note: Combining unified LU (MainLU) on a LU (SubLU) cannot be performed (i.e., you cannot make a mainLU a subLU of another main LU).

Note: Back up the LU data from the server before unifying LUs. Some servers may have to reboot the system, depending on the operating system. For details, refer to section 1.1.

To unify LUs:

1. Start the Resource Manager 9500V and then connect to the subsystem where you want to operate the LUs. For details, refer to the *Resource Manager 9500V User's Guide for GUI* (MK-92DF605).

The Array System Viewer panel appears and displays the connected subsystem (see Figure 3.1).

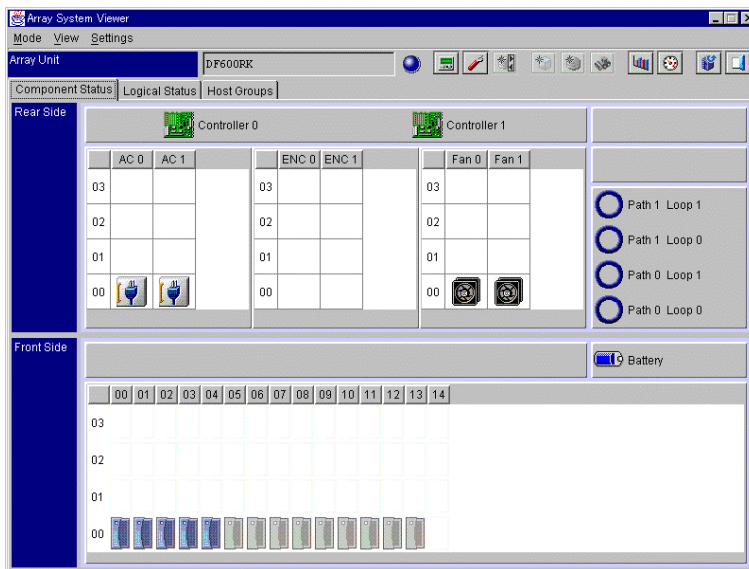


Figure 3.1 Array System Viewer Panel (Component Status Page)

2. On the Array System Viewer panel, select the **Logical Status** tab. The **Logical Status** page is displayed in front (see Figure 3.2).

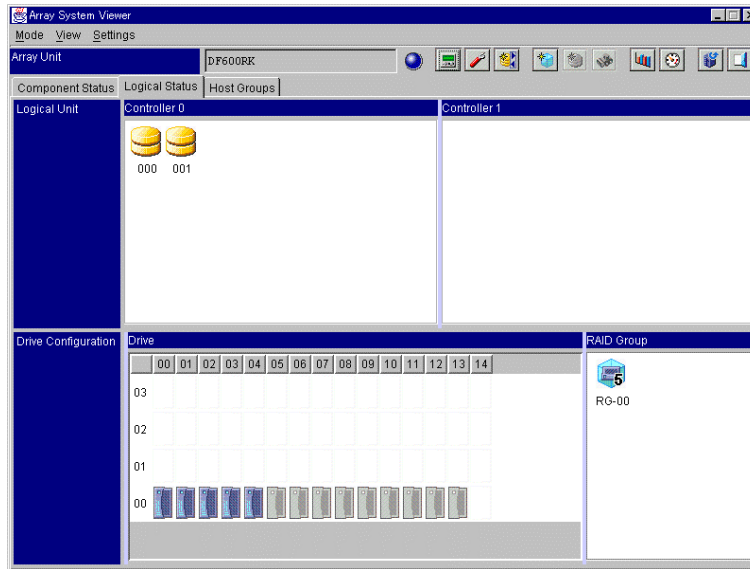


Figure 3.2 Array System Viewer Panel (Logical Status Page)

3. From **Logical Unit** field, select an LU for MainLU.
4. From the **Settings** menu, select **Logical Unit - Unify Logical Units**.

The Unify Logical Units panel opens, displaying the number of the selected LU in the **Main Logical Unit No.** text box (see Figure 3.3).

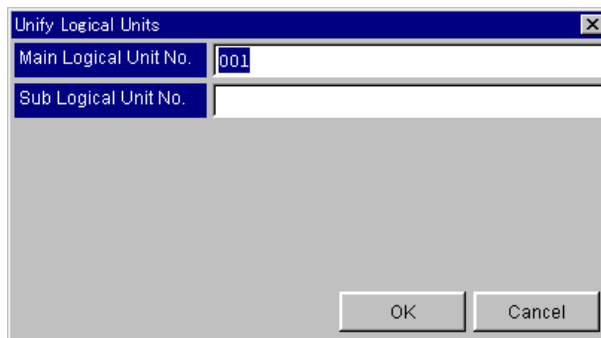


Figure 3.3 Unify Logical Units Panel

5. Enter the number of the SubLU in the **Sub Logical Unit No.** text box, then select the **OK** button.

The Resource Manager 9500V checks the validity of the numbers (the LU numbers must be specified between 0 to 511).

6. When the LU numbers are valid, a message appears asking you to confirm that you want to unify the LUs. Click the **OK** button.


The LUs will be unified. When the process is finished, a completion message is displayed. If a failure occurs, an error message is displayed.

You will return to the Array System Viewer panel. The icons of the unified LU (MainLU) and the SubLU have changed (see section 3.6).

Note: Using the Web Server Function allows you to confirm the operation result. The results are displayed as a Web Information Message and are displayed in a message format. The messages are output in order, from bottom to top (the newest message is displayed at the top).

Figure 3.4 is an example of the Web Information Message.

```
08/20/2002 10:27:29 C0 IH0102 LU unified(UNI:LU-001,M:LU-001,S:LU-002)
```



Unified LU#1 (MainLU) and LU#2 (SubLU)

Figure 3.4 Web Information Message Example for Unification of Logical Units

3.4 Separating Unified LUs

The unification of LUs can be released by separating the unified LU into individual LUs. All LUs combined into the unified LU will be separated.

To separate individual LUs from a unified LU:

1. Start the Resource Manager 9500V. For details, refer to the *Resource Manager 9500V User's Guide for GUI (MK-92DF605)*.

2. Connect to the subsystem from which you want to operate the LUs.

The Array System Viewer panel appears and displays the connected subsystem (refer to Figure 3.1).

3. On the Array System Viewer panel, select the **Logical Status** tab.

The **Logical Status** page is displayed in front (refer to Figure 3.2).

4. From the **Logical Unit** field, select a unified LU.

5. From the **Settings** menu, select **Logical Unit - Separate All Logical Units**.

A message appears asking you to confirm that you want to release the unification of the LUs. Click the **OK** button.

The unification of LUs will be released and all LUs will be separated. When the process is finished, a completion message is displayed. If a failure occurs, an error message is displayed.

You will return to the Array System Viewer panel. You can verify that the individual LUs are separated from the unified LU.

Note: Using the Web Server Function allows you to confirm the operation result. The results are displayed as a Web Information Message and are displayed in a message format. The messages are output in order, from bottom to top (the newest message is displayed at the top).

Figure 3.5 is an example of the Web Information Message.

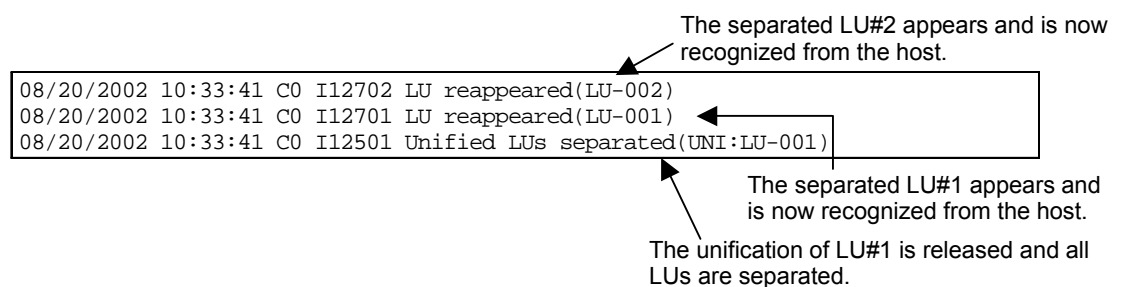


Figure 3.5 Web Information Message Example for Separating the Unified Logical Units

3.5 Separating the Last LU from the Unified LU

The last LU combined into the unified LU can be separated from the unified LU.

To separate the last LU from a unified LU:

1. Start the Resource Manager 9500V. For details, refer to the *Resource Manager 9500V User's Guide for GUI (MK-92DF605)*.
2. Connect to the subsystem from which you want to operate the LUs.
The Array System Viewer panel appears and displays the connected subsystem (refer to Figure 3.1).
3. On the Array System Viewer panel, select the **Logical Status** tab.
The **Logical Status** page is displayed in front (refer to Figure 3.2).
4. From **Logical Unit** field, select an LU for MainLU.
5. From the **Settings** menu, select **Logical Unit - Separate Last from Unified Logical Unit**.
A message appears asking you to confirm that you want to separate the last LU combined into the unified LU. Click the **OK** button.

Only the last LU will be separated. When the process is finished, a completion message is displayed. If a failure occurs, an error message is displayed.

You will return to the Array System Viewer panel. You can verify that the last LU is separated from the unified LU.

Note: Using the Web Server Function enables you to confirm the operation result. The results are displayed as a Web Information Message and are displayed in a message format. The messages are output in order, from bottom to top (the newest message is displayed at the top).

Figure 3.6 is an example of the Web Information Message.

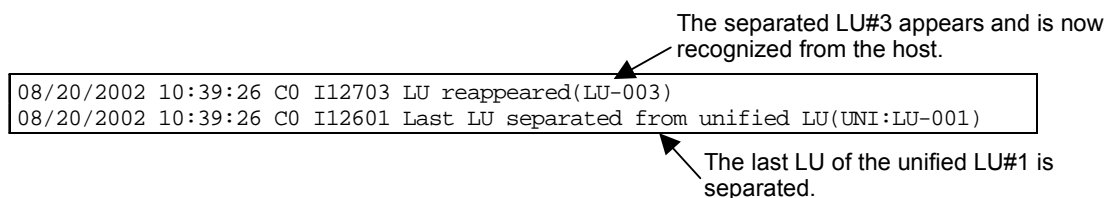







Figure 3.6 Web Information Message Example for Separating the Last Logical Unit

3.6 Confirming the Status of the Unified LUs

The status of unified LUs can be verified using the Resource Manager 9500V. The status is displayed as an icon in the **Logical Status** page of the Array System Viewer panel (refer to Figure 3.2).

Table 3.1 provides details of the Unified LU icons.

Table 3.1 Icons for Unified LUs

Icons	Status	Meaning
 yellow	Normal	Indicates that the unified logical unit is in normal status.
 pink	Regression	Indicates that the unified logical unit is in degenerated status.
 red	Alarm	Indicates that the unified logical unit is in blocked status.
 light gray	Unformat	Indicates that the unified logical unit has not been formatted yet.
 dark gray	Sub Logical Unit	Indicates a SubLU.

You can verify the properties of the unified LU by double-clicking the icon. Alternatively, you can right-click the icon, and from the displayed pop-up menu, select **Properties**.

The Property panel will be displayed (see Figure 3.7).

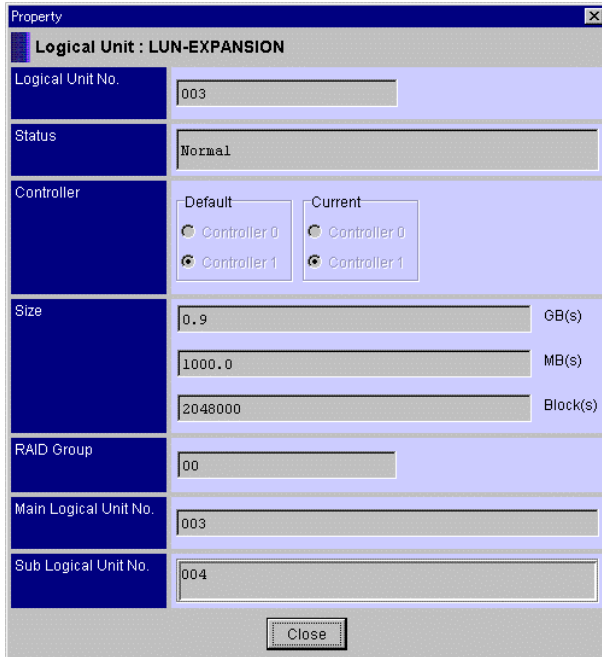


Figure 3.7 Property Panel

Chapter 4 Troubleshooting

4.1 Troubleshooting

The 9500V subsystem provides continuous data availability and is not expected to fail in any way that would interrupt access to user data. For troubleshooting information on the 9500V subsystem or Resource Manager, please refer to the *9500V User and Reference Manual* (MK-92DF601).

4.2 Calling the Hitachi Data Systems Technical Support Center

If you need to call the Hitachi Data Systems Technical Support Center, be sure to provide as much information about the problem as possible. Include the circumstances surrounding the error (or failure) and the exact content of any error codes and/or messages displayed. The worldwide Hitachi Data Systems Technical 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

Appendix A Operations Using CLI

This chapter explains how to execute the LUN Size Expansion (LUSE) 9500V feature using the Command Line Interface (CLI) version of the Resource Manager 9500V. This section includes the following:

- Installing (see section A.1)
- Uninstalling (see section A.2)
- Enabling or Disabling (see section A.3)
- Unifying LUs (see section A.4)
- Separating Unified LUs (see section A.5)
- Separating the Last LU from the Unified LU (see section A.6)

A.1 Installing

LUN Size Expansion (LUSE) 9500V is installed and uninstalled using Resource Manager 9500V.

To install this function, the key code provided with the optional feature is required.

Note: Before installing or uninstalling, make sure that the array unit is in normal operating mode (for details, refer to the *Resource Manager 9500V User's Guide for CLI* (MK-92DF603)). If a failure such as a controller blockade has occurred, installation and uninstallation operations cannot be performed.

To install the LUN Size Expansion (LUSE) 9500V feature using the CLI version of Resource Manager 9500V:

1. From the command prompt, register the subsystem (array unit) in which you will install the LUN Size Expansion (LUSE) 9500V feature and connect to the subsystem.
2. Unlock the optional feature by executing the **auopt** command as follows.

Example:

```
% auopt -unit subsystem-name -lock off -keycode manual-attached-  
keycode  
Password: manager-password  
Option was opened.  
%
```

The installation of the LUN Size Expansion (LUSE) 9500V feature is now complete and the status is "Enable."

A.2 Uninstalling

When the LUN Size Expansion (LUSE) 9500V feature is uninstalled, the LUN Size Expansion feature is not available (locked) until it is opened by the key code.

Note: The following condition must be satisfied in order to uninstall the LUN Size Expansion (LUSE) 9500V feature.

- All unified LUs must be separated.

Note: Expanded LUs can be unexpanded and then expanded again.

Note: The status of the LUs and the specification of command devices are not significant factors in this process.

To uninstall LUN Size Expansion (LUSE) 9500V:

LUN Size Expansion (LUSE) 9500V is uninstalled by using Resource Manager (for details, refer to the *Resource Manager 9500V User's Guide for GUI* (MK-92DF605)).

To uninstall LUN Size Expansion (LUSE):

1. From the command prompt, register the subsystem (array unit) in which you will uninstall the LUN Size Expansion (LUSE) 9500V feature and connect to the subsystem.
2. Lock the optional feature by executing the **auopt** command as follows:

Example:

```
% auopt -unit subsystem-name -lock on -keycode manual-attached-  
keycode  
Password: manager-password  
Option was closed.  
%
```

Execute the **auopt** command to verify that the LUN Size Expansion (LUSE) 9500V feature is locked.

Example:

```
% auopt -unit subsystem-name -refer  
Password: manager-password  
Option name      Status  
DMEC002015: No information displayed.  
%
```

The LUN Size Expansion (LUSE) feature is now uninstalled.

A.3 Enabling or Disabling

The LUN Size Expansion (LUSE) feature can be set to enable or disable after installation. This allows the LUSE feature to be activated or deactivated without the necessity of using the key code.

Note: The following condition must be satisfied in order to uninstall the LUN Size Expansion (LUSE) feature.

- All unified LUs must be separated.

Note: The status of the LUs and the specification of command devices are not significant factors in this process.

To enable/disable LUN Size Expansion (LUSE):

1. From the command prompt, register the subsystem (array unit) in which you will change the status of the LUN Size Expansion (LUSE) 9500V feature and connect to the subsystem.
2. Execute the **auopt** command to change the status (enable or disable) of the **LUN Size Expansion (LUSE)** feature.

The following is an example of how to change the status from enable to disable. To change the status from disable to enable, enter `enable` after the `-st` option.

Example:

```
% auopt -unit subsystem-name -option LUN-EXPANSION -st disable
Password: manager-password
Option modification completed successfully.
%
```

3. Execute the **auopt** command to verify that the LUN Size Expansion (LUSE) 9500V feature status has changed.

Example:

```
% auopt -unit subsystem-name -refer
Password: manager-password
Option name    Status
LUN- EXPANSION  Disable
%
```

The status of LUN Size Expansion (LUSE) 9500V feature is now changed (enabled/disabled).

A.4 Creating a New Logical Unit

More than two LUs are required for unification of LUs. If you don't have a free LU available to use for LUN Size Expansion, create the LU according to your needs. For your convenience, the procedure for creating a LU is summarized below.

To create a new LU:

1. From the command prompt, register the subsystem (array unit) in which you want to create a new logical unit. Connect to the subsystem.
2. Execute the `auluadd` command to create an LU.

Example:

```
% auluadd -unit subsystem-name -lu lu-number -size lu-size -ctl ctl-  
number -rg RG-number
```

```
Password: manager-password
```

```
%
```

3. Format the LU.

For details on creating or formatting the LU, refer to the *Resource Manager 9500V User's Guide for CLI* (MK-92DF603).

A.5 Expanding the Last Logical Unit in a RAID Group

You can expand the size of the last LU in a raid group without unifying LUs, using the conventional process. For details, refer to the *Resource Manager 9500V User's Guide for CLI* (MK-92DF603).

A.6 Unifying LUs

Multiple LUs can be combined together to create a “unified LU.”

A unified LU consists of MainLU and SubLU. Once unified, it is recognized as a MainLU from the server. You can combine more LUs (SubLUs) on a unified LU (MainLU); this is referred to as: “Re-unifying LUs.”

Note: Combining unified LU (MainLU) on a LU (SubLU) cannot be performed (i.e., you cannot make a mainLU a subLU of another main LU).

Note: Back up the LU data from the server before unifying LUs. Some servers may have to reboot the system, depending on the operating system. For details, see section 1.1

To unify LUs:

1. From the command prompt, register the subsystem (array unit) in which you want to create a new LU and connect to the subsystem.
2. Execute the **aulumrg** command to specify the subsystem and LUs (MainLU and SubLU) to be unified. Specify a number from 0 to 511 for LUs; otherwise an error message will be displayed.

Note: The CLI will not check the validity of the LU numbers or verify that the LUs are defined. See the following example.

Example:

```
% aulumrg -unit subsystem-name -lu MainLU-number SubLU-number
Password: manager-password
If the RAID level or the HDU combination of the unifying LUs does not
match, the performance may be degraded.
Are you sure you want to unify the LUs? (y/n [n]): y
%
```

The LUs will be unified. If a failure occurs, an error message is displayed.

3. Execute the **aumluref** command to verify that the LUs are unified. When this command is executed, the MainLU number, unified LU capacity, unified LU status, and the SubLUs are displayed in the order that they were combined into the MainLU.

Note: The capacity of the unified LU can be displayed in a unit of megabytes or blocks. To display in megabytes, add **-m** after the subsystem name.

In the following example, the unified LU is LU#1, SubLU is LU#3, and the capacity is shown in the unit of blocks.

Example:

```
% aumluref -unit subsystem-name
Capacity
LU [block] Status Sub LU
1 1024 Normal 3
%
```

A.7 Separating Unified LUs

The unification of LUs can be released by separating unified LUs into individual LUs. All LUs added to the unified LU will be separated.

To separate unified LUs into individual LUs:

1. From the command prompt, register the subsystem (array unit) in which you want to operate the LU and connect to the subsystem.
2. Execute the **aumludiv** command to specify the subsystem and the unified LU. Specify a number from 0 to 511 for LUs; otherwise an error message will be displayed.

Note: The CLI will not check the validity of the LU numbers or verify that the LUs are defined. See the following example.

Example:

```
% aumludiv -unit subsystem-name -lu unified-LU all
Password: manager-password
Are you sure you want to separate the unified LU into separate LUs?
(y/n [n]): y
%
```

If a failure occurs, an error message is displayed.

3. Execute the **aumluref** command to verify that the LUs from the unified LU are now separated. See the following example.

Example:

```
% aumluref -unit subsystem-name
DMEC002015: No information displayed.
%
```

The unification of the specified LU is released; all the individual LUs are separated.

A.8 Separating the Last LU from the Unified LU

The last LU added to the unified LU can be separated from the unified LU.

To separate the last LU from the unified LU:

1. From the command prompt, register the subsystem (array unit) in which you want to operate the LU. Connect to the subsystem.
2. Execute the **aumludiv** command to specify the subsystem and the unified LU that contains the LU to be separated. Specify a number from 0 to 511 for LUs; otherwise an error message will be displayed.

Note: The CLI will not check the validity of the LU numbers or verify that the LUs are defined. See the following example.

Example:

```
% aumludiv -unit subsystem-name -lu unified-LU last
Password: manager-password
Are you sure you want to separate the last LU from the unified LU?
(y/n [n]): y
%
```

If a failure occurs, an error message is displayed.

3. Execute the **aumluref** command to verify that the last LU has been separated from the unified LU. The following example demonstrates separating the last LU of a unified LU (LU#1) in which SubLUs are combined in order from LU#3 to LU#2.

Example:

```
% aumluref -unit subsystem-name
Capacity
LU [block] Status SubLU
1 1024 Normal 3
%
```

The last LU (LU#2 in this example) that is added to the unified LU is separated and is not displayed as unified LU data.

Acronyms and Abbreviations

CLI	command line interface
DAMP	disk array management program (now referred to as Resource Manager 9500V)
FDD	floppy disk drive
GUI	graphical user interface
LU	logical unit
LUN	logical unit number
LUN-CONCAT	a command previously referred to as LU-EXPANSION
Resource Manager	previously known as disk array management program

Index

A

Alarm (blocked status), 5, 19

B

blocked (Alarm status), 5

C

confirming status of unified LUs

using GUI, 19

controller in charge, 5

creating a new LU

using CLI, 26

using GUI, 13

D

data assurance, 5

degenerated (Regression status), 5, 6

disk drive blockage, 6

disk for extended LU, 3

Drive Detach Mode, 3, 5

E

enabling/disabling LUN Size Expansion (LUSE)

using CLI, 25

using GUI, 11, 25

expanding the last LU in a RAID group

using CLI, 26

using GUI, 13

F

function specifications and restrictions, 4

I

increasing LU size, 1

installing LUN Size Expansion (LUSE)

using CLI, 23

using GUI, 7

L

LU attribute, 4

LU blockage, 4

LU configuration, 4

LU size, 1

LU size expansion, 4

LU size to be reported to the host, 4

LU statuses, 4

LU unification, 4

LUN mapping, 4

LUN Size Expansion (LUSE)

overview, 1

LUN Size Expansion (LUSE) 9500 Feature

requirements, 4

M

MainLU, 4, 14, 27

N

Normal status, 5, 19

number of logical units, 4

O

overview

LUN Size Expansion (LUSE), 1

P

Parameter panel, 12

partition for extended LU, 3

R

RAID level, 6

Regression (degenerated status), 5, 19

Resource Manager, 3

restrictions, 4

re-unifying a unified LU, 3

re-unifying LUs, 4

S

separating the last LU from a unified LU

using CLI, 29

using GUI, 18

separating unified LUs

using CLI, 28

using GUI, 17

statistical information, 5

status of unified LU, 5

statuses

Alarm (blocked status), 19

Normal, 19

Regression (degenerated status), 19

Unformat, 19

SubLU, 4, 14, 19, 27

system management procedure, 3

T

technical support, 21

trace data, 5

troubleshooting, 21

U

Unformat status, 5, 19

unified LUs, 1

unifying LUs, 1

using CLI, 27

- using GUI, 14
- uninstalling LUN Size Expansion (LUSE)
 - using CLI, 24
 - using GUI, 9
- user interface, 4

W

- Web Information Message, 16, 17, 18
- Web Server Function, 4, 16, 17, 18