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Preface

This manual describes the operation methods that NEC Storage Manager (hereinafter may be referred to as iSM) clients need to set the Disk Array Subsystem (hereinafter may be referred to as disk array) and reference the configuration information from the GUI (Graphical User Interface). It is also possible to use the CLI (Command Line Interface) to set the disk array configuration or reference the configuration information, etc. (see the NEC Storage Manager Configuration Setting Tool User’s Manual (IS002))

As its readers, this manual is aimed at those who have professional knowledge of disk array. For information on the disk array functions, refer to the NEC Storage Manager User’s Manual.

Refer to the “NEC Storage Manager Manual Guide” (IS901) for the overview of NEC Storage Manager and the related manuals.

Remarks
1. This manual explains functions implemented by the following program products:
   - NEC Storage Manager and NEC Storage BaseProduct
   - NEC Storage PerformanceMonitor
   - NEC Storage ReplicationControl
   - NEC Storage ReplicationControl SQL Option
   - NEC Storage AccessControl
   - NEC Storage PerformanceOptimizer
   - NEC Storage ReallocationControl

2. This manual is applicable to the program products of the following versions:
   - NEC Storage Manager Ver2.1
   - NEC Storage BaseProduct Ver2.1

3. The term “iSM” in this text refers to all the NEC Storage Manager program products.

4. Trademarks and registered trademarks
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   - UNIX is a registered trademark of The Open Group in the United States and other countries.
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   - Solaris is a registered trademark of Sun Microsystems, Inc. in the United States.
   - Linux is a trademark or registered trademark of Mr. Linus Torvalds in the United States and other countries.

   Other product names and company names, etc. are registered trademarks or trademarks of the associated companies.

5. In this document, matters to which careful attention needs to be paid will be described as follows:
   Be sure to observe the contents.
If the indications are ignored and the system is improperly operated, settings which have been already made might be affected.

<table>
<thead>
<tr>
<th>Type of Indication</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Describes contents which require special attention during operation.</td>
</tr>
<tr>
<td></td>
<td>Describes limitations to operation and similar information.</td>
</tr>
</tbody>
</table>

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Part I Overview
Chapter 1 Storage Overview

This chapter explains the overview of the NEC Storage series disk array, which is the object of the iSM management. iSM is software that provides the operation and a variety of information (configuration, status, etc.) of the NEC Storage series disk array. Therefore, to understand the iSM functions and to use the iSM efficiently, knowledge of disk array is required. The outline of disk array necessary to use for iSM is explained in the following sections.

1.1 NEC Storage Series Disk Array

The outline of the NEC Storage series disk array which is the object of the iSM management is explained below.

(1) NEC Storage 4000 series

NEC Storage 4000 Series, high-end disk array of the NEC Storage Series, realizes high scalability (up to 10 extended cabinets can be connected to a basic cabinet and up to 1200 PDs can be mounted) and high availability (all components have redundancy) and displays stable performance. Furthermore, it provides the function to replicate logical disks (DynamicDataReplication and RemoteDataReplication) in and between disk arrays, which enables backup and batch processing to be performed in parallel with the main function.

(2) NEC Storage 3000 series

NEC Storage 3000 Series, mid-range disk array that can handle key business of the NEC Storage Series, realizes high scalability (up to 2 extended cabinets can be connected to a basic cabinet and up to 240 PDs can be mounted) and high availability (all components have redundancy) and displays stable performance. Furthermore, it supports functions equivalent to all of the solutions (DynamicDataReplication, RemoteDataReplication, etc.) provided by NEC Storage 4000 Series, the high-end disk array, thereby efficiently performing business.

(3) NEC Storage 2000 series

NEC Storage 2000 Series, mid-range disk array of the NEC Storage Series, realizes high scalability (up to 14 disk enclosures can be extended) and high availability (main components have redundancy). Furthermore, it provides a function to replicate logical disks (DynamicDataReplication) in the disk array, which enables effective backup and batch processing.
(4) NEC Storage 1000 series

NEC Storage 1000 series, entry model disk array of the NEC Storage series, realizes the little space consuming (One controller and maximum of 15 PDs may be loaded to 3U) and high availability (main components are redundant).

1.2 Disk Array Configuration

(1) Components

The NEC Storage series disk array is composed of Disk Array Controller (DAC), which carries the component of control systems, such as host director, disk director and cache, and disk enclosure (DE) that carries two or more Physical Disks controlled by DAC.

Figure 1-1  Disk Array Composition (NEC Storage 4000 series)
Chapter 1 Storage Overview

Figure 1-2 Disk Array Composition (NEC Storage 3000 series)

Figure 1-3 Disk Array Composition (NEC Storage 2000 series)

Figure 1-4 Disk Array Composition (NEC Storage 1000 series)
<Components identification>
In the NEC Storage 4000/3000 series disk array, the cabinet composed of Disk Array controller and two or more disk enclosures is called as “Basic Cabinet (BC)” and the cabinet that is composed of plural disk enclosures to be connected to basic cabinet is called as “Extended Cabinet (EC)”. NEC Storage 4000/3000 series can mount 10 or 15 Physical Disks (PDs) per disk enclosure, and 4 disk enclosures are managed as 1 group (array group). Individual PD has identification number per PD management group (PD group) that includes the above 4 array groups. Thus the combination of PD group number and PD position number enables identifying of the physical mounting place of the PDs.

In the same way, unique identification number is assigned to other components in disk enclosure (shown below), per controller unit, and this identification number enables components in the same disk enclosure to be specified. But assignment of identification number depends on number of component in disk enclosure.

NEC Storage 2000 series is also composed of DAC and one or more disk enclosures. (There has no concept of basic cabinet and extended cabinet as in NEC Storage 4000 series). It can mount 10 or 15 Physical Disks (PDs) per disk enclosure. PD management group (PD group) is defined depending on the connection relation to disk array controller. (PDs connected to the same group are defined as one PD group). There is no concept of array group.

In the NEC Storage 1000 series disk array, DAC and DE which are in different cabinets in NEC Storage 2000 series are put in the same cabinet. 15 Physical Disks (PD: Physical Disk) can be carried in DAC part. Because there is not the concept of array group, the Physical Disks connected to the same loop are managed as one group (PD group).
Chapter 1  Storage Overview

<NEC Storage 4000 series>

[Diagram showing the components and connections of NEC Storage 4000 series]

<NEC Storage 3000 series>

[Diagram showing the components and connections of NEC Storage 3000 series]
Chapter 1  Storage Overview

<NEC Storage 2000 series>

Figure 1-5  Disk array components
<Components>

Disk array components are shown below.

<table>
<thead>
<tr>
<th>Component (abbreviation)</th>
<th>Configuration devices (abbreviation)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk Array Controller (DAC)</td>
<td>Host Director (HD)</td>
<td>Host interface control and cache module control device. 1 or 2 ports are mounted in single director.</td>
</tr>
<tr>
<td>Replication Director (RD)</td>
<td>Control part of DynamicDataReplication and RemoteDataReplication function. 2 ports are mounted in single director.</td>
<td></td>
</tr>
<tr>
<td>Disk Director (DD)</td>
<td>Disk array control device. 4 ports are mounted in single director.</td>
<td></td>
</tr>
<tr>
<td>Cache Module Card (CHE)</td>
<td>Cache memory</td>
<td></td>
</tr>
<tr>
<td>Service Processor Card (SVP)</td>
<td>Processing part that provides various interfaces (maintenance PC, Ether, modem, SCBI) to perform power supply control and maintenance.</td>
<td></td>
</tr>
<tr>
<td>Temperature Alarm (DAC_TEMP_ALM)</td>
<td>Temperature abnormality detection part with temperature sensor, in DAC (Disk Array Controller).</td>
<td></td>
</tr>
<tr>
<td>Panel (PANEL)</td>
<td>External panel composed of status display part of disk array, and system power on/off switches.</td>
<td></td>
</tr>
<tr>
<td>Fan (DAC_FANU/FANL)</td>
<td>Cooling fan to maintain the constant temperature inside of the controller. There are two types: Upper and Lower.</td>
<td></td>
</tr>
<tr>
<td>Power Supply (DAC_PS)</td>
<td>Power supply part in DAC.</td>
<td></td>
</tr>
<tr>
<td>Battery Backup Unit (DAC_BBU)</td>
<td>Power supply part to hold data of cache module in DAC.</td>
<td></td>
</tr>
<tr>
<td>Basic Cabinet Junction Box (BC_JB)</td>
<td>Connection part of AC power cable in the basic cabinet. It supplies electric power for components (configuration devices) of cabinet.</td>
<td></td>
</tr>
<tr>
<td>Back Board (DAC_BB)</td>
<td>Back board connecting each component (configuration devices) in DAC.</td>
<td></td>
</tr>
</tbody>
</table>
Table 1-1  Component list (2/2)

<table>
<thead>
<tr>
<th>Component (abbreviation)</th>
<th>Configuration devices (abbreviation)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan (DE_FAN)</td>
<td></td>
<td>Cooling fan in DE to maintain the constant temperature inside of the unit.</td>
</tr>
<tr>
<td>Adapter Card (DE_ADP)</td>
<td></td>
<td>Adapter Card for connection between PD and DD.</td>
</tr>
<tr>
<td>Extended Cabinet Junction Box (EC_JB)</td>
<td></td>
<td>Connection part of AC power cable in the extended cabinet. It supplies electric power to components (configuration devices) of cabinet.</td>
</tr>
<tr>
<td>Temperature Alarm (DE_TEMP_ALM)</td>
<td></td>
<td>Temperature abnormality detection part with temperature sensor in DE.</td>
</tr>
<tr>
<td>Back Board (DE_BB)</td>
<td></td>
<td>Back board connecting each component (configuration devices) in DE.</td>
</tr>
<tr>
<td>Physical Disk (PD)</td>
<td></td>
<td>Physical Disk</td>
</tr>
<tr>
<td>Logical Disk (LD)</td>
<td>Logical Disk (disk from operation host side)</td>
<td></td>
</tr>
</tbody>
</table>

(2) Logical disk configuration

In disk array, RAID is built from virtual media that bind two or more physical disks (PDs). These virtual media are called “RANK” in the NEC Storage series disk array, and disk that RANK is subdivided to easy-to-use size, is called logical disk (LD). On this account, one LD can store data to two or more PDs that configure RANK.
1.3 Component State Value

As follows, iSM defines the status in disk array component mentioned in the previous section.
Level definition of status value corresponds to the level that output to event log. If transition from other status is detected, the status is output to system according to this status level.

Table 1-2 Status Value List

<table>
<thead>
<tr>
<th>Status value</th>
<th>Level</th>
<th>Description</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal (ready)</td>
<td>info</td>
<td>All component functions operate normally.</td>
<td>--</td>
</tr>
<tr>
<td>Attention (attn)</td>
<td>notice</td>
<td>Some component functions do not operate normally and requires attention. (Data access from operation host is possible).</td>
<td>Maintenance is required if trouble occurred except during maintenance work</td>
</tr>
<tr>
<td>Fault (fault)</td>
<td>warning/error</td>
<td>Component stop functioning because of fault. If data access from operation host is possible (=single fault), the level is “warning”, and if data access from operation host is impossible (=double fault), it is “error”.</td>
<td>Maintenance is required immediately.</td>
</tr>
<tr>
<td>Offline (offline)</td>
<td>notice</td>
<td>Component is separated.</td>
<td>Maintenance is required if trouble occurred except during maintenance work</td>
</tr>
</tbody>
</table>
Chapter 2  Overview of Disk Array Configuration Setting

Chapter 2 provides an overview of the disk array configuration setting, which is used to make various settings for the disk array.

2.1 Disk Array Configuration Setting

The disk array Configuration Setting is a function for setting the configuration when initializing the disk array and when extending the physical disks. This operation can be performed by using a GUI from the iSM client.

![Configuration Setting Outline](image)

Figure 2-1  Configuration Setting Outline
## 2.2 Parameter List

The parameters for the NEC Storage 1000/2000 series and 3000/4000 series disk arrays in setting and reference modes (rebuild instruction) are listed in Table 2-1.

<table>
<thead>
<tr>
<th>Setting screen</th>
<th>Parameter</th>
<th>NEC Storage 1000/2000 series</th>
<th>NEC Storage 3000/4000 series</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Setting Mode</td>
<td>Reference (Rebuild Instruction) Mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L3*</td>
<td>L1/L2*</td>
</tr>
<tr>
<td>LD Batch Binding</td>
<td>LD Batch Binding</td>
<td>√</td>
<td>–</td>
</tr>
<tr>
<td>Nickname Batch Setting</td>
<td>Nickname Batch Setting</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Replication Batch Setting</td>
<td>Replication Batch Setting</td>
<td>√</td>
<td>–</td>
</tr>
<tr>
<td>Rank/spare</td>
<td>RANK Bind</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>RANK Unbind</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>RANK Information</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Capacity Expansion</td>
<td>√</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Change Rebuild Time</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Rebuild Start Instruction</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Spare Bind</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Spare Unbind</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>PD Information</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>LD</td>
<td>LD Bind</td>
<td>√</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>LD Unbind</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>LD Information</td>
<td>√</td>
<td>&gt;</td>
</tr>
<tr>
<td></td>
<td>Change Ownership</td>
<td>√</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Change Format Time</td>
<td>√</td>
<td>–</td>
</tr>
<tr>
<td>Nickname</td>
<td>Setting Disk Array Name</td>
<td>√</td>
<td>&gt;</td>
</tr>
<tr>
<td></td>
<td>Setting Port Name</td>
<td>√</td>
<td>&gt;</td>
</tr>
<tr>
<td>Platform</td>
<td>Setting Port Platform</td>
<td>√</td>
<td>&gt;</td>
</tr>
<tr>
<td>Network</td>
<td>Setting Network</td>
<td>√</td>
<td>&gt;</td>
</tr>
<tr>
<td>License</td>
<td>Unlocking License</td>
<td>√</td>
<td>–</td>
</tr>
<tr>
<td>Special</td>
<td>Cross Call</td>
<td>√</td>
<td>&gt;</td>
</tr>
<tr>
<td></td>
<td>Auto Assignment</td>
<td>√</td>
<td>&gt;</td>
</tr>
<tr>
<td></td>
<td>Spare Mode</td>
<td>√</td>
<td>&gt;</td>
</tr>
<tr>
<td></td>
<td>Expand LUN</td>
<td>√</td>
<td>&gt;</td>
</tr>
<tr>
<td></td>
<td>Change Disk Array Time</td>
<td>√</td>
<td>&gt;</td>
</tr>
<tr>
<td></td>
<td>Get Log</td>
<td>√</td>
<td>&gt;</td>
</tr>
<tr>
<td>AccessControl</td>
<td>Access Control</td>
<td>√</td>
<td>&gt;</td>
</tr>
<tr>
<td>LD Administrator Setting</td>
<td>Access Control</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Initialization of Logical Disk</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Initialization of EVN</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Performance Optimization</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Get Configuration Information</td>
<td>Get Configuration Information</td>
<td>√</td>
<td>&gt;</td>
</tr>
</tbody>
</table>

√: Settable, >: Reference only, <: Reference/Rebuild Instruction mode only, -: Inoperable

*: Refer to 6.2 “Operating Range” for L1 to L3 (levels 1 to 3).
Chapter 3  Nickname

Chapter 3 describes the overview of the nickname function.

3.1  Nickname

Nicknames refer to any names that can be set for the disk array, the logical disk and the port respectively with regard to iSM’s management target disk array. Since the names thus set are stored in the disk array, they are held regardless of whether iSM or NEC Storage is restarted or not. Each parameter is outlined below.

(1)  Disk Array Name
    Refers to any ID name for iSM’s management target disk array. When the disk array is specified with iSM, the disk array name is used.

(2)  LD Name
    Refers to any ID name for a logical disk in iSM’s management target disk array. When the logical disk is specified with iSM, the LD name is used.

(3)  Port Name
    Refers to any ID name for a port in iSM’s management target disk array. When the port is specified with iSM, the port name is used.

3.2  Method of Using Nicknames

Before operating the disk array, users can perform efficient management of the disk array by setting the ID information with the nickname.
Chapter 4 describes logical disks and spares.

4.1 Logical Disk

The overview of logical disks required for binding logical disks is described below.
Chapter 4  Logical Disk Bind

### 4.1.1 Logical Disk

The logical disks in the disk array are equivalent to the physical disk when viewed from the OS. In the OS, this physical disk is partitioned to be managed as multiple logical disks. In the disk array, multiple physical disks are bound as a RANK, which is then divided to form logical disks.

---

**Figure 4-1  Physical Disks and Logical Disks**

*1  When the OS is used to support the volume group and the software RAID, etc.
*2  The PD group refers to a management aggregate of physical disks consisting of one or more DEs.
*3  The disk enclosure (DE) refers to a management aggregate of 10 to 15 physical disks.
*4  The physical disk number and the RANK number are given in terms of each PD group.
4.1.2 Method of Binding Logical Disks

Bind logical disks in accordance with the following procedure in terms of each PD group of the disk array.

1. **Spare Bind**
   - It is necessary to set Spares in accordance with their applications. For information on Spares, refer to 4.2 “Spare Functions”.

2. **RANK Bind**
   - After considering the RAID characteristics, bind the RANKs of the RAID type suitable to the application. Refer to Appendix C “RAID” for the types of RAID.
   - In RANK binding, pay attention to the fact that the maximum capacity of the logical disk is less than the RANK capacity.

3. **LD Bind**
   - Bind the logical disk with the most suitable capacity in accordance with its application. When using data replications, it is impossible to set a pair unless the logical disk capacity is the same; therefore, it is necessary to bind logical disks of the same capacity beforehand.

4.2 Spare Function

When binding RANKs other than RAID0, data are still in the disks even when a single physical disk fails. However, if one more physical disk fails, data may be in danger of being lost.

To cope with this situation, the reliability of the disk array can be enhanced further by switching to a reserve (i.e. Spare) disk which is set beforehand, at the point when a physical disk fails.

4.2.1 Spare

Spares can be set for physical disks which are not used in RANK binding, thus making it possible to recover data to a Spare in the same PD group when a physical disk fails. When recovery to Spares is started, the RANK is rebuilt and the Spares become physical disks which comprise the RANK. The failed physical disk can be replaced without stopping the access to the disk array. Considering the physical layout, it is normally desirable to set one Spare disk per DE for the physical disk in the rightmost slot in the DE.

4.2.2 Repair Mode

If one of the physical disks configuring the logical disks fails, data can be rebuilt during operation. The repair mode can be set in either of two types: manual and automatic.

- When the repair mode is manual, the RANK including the failed physical disk is placed in the rebuilt wait state, thus requiring a rebuild start instruction for data rebuilt to the Spare or replaced physical disk.
- When the repair mode is automatic, data recovery to the Spare is automatically started on the RANK including the failed physical disk (In this case, the Spare replaces the failed physical disk.)
- If the repair mode is automatic while a Spare is not set, the data repair to the replaced physical disk is automatically started by replacing the failed physical disk.

Since the initial value is ON (automatic repair), it is normally desirable to operate the program in the ON state (initial value).
Chapter 5  Access Management

Chapter 5 describes the overview of the Cross Call and the Access Control. For the Cross Call, the Cross Call functions and the Auto Assignment functions are described. For the Access Control, the port Mode’s Access Control and the WWN (World Wide Name) mode’s Access Control are described.

5.1  Cross Call

5.1.1  Function

The NEC Storage series disk array has the Cross Call function and the NEC Storage 3000/4000 series disk array is fixed to ON. However, for the NEC Storage 1000/2000 series disk array, it is possible to change the settings from iSM.

(1)  Cross Call function OFF (Initial value)

In this state, it is possible to access from the controller (HD) of which you have the ownership*.

(2)  Cross Call function ON

In this state, it is possible to access all the logical disks from both controllers (HD).

By using the Cross Call function, it is possible to access from the alternate path even when HDs have failed thus minimizing the impact on the operation. However, a precondition for this is to use the path switching function, etc.

* The ownership is set in terms of each logical disk to define which controller the disk can be accessed from. This function is meaningless when the Cross Call function is ON.
The Cross Call function can be set by using iSM. The initial value of the disk array is Cross Call function OFF. When using the program at Cross Call function OFF, pay attention to the ownership of the logical disk. If the connected controller (HD) and the ownership do not match, it is impossible to detect the logical disk from the OS. When using the alternate path switching function of the business server, the Cross Call function must be set to ON.

**Figure 5-1  Schematic Diagram of Cross Calls**

- **5.1.2 Setting**

  The Cross Call function can be set by using iSM. The initial value of the disk array is Cross Call function OFF. When using the program at Cross Call function OFF, pay attention to the ownership of the logical disk. If the connected controller (HD) and the ownership do not match, it is impossible to detect the logical disk from the OS. When using the alternate path switching function of the business server, the Cross Call function must be set to ON.
5.2 Auto Assignment

5.2.1 Function

This function is valid only when the Cross Call function is OFF.

When the controller (HD) with the ownership fails, this function makes it possible to access any of the logical disks of the disk array from the controller (HD) without the ownership. The changed state is maintained until the power of the disk array is turned back on or until a change is made with this software.

When this function is in operation, it is necessary to detect the logical disk from the OS once again. The detection method varies with the OS. For details, refer to Table 5-1.

---

![Schematic Diagram of Auto Assignment](image)

**In the normal state, LD0 can be accessed from HD0 only; and LD1 from HD1 only.**

**Failure with HD1**

**LD1’s ownership changed to HD0**

---

Figure 5-2  Schematic Diagram of Auto Assignment
Chapter 5  Access Management

Table 5-1  Logical Disk Recognition Methods

<table>
<thead>
<tr>
<th>OS</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP-UX</td>
<td>Commands such as “ioscan”</td>
</tr>
<tr>
<td>Solaris</td>
<td>“format” command after enabling the system to recognize the disk by</td>
</tr>
<tr>
<td></td>
<td>rebooting for re-configuration or by using the “devfsadm” command</td>
</tr>
<tr>
<td></td>
<td>(from Solaris8)</td>
</tr>
<tr>
<td>Windows2000</td>
<td>“Disk management” → “Rescan Disks”</td>
</tr>
</tbody>
</table>

5.2.2 Setting

It is possible to set the Auto Assignment function (to determine whether to use the path switching function or not when in failure) by using iSM.

When the Cross Call is in the OFF state, it is made possible to continuously use the disk array even during controller failure by using this function if connecting two paths from a single host system.

In this case, however, it is necessary to detect the logical disk from the OS in the methods shown in Table 5-1.
5.3 Access Control

The Access Control is available in two modes: the port mode, which functions in terms of each disk array port, and the WWN (World Wide Name) mode, which functions in terms of each business server HBA (Host Bus Adaptor). The respective functions are described below.

If using a disk array before x300 series, refer to Edition 4 (IS 007-4) of this manual about explanation in the port mode.

5.3.1 Port Mode

(1) Function

This function, which can set the accessible logical disk in terms of each disk array port, allows the access management for the logical disk in terms of each business server connected to each port of the disk array.

![Schematic Diagram of Access Control (Port Mode)](image)

Figure 5-3  Schematic Diagram of Access Control (Port Mode)
Table 5-2  Setting HD Numbers and LD Numbers

<table>
<thead>
<tr>
<th>HD No.</th>
<th>00</th>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
<th>06</th>
<th>07</th>
<th>08</th>
<th>09</th>
<th>0a</th>
<th>0b</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>√</td>
<td>√</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>√</td>
<td>√</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>-</td>
<td>√</td>
<td>√</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>√</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>√</td>
</tr>
</tbody>
</table>

✓: Sets the HD number and LD number as being accessible.
-: Sets the HD number and LD number as being inaccessible.

According to the settings in Table 5-2:
- Business server A can access logical disks LD00, LD01, LD06 and LD07 through ports HD0 and HD1.
- Business server B can access logical disks LD02, LD03, LD08 and LD09 through port HD2.
- Business server C can access logical disks LD04 and LD0a through port HD3.
- LD05 and LD0b cannot be accessed from any business server.

This function can divide the logical disks which bind the disk array into logical disk groups and set whether to restrict the access or not in terms of each port. Data protection and security protection, etc. in terms of each business server connected to each port can be achieved through this function.

(2) Setting

This mode can be set through the configuration setting screen of the iSM client.
5.3.2 WWN Mode

(1) Function

This function, which can set the accessible logical disk in terms of each business server HBA (Host Bus Adaptor), can set whether the logical disk is accessible or not in terms of each server. The HBA has the only ID code called WWN (World Wide Name). Use this code to set the WWN which allows access to logical disks.

![Schematic Diagram of AccessControl(WWN Mode)](image)

Figure 5-4  Schematic Diagram of AccessControl(WWN Mode)
Table 5-3 Setting WWN and LD Numbers

<table>
<thead>
<tr>
<th>LD No.</th>
<th>00</th>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
<th>06</th>
<th>07</th>
<th>08</th>
<th>09</th>
<th>0a</th>
<th>0b</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBA 0</td>
<td>√</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>HBA 1</td>
<td>√</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>HBA 2</td>
<td>-</td>
<td>-</td>
<td>√</td>
<td>√</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>√</td>
<td>√</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HBA 3</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>√</td>
<td>√</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HBA 4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>√</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>√</td>
<td>-</td>
</tr>
</tbody>
</table>

√: Sets HBA’s WWN and LD number as being accessible.
-: Sets HBA’s WWN and LD number as being inaccessible.

According to the settings above:
- Business server A can access logical disks LD00, LD01, LD06 and LD07.
- Business server B can access logical disks LD02, LD03, LD08 and LD09.
- Business server C can access logical disks LD04 and LD0a.
- LD05 and LD0b cannot be accessed from any business server.

This function can divide the logical disks which bind the disk array into logical disk groups in terms of each business server HBA (Host Bus Adaptor), thus enlarging the degree of freedom of the system configuration. It can also restrict the access in terms of each server, thus making possible data protection and security protection, etc.

(2) Setting

When setting this mode, it is possible to use the iSM client’s configuration setup screen.
The concept of “LD Set” is introduced in AccessControl to incorporate multiple ports of disk arrays and logical disks in multiple WWNs. The purpose of this function is to define multiple access paths together which a single business server sometimes has in duplication of I/O paths or in clustering of business servers, etc.

Since all the ports and WWNs defined as the paths of LD Sets have the setting for accessibility to the same logical disk, the defining is easy thus making it difficult to make mistakes due to setting delays.

Even regarding post-setting addition/deletion, all the settings for ports and WWNs take effect through a single operation on the LD Sets, which in turn makes the maintenance easy.

Figure 5-5  Schematic Diagram of AccessControl
5.3.4 Difference between Port Mode and WWN Mode

The port mode, which is based on the physical style of connection, and the WWN mode, whose setting can be done through software, is equivalent in terms of setting the accessibility from the connecting server. However, they differ in the number of connecting servers. For details, refer to Table 5-4.

<table>
<thead>
<tr>
<th>Access mode</th>
<th>Disk array</th>
<th>Maximum Number of Connected Ports*/Number of HBAs (WWNs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port</td>
<td>NEC Storage 1000 series</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>NEC Storage 2000 series</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>NEC Storage 3000 series</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>NEC Storage 3300 series</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>NEC Storage 4000 series</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>NEC Storage 4300 series</td>
<td>64</td>
</tr>
<tr>
<td>WWN</td>
<td>NEC Storage 1000 series</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>NEC Storage 2000 series</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>NEC Storage 3000 series</td>
<td>256</td>
</tr>
<tr>
<td></td>
<td>NEC Storage 4000 series</td>
<td>256</td>
</tr>
</tbody>
</table>

* The maximum number is halved when the alternate path switching function, etc. are used.

The number here applies to the case that the number of mounted HDs in the disk array is maximized.
5.4 Conclusion

The relationship of setting the Cross Call, the Auto Assignment and the Access Control is shown in Table 5-5.

<table>
<thead>
<tr>
<th>Cross Call</th>
<th>Auto Assignment</th>
<th>Access Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Port</td>
</tr>
<tr>
<td>ON</td>
<td>Invalid</td>
<td>Can be set*</td>
</tr>
<tr>
<td>OFF</td>
<td>Valid</td>
<td>Cannot be set</td>
</tr>
</tbody>
</table>

* When setting this mode, consult a customer engineer.
Chapter 6 User Level

Chapter 6 describes the overview of the user levels.

6.1 User Level

This software defines the user level and limits the range of operability. Therefore, users of the iSM client are required to set the user level beforehand. The setting is defined on the iSM side.

6.2 Operating Range

Set level 1 to 3 as a user level. The following shows target users and executable functions at each level:

- Level 1 (L1):
  This level is defined for general users. The users are permitted to perform only reference operation focusing on status display or monitoring.

- Level 2 (L2):
  This level is defined for operators. The operators are permitted to perform the level 1 operations and execute functions necessary for daily operations.

- Level 3 (L3):
  This level is defined for system administrators. The system administrators are permitted to execute all functions including various settings for disk arrays.

After connection to the iSM server, the user level is displayed on the status bar of the iSM client, and only those functions allowed on the relevant level are made executable. Refer to 2.2 “Parameter List” for levels of users who are permitted to execute the configuration setting function.
Chapter 7 describes the overview of the LD Administrator. In LD Administrator, it is necessary to perform setting/canceling of information on accessibility from the business server to logical disks by using AccessControl. Also read “Chapter 5 Access Management”.

If using a disk array to which the program product “NEC Storage AccessControl(WN)” is applied, read AccessControl(WN) as AccessControl and NEC Storage AccessControl(WN) as NEC Storage AccessControl in this chapter.

### 7.1 Overview

This software provides functions to pool spare disks in respective servers and dynamically add disks according to the necessity as described below.

- Setting and canceling of information on accessibility from the business server to logical disks by using AccessControl
- Operation of logical disks inaccessible from the business server
  - Initialization of logical disk
  - Setting and canceling of the Work Disk for Optimization

Using these functions enable users to easily and flexibly change configuration of logical disks and set accessibility.

Figure 7-1  Schematic Diagram of LD Administrator
7.2 Setting and Canceling of Information on Accessibility to Logical Disks

To use functions of the LD Administrator, it is indispensable to apply an AccessControl program product.
In the LD Administrator, setting/canceling of information on accessibility from the business server to logical disks is
performed by using the AccessControl function. Therefore, be sure to read “Chapter 5: Access Management”.

7.3 Logical Disk Initialization

When a logical disk used for the business server becomes unnecessary, it may be modified to be assigned to another
business server. In such a system configuration change, if a business server to which the logical disk is to be
assigned is in the same file system as the business server to which the disk has been assigned, the logical disk
contents can be used for the new business server without change.
From the aspect of security protection in such a situation, the LD Administrator uses the AccessControl function to
initialize logical disks hidden from the business server.
7.4 Performance Optimization Setting of Logical Disk

The performance optimizing function is for relocating logical disks from a high-load physical disk to a low-load physical disk so as to distribute the load. To use this function, it is necessary to specify logical disks which are surely inaccessible, hidden from the business server as destination the Work Disk for Optimization. The LD Administrator is capable of setting and canceling the Work Disk for Optimization.

Moreover, for information on the performance optimizing function, refer to the “NEC Storage Performance Monitor/Optimizer User’s Manual”(IS008).
Part II  Installation
Chapter 8 Server Installation

8.1 Operating Environment

The operating environment for disk array configuration setting is the same as that for iSM. Therefore, for details, refer to the “NEC Storage Manager User’s Manual” for the OS installed on your server.

8.2 Installation and Uninstallation

This software is installed simultaneously with the installation of the iSM server. For information on installation and uninstallation, refer to the section on the server installation in the “NEC Storage Manager User’s Manual” for the OS in use.
Chapter 9  Client Installation

9.1  Operating Environment

The operating environment for disk array configuration setting is the same as that for iSM. Therefore, for details, refer to the “NEC Storage Manager User’s Manual” for the OS in use.

9.2  Installation and Uninstallation

This software is installed simultaneously with the installation of the iSM client. For information on installation and uninstallation, refer to the section on the client installation in the “NEC Storage Manager User’s Manual” for the OS installed in use.
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Part III Application
Chapter 10  Initial Installation

10.1 Setting Procedure

In the event of newly installing a system and a disk array, make the settings basically in accordance with the following procedure.

Check the following beforehand.
- If the monitoring path is Ether
  Make sure that the disk array’s IP Address is set.
- If the monitoring path is FC
  Make sure that at least one logical disk is bound.

Execute the following work while referring to the “NEC Storage Manager User’s Manual”.
- Install the NEC Storage Manager.
- Consider the target disk array as the monitoring target.

If necessary, set the Disk Array. (For details, refer to 10.3 “Setting of Disk Array”.)

It is necessary to bind the logical disk. (For details, refer to 10.4 “Logical Disk Bind”.)

If necessary, set the access permission. (For details, refer to Chapter 5 “Access Management”.)
10.2 Setting of NEC Storage Manager

Regarding the disk array, the following work is required before setting the configuration.

(1) Installing the NEC Storage Manager

For information on installing the NEC Storage Manager, refer to the “Installation and Setting of NEC Storage Manager” in the “NEC Storage Manager User’s Manual”.

(2) Considering the target Disk Array as the monitoring target

Regarding the disk array, it is necessary to consider the disk array as the monitoring target by NEC Storage Manager in setting the configuration. For information on how to target for monitoring, refer to 1.3 “Environmental Setting” in the “NEC Storage Manager User’s Manual”.

10.3 Disk Array Settings

Depending on the operating environment, it is necessary to set the disk array. For information on the parameters, refer to 2.2 “Parameter List”. Before changing the settings, carefully read the disk array manual for information on the functions to change until they are fully understood.

10.4 Logical Disk Bind

Logical disks can be bound in two different methods: batch binding and individual bind. Select the batch binding when binding logical disks for all the physical disks mounted on the disk array in such a case when the disk array is initially introduced. Also select the batch binding when binding logical disks supported by a batch setting command for part of the physical disks mounted on the disk array in such a case when physical disks are extended. Select the individual bind when binding logical disks for some physical disks of the disk array due to expansion of physical disks or when binding other than logical disks being supported by the batch setting command. Details of each bind are described below.

Bind logical disks in a capacity suitable for the usage. If using data replication, you can pair only logical disks that have the same capacity. Therefore, bind logical disks having the same capacity in advance.

(1) When LD Batch Binding

In the batch binding, all the logical disks and unused physical disks are bound in the same RAID type with the same LD Capacity in accordance with the details specified for all the physical disks mounted on the disk array. Please note that when binding all physical disks, if the program has already been in operation and the required data has been stored in the disk array, the data recorded in all the logical disks in use is erased. Please be careful about it. If the data in use are necessary, select unused physical disks or bind logical disks newly from unused physical disks through individual bind.

There are the following four logical disk configurations which can be selected.
• High reliability: RAID1 (1+1) Consisting of two PDs, the RANK Capacity is the same as that of about one PD.
• Standard: RAID5 (4+P) Consisting of five PDs, the RANK Capacity is the same as that of about four PDs.
• Large capacity: RAID5 (6+P) Consisting of seven PDs, the RANK Capacity is the same as that of about six PDs.
• Huge capacity: RAID5 (8+P) Consisting of nine PDs, the RANK Capacity is the same as that of about eight PDs.

(2) When LD Individual Bind

In the individual bind, the RANK is bound by specifying the physical disks and the RAID type for binding RAID from the physical disks installed on the disk array. Then, for the RANK thus bound, logical disks can be bound by binding logical disks.

When extending physical disks, logical disks can be bound for the extended physical disks in accordance with the same procedure, thus not affecting the logical disks on other RANKs already in use. Even when new logical disks are additionally bound for the same RANK, they do not affect the already bound logical disks.

Regarding LD binding, selections can be made from the following configurations, thus making possible a different configuration for each RANK.

Logical disk configuration:

RAID1 (1+1)
RAID5 (2+P)/(3+P)/(4+P)/(5+P)/(6+P)/
(7+P)/(8+P)/(9+P)/(10+P)/(11+P)/
(12+P)/(13+P)/(14+P)
RAID0 1/3/5/10/15
RAID10 (2+2)/(3+3)/(4+4)/(5+5)/(6+6)/(7+7)

* Only Windows2000 and Solaris can specify RAID0. Do not use RAID0 in a highly reliable system (e.g., cluster environment or server environment) because RAID0 has no redundancy.

Bind logical disks in accordance with the following procedure.

(1) RANK Bind
(2) LD Bind

The NEC Storage 3000/4000 series is complete with LD Bind when it is initially installed.

10.5 Access Management Setting

Depending on the operating environment, it is necessary to set the access management. Before making settings, make sure to thoroughly read the disk array manual and this manual for full understanding of the functions to set.
(For details, refer to chapter 5 “Access Management”.)
11.1 Setting Procedure

When expanding physical disks to the disk array in operation, set them basically in accordance with the following procedure.

Expand Physical Disks

Bind Logical Disks

Set Access Permission

End of Configuration Setting

In operating the program, it is necessary to bind logical disks. (For details, refer to 11.2 “Logical Disk Bind”.)

In operating the program, set the access permission if necessary. (For details, refer to 11.3 “Access Management Setting”.)
11.2 Logical Disk Bind

Logical disks can be bound in two types: newly binding logical disks and adding the capacity of existing logical disks. The details of setting them are described below.

(1) New LD bind

Batch bind unused physical disks, or newly bind logical disks from unused physical disks through individual bind setting.

When binding logical disks, follow the procedure below.

(A) RANK Bind
(B) LD Bind

(2) Expanding the capacity of the existing logical disk

Through individual bind, expand physical disks to the RANK of logical disks to expand their capacity.

When extending multiple physical disks, extend them one by one. Make sure that the extension of one disk has been completed before extending the next physical disk.

Bind logical disks in a capacity suitable for the usage. If using data replication, you can pair only logical disks that have the same capacity. Therefore, bind logical disks having the same capacity in advance.

The NEC Storage 3000/4000 series binds the RANK and logical disks by using a maintenance PC. Logical disks cannot be bound from the NEC Storage Manager.

11.3 Access Management Setting

Depending on the operating environment, it is necessary to set access management. Before making the settings, carefully read the disk array manual and this manual for information on the functions to set until they are fully understood. (For details, refer to Chapter 5 “Access Management”.)
Chapter 12 Change of Logical Disk Configuration

12.1 Setting Procedure

When changing the logical disk configuration, set them basically in accordance with the following procedure.

- **Start the Configuration Setting**

- **LD Unbind**
  - It is necessary to unbind the logical disks. (For details, refer to 12.2 “Logical Disk Unbind”.)

- **LD Rebind**
  - It is necessary to rebind logical disks. (For details, refer to 12.3 “Logical Disk Rebind”.)

- **Set Access Management**
  - If necessary, set access management. (For details, refer to Chapter 5 “Access Management”.)

- **End of Configuration Setting**
Chapter 12  Change of Logical Disk Configuration

12.2 Logical Disk Unbind

Before changing the configuration of logical disks, it is necessary to unbind the relevant logical disks. The data saved in the logical disks thus unbound are lost; be careful about this. If the Access Control is set for the logical disks to unbind, the logical disks cannot be unbound. In this case, therefore, unbind the logical disks after unsetting the Access Control.

The NEC Storage 3000/4000 series unbinds the RANK and logical disks by using a maintenance PC. Logical disks cannot be unbound from the NEC Storage Manager.

12.3 Logical Disk Rebind

Logical disks can be rebound through individual bind. The details of each setting are described below.

Through individual bind, newly bound logical disks from unused physical disks (including the physical disks for which logical disks are unbound and the RANK is not bound).

Bind the logical disks in accordance with the following procedure.
(1) RANK Bind
(2) LD Bind

Bind logical disks in a capacity suitable for the usage. If using data replication, you can pair only logical disks that have the same capacity. Therefore, bind logical disks having the same capacity in advance.

The NEC Storage 3000/4000 series rebinds the RANK and logical disks by using a maintenance PC. Logical disks cannot be rebound from the NEC Storage Manager.

12.4 Access Management Setting

Depending on the operating environment, it is necessary to set access management. Before making the settings, carefully read the disk array manual and this manual for information on the functions to set until they are fully understood. (For details, refer to Chapter 5 “Access Management”.)
Part IV  Operations
Chapter 13 Batch Settings

Chapter 13 describes the “Batch Setting” operation, which is one of the configuration setting functions. The batch setting involves three setting functions: LD Batch Binding, Nickname Batch Setting and Pair Batch Setting.

13.1 Logical Disk Batch Bind

The method for the LD Batch Binding, which is one of batch setting functions, is described below.

13.1.1 Procedure of Logical Disk Batch Bind

The LD Batch Binding refers to bind multiple logical disks in a batch in accordance with simple parameter instructions such as the RAID type and the number of logical disks. The procedure and precautions for its execution are described below.

The LD Batch Binding is executed after all binding are unbound. Therefore, please note that all the RANKs and logical disks that are already bound will be unbound.

(1) Execution procedure

The procedure for Batch Binding of logical disks is as follows. The screen transition is shown in Figure 13-1.

(i) Select the disk array from the iSM client main screen and then start [Configuration] from the menu or from the toolbar.

(ii) Click on [Setting] from the “Select Operation Mode” dialog.

(iii) “Configuration- [Setting Mode]” appears. Press the [LD Bind] button to display the LD Batch Binding screen. (For details of the LD Batch Binding screen, refer to 13.1.2 “LD Batch Binding Screen”.)

(iv) Set the necessary item on the LD Batch Binding screen and then press the [OK] button to output the LD Batch Binding Confirmation screen. (For details of display items, refer to 13.1.2 (2) “LD Batch Bind Confirmation screen”.)

(v) If there is no problem with the value to bind, press the [Yes] button. LD Batch Binding will start.

For details from “Select Operation Mode” to “Configuration- [Setting Mode]” refer to Chapter 14 “Individual Setting”.
Figure 13-1  Transition of LD Batch Binding Screens
(2) Execution conditions

When batch binding logical disks for all the physical disks, all the existing settings are unset. Therefore, if any one of the following conditions is met, the batch binding cannot be executed.

(i) Logical disks managed by the Access Control (Port mode) are present.
(ii) Logical disks managed by the Access Control (WWN mode) are present.
(iii) Logical disks that are set in pairs are present.

Execute the batch binding after unset the states above.

(3) Disk relationship

When binding logical disks, it is necessary to understand the relationship between the physical disk, the RANK and the logical disk. A diagram of their relationships is shown in Figure 13-2.

![Figure 13-2 Disk Relationship Diagram]

(4) Complement

In the batch binding, it is executed from RANK Bind to LD Bind all at once. In this case, both the RANK and the LD are bound with the same capacity. Regarding the RANK binding, four patterns based on the combinations of the PD count and the RAID type can be specified. However, when binding through other settings, follow the procedure described in 14.1 “Logical Disk Bind/Unbind”.

Physical Disks (PDs)  RANK  Logical Disks (LDs)

The unit of physical disks comprising a RAID is called RANK. The capacity of a RANK is not a simple total of physical disk capacities but varies with the RAID type.

Logical disks are bound in the RANK. Multiple logical disks can be created in a single RANK.

Figure 13-2  Disk Relationship Diagram
13.1.2 LD Batch Binding Screen

The screen displayed when binding logical disks in a batch and the details are described below.

LD Batch Binding screen

The LD Batch Binding screen is shown in Figure 13-3. The displays and setting items in the screen are described.

(A) PD Group Number

The PD group of LD Batch Binding is specified here. The PD groups existing in the disk array are displayed in the pull-down list. Select one from the list.

The PD group refers to a management aggregate of PDs; therefore, it is impossible to form a configuration spanning two or more PD groups. Binding logical disks shall be set within this PD group.

(B) Physical Target Disk

Select batch binding target physical disks.

- All the PD
  Batch binds all physical disks that exist in the specified PD group. Unbinds all the spares and RANKs which have already been bound, and newly binds them.
- Unused PD
  Binds physical disks which have not configured the spare and RANK in the specified PD group. Does not unbind spares and RANKs which have already been bound.

Figure 13-3  LD Batch Binding Screen

(C) Setting RANK

Select RANK setting items for each RANK. Unspecified items will be calculated automatically.

(D) Setting LD

Here are set LD setting items for each RANK. Unspecified items will be calculated automatically.

(E) Setting LD Type/Name

LD type and name can be specified. It is also possible to set after binding.

(F) Setting LD Type/Name

If the number of LDs is two or more, LD numbers will be reused at the end of specified names.

(G) OK Cancel Help
(C) RANK Information
The number of RANKs to bind is displayed here.
The number of displays is automatically calculated depending on the disk array setting state as well as the set values of spares and LDs.

(D) Setting Spare
Specifies the number of spares. The set value up to twice as many as the DE count can be specified. However, the maximum value varies with the number of spare binding target physical disks. For example, if the DE count is 2, the specifiable range is 0 to 4 and the initial value is 2. Since there are up to 8 spares per PD group, the upper limit of the set value is 8 when the DE count is 4 or more.

Up to two spares can be created for a disk enclosure (DE).
DEs are physical components of the disk array on which physical disks are mounted.
When binding unused physical disks, the maximum value varies with the number of spares that have already been bound.

(E) Setting RANK
Specifies the RAID type of the RANK to bind. This setup and the PD capacity determine the RANK capacity.
- High Reliability RAID1 (1+1): Consisting of two PDs, the RANK capacity is equivalent to that of about one PD.
- Standard RAID5 (4+P): Consisting of five PDs, the RANK capacity is equivalent to that of about four PDs.
- Large Capacity RAID5 (6+P): Consisting of seven PDs, the RANK capacity is the same as that of about six PDs.
- Huge Capacity RAID5 (8+P): Consisting of nine PDs, the RANK capacity is the same as that of about eight PDs.
Initial setting is set as “Standard RAID5 (4+P)”.

(F) Setting LD
Specifies the number of LDs to bind or their capacity (or both).
- Only specify the number of LDs
  The individual LD Capacity is used by automatically calculating the maximum capacity that can be created.
  Since, in this case, the number of LDs to bind in a RANK is specified, the number of actually bound LDs is the specified value multiplied by the RANK count.
- Only specify LD Capacity
  The number of LDs to be bound in the RANK is used by automatically calculating the maximum number that can be created. In this case, information such as the number of LDs that are finally bound and their capacity can be checked with 13.1.2 (2) “LD Batch Bind Confirmation screen” after pressing the OK button.
• Specify both the number of LDs and LD Capacity
  In this case, any setting is possible. The acceptability of the set value is verified after the OK button is pressed.
  If the set value is in error, an error message is output.

1. The capacity which is entered into the input field can be used by the user. However, depending on the input value and the RAID configuration, a capacity exceeding this value may be obtained. The reason is that, since the minimum unit that can be bound in the case of RAID5(n+P) is 128KBxn, disks are bound in terms of rounded-up MBs if the resulting figure cannot be divided. As the area for use in the RANK, there are not only the capacity for use by the user but also the disk management area.

2. The maximum number of LDs which can be bound in the same RANK is 36.

(G) Setting LD Type/Name
For the LDs to bind, it is possible to set their formats and names simultaneously with their binding. The LD name needs to be unique in the disk array (no two names must not be the same). Therefore, when binding multiple LDs, the LD names in which the sequential numbers are added to the specified character strings are automatically given.

The value initially displayed in the LD name input field is 20 characters which result from adding 4 characters of the logical disk number to 16 characters inherent to the disk array. When the logical disk name is not changed, the above-mentioned initial value is set.

When the LD type is not changed, the LD Type is made blank.

Example: 0200200000004C518CAC0000, 200000004C518CAC0001, …

Moreover, when the LD Type is made blank, the value set before shipment is initially displayed. The LD Type is made blank, and “16 characters inherent to the disk array + 4 characters of the logical disk number” is set for the LD name.

A list of selectable LD Type is shown in Table 13-1.
The LD Type and LD name can be changed later on the main screen of the iSM client or in 13.2 “Nickname Batch Setting”.

<table>
<thead>
<tr>
<th>LD Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A4</td>
<td>Operating LDs by the ACOS-4 system</td>
</tr>
<tr>
<td>A2</td>
<td>Operating LDs by the ACOS-2 system</td>
</tr>
<tr>
<td>NX</td>
<td>Operating LDs by the HP-UX system</td>
</tr>
<tr>
<td>WN</td>
<td>Operating LDs by the Windows system</td>
</tr>
<tr>
<td>CX</td>
<td>Operating LDs by the Solaris system</td>
</tr>
<tr>
<td>LX</td>
<td>Operating LDs by the Linux system</td>
</tr>
<tr>
<td>AX</td>
<td>Operating LDs by the AIX system</td>
</tr>
</tbody>
</table>
1. LD name which do not abide by the following regulations cannot be set.
   • Number of available characters: 1 to 24 characters
   • Available characters: Alphabet A to Z (a to z) * Upper- and lower-case characters are distinguished.
     Numbers 0 to 9
     Underbar -
     Slash /
   * All the characters must be in single bits.
2. If this set value is in error, the same LD name as when this setting is omitted is given.
3. On the ACOS-4 system, make sure that the LD name matches the LD identifier name on the host.

(2) LD Batch Bind Confirmation screen

Press the [OK] button after entering the required parameters into the LD Batch Bind screen described in (1) to display the confirmation screen shown in Figure 13-4.

If there are no problems with the setting information on batch binding, press [Yes]. The RANK and LD binding will start.

![LD Batch Binding Confirmation Screen](image-url)
Chapter 13  Batch Settings

(A) Information About PD

- **PD Group Number**: PD group number to bind
- **Number of Spares**: (total) Number of spares to bind
- **Number of Unused PDs**: Number of PDs unused for binding

In case of batch binding, the number of PDs for RANK Bind is any of 2, 5, 7 and 9. Therefore, depending on specifying the physical configuration and “Setting RANK”, “Unused PD” may be present.

Example: In the event of a single DE with 15 PDs in the DE, these values are as shown in the table below.

<table>
<thead>
<tr>
<th>RANK setting</th>
<th>Number of Spares</th>
<th>Number of created RANKs</th>
<th>Number of Unused PDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Reliability RAID1 (1+1)</td>
<td>1</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Standard RAID5 (4+P)</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Standard RAID5 (4+P)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

(B) Information About RANK

- **RANK Type**: RAID type and the number of PDs which bind the RANK
  - High reliability RAID1 (1+1): Mirroring configuration based on two PDs
  - Standard RAID5 (4+P): Striping configuration based on five PDs
  - Large capacity RAID5 (6+P): Striping configuration based on seven PDs
  - Huge capacity RAID5 (8+P): Striping configuration based on nine PDs

- **Number of RANKs**: Number of RANKs to bind
- **Total RANK Capacity**: Total capacity of RANKs to bind
- **Total Unused RANK Capacity**: Capacity of the free space for LD Binding in the RANK to bind. If the LD Capacity is automatically calculated, it is basically 0 here.

(C) Information About LD

- **LD Capacity**: Capacity of a single LD to bind
- **Total Number of LDs**: Total number of LDs to bind
  - Not the number of LDs per RANK but the total number of LDs to bind
- **Total LD Capacity**: Total capacity of all the LDs to bind
  - \(\text{LD Capacity} \times \text{Total Number of LDs} = \text{Total LD Capacity}\)

(D) Information About LD Ownership

The ownership of the LDs to bind is displayed. Fixed to controller 0.

The Ownership is valid only when Cross Call is OFF. To set the LD Ownership to controller 1 when Cross Call is ON, use “Change Ownership” after binding or specify the controller on “Individual Bind of LD” and perform binding.
(3) Result screen

When LD Batch Binding is completed successfully, a message box as shown below appears.

![Success Message Box](image)

Since “Bind” here means that LD binding started successfully, check the LD state for information by using the main screen of the iSM client to see if the actual binding is completed or not.

Immediately after the binding is started, “Attn.(formatting)” appears as shown in Figure 13-6.

![LD Formatting Screen](image)

Even during LD formatting as shown in Figure 13-6, it is possible to unbind LDs. Therefore, even after LD Batch Binding can be performed again without waiting for completion of an error binding.

The LD Format Time is set to 0 hours. To change this format time, use “Change Format Time” on 14.1.2 “Logical Disk screen”.

IV-10
When LD Batch Binding fails, a message box appears as shown below.

![Failure Message Box](image)

Figure 13-7  Failure Message Box

Communications between the iSM server and the iSM client may be in error or the disk array itself may have problems. When there is a communication error, the binding instruction may have been correct; therefore, reconnect the iSM client and check the state. If the disk array is in error, the failure factor is recorded in the application log of the iSM server. Take appropriate measures while referring to this and then re-execute the binding.
13.2 Nickname Batch Setting

Nickname Batch Setting refers to name batch setting (disk array name, port name, LD type/name) based on the definition file.

(1) Execution procedure

Perform the name batch setting (disk array name, port name, LD type/name) based on the definition file in accordance with the following procedure.

(A) Press the [Setting Nickname] button from the “Configuration- [Setting Mode]” to display the Nickname Batch Setting dialog.

(B) When making settings based on the user definition file, select [Read from text file] and then select any file from the dialog that opens up to read files. For information on formatting the user definition file for batch setting, refer to (a) “Formatting the user definition file”.

(C) After file reading, the data that has been read appears in the edit box. Modification, if necessary, can be made on this screen.

The format which appears in the edit box comes with “,” at the head of the file records that are read. Make sure to keep this because it is used as the state area for storing individual set results to be described later.

(D) If the check box for [Execute From Cursor Line] is activated, execute the setting from the cursor line in the edit box.

(E) After content verification, click [Set disk array].

(F) Individual set results (see below) are displayed in the state area. If in error, take measures appropriate to the displayed content.

   success: Execution results are normal.
   success (already): Execution results are normal (Already set to the same name)
   failure (invalid): Parameter error
   failure (i/o error): Access error
   failure (same name): The same name exist.
   failure (RPL pair): Format change of LDs for which replication pairs are set
   failure (busy): Executing other processing
   failure (communication): Communication error
   failure (nnh): Other error(s) (nn: Internal error code)
If “failure (communication)” or “failure (nnh)” is displayed in the batch setting process, error may have been detected after I/O to/from the disk array is ended. If it occurs, terminate “Configuration Setting”, restart the disk array monitoring and check the iSM client’s main screen to see if settings have been made for the disk array or not, before re-executing the setting.

(G) By clicking on the [Extract Error Line] button after completing the process, only the settings in error are extracted in the edit box.

(H) In the event of saving the definition file, select [Save As] from the dialog and then save it by specifying any file name from the save dialog.

Output to a file can be made except the state area at the head of the record

Figure 13-8 Nickname Batch Setting Dialog

(a) Formatting the user definition file

The format for batch setting the disk array name, LD type/name and the port name from the user definition file is described below.

The user definition file contains a line starting with “#” or “;” to be handled as a comment line.
Chapter 13  Batch Settings

[User definition file format for batch setup]

```plaintext
# Comment line
rmon name list  (A)
[array]  (B)
Target disk array name and new disk array name  (C), (D)
[ld]  (E)
nnnnh, new LD type and new LD name  (F)
:
[port]  (G)
mmh-ssh, and new port name  (H)
:
[array]  (B)
:
```

(A) Key information (File identification info)

Describes “rmon name list” as the key information indicating that the following parameter is the name setting file.

(B) Key information (Disk array)

Describes key information for specifying the name of the target disk array. The information following the [array] key is valid for the disk array name specified by the [array] key until the next [array] key appears. Only one disk array name can be set by using one [array] key. To set multiple disk array names, an [array] key is required for each disk array name. If multiple disk array names are specified by using one [array] key, only the first disk array name is valid.

When an invalid disk array name is specified, the settings are invalid until the next [array] key.

(C) Target disk array Name

Describes the disk array name (up to 32 alphanumeric characters) targeted by the following parameter, to continue from the key information [array].

(D) New disk array Name

Describes the disk array name to set following the target disk array name + `, (comma)` when executing the disk array name setting. It is unnecessary to specify this when the disk array name is not to be set (i.e., when changing only the LD type/name or the port name).

Describing a name in excess of 32 characters for the disk array name will end in error.

(E) Key information (LD)

Describes [ld] as the key information indicating that the following parameter is the setup information for LDs. (The information following [ld] is valid until the next [array] or [ld] appears.)

(F) New LD Type/Name

Sets the format and LD names for the LDs in the target disk array ((c) above) described before describing this parameter. Describes “nnnnh (nnnn: LD number in four hexadecimal digits)” as the ID information of the target LDs. Describes the newly set format (see Table 13-2), “, (comma)” and LD name to continue from “, (comma)”.

Describing a name in excess of 24 characters for the LD name will end in error.

When making settings for other LDs in the same disk array, describe the information to be set in the same format on the succeeding line.
On the ACOS-4 system, make sure that the LD identifier name matches the LD disk name on the host.

(G) Key information (port)  
Describes [port] as the key information indicating that the following parameter is the setup information related to ports. (The information following [port] is valid until [array] or [ld] appears.)

(H) New Port Name  
Sets the names for the ports in the target disk array ([C] above) described before describing this parameter. 
Describes “mmh-ssh (mm: director number in two hexadecimal digits; ss: port number in two hexadecimal digits)” as the ID information of the ports. Describes the newly set port name to continue from “,” (comma)
Describing a name in excess of 32 characters for the new port name will end in error.  
When making settings for other ports in the same disk array, describe the information to be set in the same format on the succeeding line.

[An example of the user definition file for batch setting in initial introduction]

```
rmon name list
[array]
3000000000000003,Array001 Set the disk array name of 3000000000000003 to Array001.
The following indicate the name settings for this disk array.
[ld]
0000h,WN,DBmaster001 Set the format of the LD number 0000h to WN, and the LD name to DBmaster001. The same applies to the following.
0001h,WN,DBmaster002
0002h,NX,DBmaster003
0003h,NX,DBmaster004
0004h,NX,DBmaster005
0005h,WN,DBmaster006
0006h,WN,DBmaster007
0007h,NX,DBmaster008
[port]
04h-00h,DBServer01 Set the port name of the port number 04-001 to DBServer01.
04h-01h,DBServer02 The same applies to the following.
06h-00h,DBServer03
06h-01h,DBServer04
```
**[An example of the user definition file for batch setting after start of operation]**

<table>
<thead>
<tr>
<th>rmon name list</th>
</tr>
</thead>
<tbody>
<tr>
<td>[array]</td>
</tr>
<tr>
<td>Array001</td>
</tr>
<tr>
<td>Indicates that the disk array to be set is Array001.</td>
</tr>
<tr>
<td>[ld]</td>
</tr>
<tr>
<td>0000h,WN,DBtest001</td>
</tr>
<tr>
<td>Set the format of the LD number to 0000h to WN, and the LD name to DBtest001. The same applies to the following.</td>
</tr>
<tr>
<td>0011h,NX,DBtest002</td>
</tr>
</tbody>
</table>
13.3 Replication Batch Setting

Replication Batch Setting refers to setting replication, which is used for replications, collectively using the definition file. For information on the replication functions, refer to the “NEC Storage Manager Data Replication User’s Manual (Function Guide)”.

(1) Execution procedure

When Replication Batch Setting, press the [Replication Setting] button from “Configuration- [Setting Mode]” to display the Replication Batch Setting dialog. An example of the Replication Batch Setting screen is shown in Figure 13-9.

Figure 13-9  Example of Replication Batch Setting Screen

The screen above is operated in the same manner as described in 13.2 “Nickname Batch Setting”. However, the detailed definitions of the file format and execution results are different.

For information on the file format, refer to Appendix E “Pair Setting File”. The execution results are listed below.

success: Indicates that the pair setup was successful.
success (already): Indicates that pairs are already set.
failure (invalid): Indicates that the description of the batch setup file is illegal (including the violation of pairing conditions).
failure (communication): Indicates that the communications between server clients ended in error.
failure (LINK path): Indicates that not all the link paths between the specified disk arrays are in the ready state.
failure (nnh): Other error (nnh: Internal error code)
As a replication setting file, it is possible to use the file which is output by using the “Save the pair setup information” function in “Replication Management”.
Chapter 14 Individual Settings

Chapter 14 describes the operations for “Individual Setting” in the Configuration Setting.

Individual settings are made by pressing the respective function buttons from the “Configuration- [Setting Mode]” screen. The following is the procedure until the “Configuration- [Setting Mode]” screen appears.

1. Select the disk array from the iSM client’s main screen to start “Configuration” which in turn will make the Select Operation Mode screen appear.
2. Click [Setting] in the Select Operation Mode dialog to display the “Configuration- [Setting Mode].”
3. At this time, monitoring the selected disk array is stopped thus placing the disk array in the occupied state.

*1. When [Reference] is selected, the “Configuration- [Setting Mode]” screen is placed in the mode for reference only, thus not stopping the state of monitoring the selected disk array (the monitoring state is continued on). Although the disk array is not occupied, the server is occupied.

*2. At this time, even the server is occupied thus making it impossible to open the “Configuration- [Setting Mode]” screen from other clients connected to this server. Conversely, if the server is already occupied, it fails to opening up the “Configuration- [Setting Mode]” screen.

*3. If the disk array is occupied, it is no more possible to make settings by using a maintenance PC, etc.

*4. Occupation of the server and the disk array is cancelled simultaneously with the end of “Configuration setting”.

Figure 14-1 “Configuration- [Setting Mode]” Screen
14.1 Logical Disk Bind/Unbind

Bind or unbind LDs or RANKs individually in accordance with the following procedure.

1. Press “LD Bind/Unbind” from the “Configuration- [Setting Mode]” screen.
2. RANK Binding or settings related to Spare disks are performed by selecting “RANK/Spare” with a tab (see 14.1.1 “RANK/Spare screen” for details).
3. Settings for LD bind/unbind are performed by selecting “LD” with a tab (see 14.1.2 “Logical Disk screen” for details).

14.1.1 RANK/Spare screen

(1) Description

The RANK/Spare screen, which is shown in Figure 14-2, describes the content based on its encircled numbers. Refer to (2) “Operation” to know how to operate the screen.

(A) PD Group Number

The PD group for performing the RANK/Spare Bind/Unbind is specified here. The PD groups existing in the disk array are displayed in the pull-down list; select one from among them.

The PD group refers to a management aggregate of PDs; therefore, it is impossible to form a configuration spanning two or more PD groups. RANK/Spare Bind/Unbind shall be set within this PD group.

Figure 14-2  RANK/Spare Screen

(A) PD Group Number

The PD group for performing the RANK/Spare Bind/Unbind is specified here. The PD groups existing in the disk array are displayed in the pull-down list; select one from among them.

The PD group refers to a management aggregate of PDs; therefore, it is impossible to form a configuration spanning two or more PD groups. RANK/Spare Bind/Unbind shall be set within this PD group.
(B) PD window
PDs existing in the selected PD group are displayed in terms of each DE. For details of the display, refer to the diagram below.

![PD Window Diagram](image)

Figure 14-3 PD Window

(C) RANK window
RANKs bound within the PD group are displayed.
For details of the display, refer to the diagram below.

![RANK Window Diagram](image)

Figure 14-4 RANK Window

(D) Spare window
Spare disks bound within the selected PD group are displayed.
For details of the display, refer to the diagram below.

![Spare Window Diagram](image)

Figure 14-5 Spare Window

(E) Shape of selected button
PDs and RANKs are displayed with button shapes. Select/Deselect are performed by clicking on the relevant buttons. The selected state has the convex shape, whereas the deselected state is the concave shape. These are alternated by clicking the left button of the mouse. Clicking again on what is already selected will change it to Deselect (or vice versa).
The states of RANKs and unused PDs are as follows.

* Select an unused PD when a RANK is already selected. → Both the RANK and the unused PD are placed in the selected state.

* Select another unused PD when an unused PD is already selected. → Multiple unused PDs are placed in the selected state.
(2) Operation

In this dialog, RANK Bind/unbind can be performed by using the popup menu of the right button or the buttons on the screen after selecting PDs and RANKs, etc. The encircled alphabets on the screen are described.

Figure 14-8  RANK/Spare Tab Screen Menu and Buttons

(A) RANK Bind
Selecting unused PDs enables this button, thus making it possible to bind RANKs.

Figure 14-9  RANK Bind
Press the [RANK Bind] button to display the following dialog.

![RANK Bind Confirmation Dialog](image1)

RAID types satisfying the following conditions can be specified:

- RAID type supported by the disk array
- RAID type of a RANK that can be bound with the selected number of physical disks

The following message is displayed if there are no RAID types of RANKs that can be bound with the selected number of physical disks.

![Message if Binding a RANK is Impossible](image2)

To bind a RANK, click the [OK] button in the RANK Bind confirmation dialog box. Binding a RANK does not take much time.
(a) and (b) in the diagram are described below.

(a) RAID Type

The selectable RAID type varies depending on the number of selected PDs. The list is shown in Table 14-1 for your reference.

Table 14-1

<table>
<thead>
<tr>
<th>RAID type</th>
<th>Target Disk</th>
<th>Selected PD count</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Array</td>
<td>1  2  3  4  5  6  7  8  9  10 11 12 13 14 15</td>
</tr>
<tr>
<td>RAID0</td>
<td>NEC Storage</td>
<td>✓  -  ✓  -  ✓  -  -  -  ✓  -  -  -  ✓  -  -</td>
</tr>
<tr>
<td>RAID1</td>
<td>1000 Series</td>
<td>-  ✓  -  -  -  -  -  -  -  -  -  -  -  -  -</td>
</tr>
<tr>
<td>RAID5</td>
<td>NEC Storage</td>
<td>-  -  ✓  ✓  ✓  ✓  ✓  ✓  ✓  ✓  ✓  ✓  ✓  ✓  ✓</td>
</tr>
<tr>
<td>RAID10</td>
<td>2000 Series</td>
<td>-  -  -  ✓  -  ✓  -  ✓  -  ✓  -  ✓  -  ✓  -</td>
</tr>
</tbody>
</table>

✓: Select enable  -: Select disable

(b) Rebuild Time

Specifies the maximum time required for rebuilding the RANK. It is possible to select 0 to 24 hours as Rebuild Time. Select 0 to perform rebuilding in the shortest amount of time. In consideration of the host I/O load, set a suitable value for Rebuild Time. Moreover, the time is an indication and it does not always take the time as specified.

(B) RANK Unbind

Selecting a RANK from the PD window or the RANK window enables RANK Unbind.

Even during LD binding, it is possible to unbind LDs.

Figure 14-12  RANK Unbind
If LDs are already bound in the RANK to unbind, a message as follows will appear asking whether to unbind the LDs or not.

![Figure 14-13  RANK/LD Unbind Check](image)

Select Yes to unbind the LDs and RANK.

If LDs in the RANK are in the following states, it is impossible to unbind them.
1. Managed by the Access Control (PORT Mode).
2. Managed by the Access Control (WWN Mode).
3. Pairing is performed.
Execute the unbinding after removing these conditions.

(C) Capacity Expansion
Selecting unused PDs (the selecting sequence can be reverse) after selecting the RANK from the PD window or the RANK window enables the [Capacity Expansion] button.
* Only Windows2000 and Solaris can use this function.

![Figure 14-14  Capacity Expansion](image)
Press the [Capacity Expansion] button to display the following dialog.

![Capacity Expansion Confirmation Dialog]

Figure 14-15  Capacity Expansion Confirmation Dialog

Use the [OK] button to execute the capacity expansion.

(a) Expansion Time

Specifies the maximum time required for rebuilding the RANK. It is possible to select 0 to 24 hours as Rebuild Time. When 0 is specified, the rebuilding is performed at the maximum speed. Moreover, the time is an indication and it does not always take the time as specified.

When extending multiple physical disks, extend them one by one. Make sure that the extension of one disk has been completed before extending the next physical disk.
When the capacity expansion is successful, end the configuration setting and check the iSM client screen until the completion. As shown in Figure 14-16, the expansion is completed when the display is changed from “Attn. (expanding)” to “Ready”.

![Figure 14-16  Capacity Expansion State](image)

(D) Spare Bind

Selecting only a single unused PD enables this button, thus making it possible to bind a spare.

![Figure 14-17  Spare Bind](image)
Press the [Spare Bind] button to display a message as follows.

![Figure 14-18  Spare Bind Confirmation](image)

Select [Yes] to bind a spare.

(E) Spare Unbind

Select Spare to enable [Spare Unbind].

![Figure 14-19  Spare Unbind](image)

Press the [Spare Unbind] button to display a message as shown below.

![Figure 14-20  Spare Unbind Confirmation](image)

Select [Yes] to unbind the spare.
(F) Change Rebuild Time

When logical disks are bound in the RANK and a physical disk configuring the logical disks fails during operation, it is possible to rebuild data. Through changing Rebuild Time, it is possible to change the data rebuild time of the selected RANK.

Selecting RANKs from the PD window or the RANK window enables [Change Rebuild Time].

Figure 14-21  Change Rebuild Time

Press the [Change Rebuild Time] button to display the following dialog.

Figure 14-22  Change Rebuild Time Setting

Changing the Rebuild Time and then pressing the [OK] button result in changing the Rebuild Time. For the Rebuild Time, 0 to 24 hours can be selected. Select 0 to perform rebuilding in the shortest amount of time. In consideration of the host I/O load, set a suitable value for Rebuild Time.

The RANK Rebuild Time is specified during RANK building. Here, considering the host I/O load, the Rebuild Time can be changed.
Chapter 14  Individual Settings

(G) Rebuild Start Instruction

If one of the physical disks configuring a logical disk fails, the logical disk is placed in the Reduce state and the RANK which includes this logical disk is also placed in the Reduce state. When the RANK is in the Reduce state, data can be rebuilt during operations by using the [Rebuild Start Instruction].

The [Rebuild Start Instruction] button is enabled when a reduced RANK is selected in the PD window or RANK window and when a spare disk is selected in this status.

To confirm the reduced status of a RANK, display the main screen of the iSM client.

![Reducing RANK and Spare selected](image1)

Press the [Rebuild Start Instruction] button to display the dialog.

![Rebuild Start Instruction Confirmation](image2)

Press the [OK] button to start rebuilding.

(a), (b) and (c) in the diagram are described.
(a) Information
The specified RANK and PD group are displayed.
When this dialog is output by selecting the spare, the spare for rebuilding is displayed.

(b) Target PD
When only reducing RANK is selected, it is necessary to specify the rebuild target disk.
* Rebuild Instruction
  Target Disk Number contains the PD number configuring the RANK. Therefore, when the PD is
  replaced with a normal PD, specify its number.
* Instruction of Rebuild to Spare Disk
  For the Instruction of Rebuild to Spare Disks, the Spare disk is automatically determined by the disk array.
  Specify the target disk number by entering the number of the failed physical disk.

(c) Rebuild Time
Specifies the maximum time required for rebuilding the RANK. It is possible to select 0 to 24 hours as
Rebuild Time. Select 0 to perform rebuilding in the shortest amount of time. In consideration of the host
I/O load, set a suitable value for Rebuild Time. Moreover, the time is an indication and it does not always
take the time as specified.

Change the RANK Rebuild Time by using the “Change Rebuild Time” previously described.

If LDs are not bound on the RANK, the rebuild start instruction fails.

(H) Unselect
Deselects the selected RANKs, unused PDs or Spares.
(I) Properties
The properties of selected RANKs, unused PDs and Spares are displayed as shown below.

Figure 14-25  RANK/PD/Spare Properties

(J) Get Disk Array Info.
This button is used to read the current values which are set in the disk array. In the event of communication errors or some changes in the disk array, this button can be used to update the information.
14.1.2 Logical Disk screen

(1) Description

The LD screen is shown in Figure 14-26. The encircled alphabets in the screen are described below. To know how to manipulate the screen, refer to (2) “Operation”.

(A) PD Group Number

The PD group for performing the LD bind/unbind is specified here. The PD groups existing in the disk array are displayed in the pull-down list; select one from among them.

The PD group refers to a management aggregate of PDs; therefore, it is impossible to form a configuration spanning two or more PD groups. LD bind/unbind shall be set within this PD group.
(B) LD window

RANKs existing in the selected PD group and the LDs bound in the RANK are displayed. For details of the display, refer to the diagram below.

Because LDs are spanning two or more PD groups, if any one of those is selected, the RANK partitions which configure the LDs are simultaneously selected.

Selecting a logical disk and then displaying the properties will result in outputting the detailed information. For details of the display, refer to (E) “Properties” of (2) “Operation”.

Figure 14-27 LD Window
(2) Operation

In this dialog, the right button’s popup menu or the buttons on the screen can be used to perform LD Bind/Unbind after selecting a logical disk or free space of RANK. The encircled alphabets in the screen are described below.

Figure 14-28  LD Individual Bind/Unbind

(A) LD Unbind

Selecting a bound LD enables the [LD Unbind] button.

Figure 14-29  LD Unbind
Press the [LD Unbind] button to display a message box as shown below.

![LD Unbind Confirmation Message](image)

Figure 14-30  LD Unbind Confirmation Message

Select [Yes] from this screen to unbind the logical disk.

If the logical disks are in the following states, it is impossible to unbind them.
1. Managed by the Access Control (PORT mode).
2. Managed by the Access Control (WWN mode).
3. Pairing is performed.
Execute the unbinding after removing these conditions.

(B) LD Bind
Selecting a free space of RANK will enable the [LD Bind] button.

![LD Bind](image)

Figure 14-31  LD Bind

Press the [LD Bind] button to display the following screen.
Pressing the [OK] button after specifying the required particulars in this screen will start the LD binding.

(a), (b), (c) and (d) in the screen are described as follows.

(a) General Setting

- LD Setting
  
  The number of LD and the LD Capacity are specified here. It is also possible to specify either of them. When only the number of LD is specified, the maximum capacity that can be created is automatically calculated.
  
  When only the LD Capacity is specified, the maximum number of logical disks that can be created is calculated.
  
  If having specified LD Capacity, you can either enter a numeric value or specify a bound logical disk. To bind a logical disk having the same capacity as for a bound one, you should select [Only specify LD Capacity]. Logical disks having the same capacity are necessary for using the data replication function*.

  Pressing the [Reference] button in Figure 14-32 displays the screen below.
A list of bound logical disks is displayed. Select a logical disk having a desired capacity from the list.

The configuration and capacity of the selected logical disk can be specified. If binding a logical disk having a capacity different from those of bound ones, refer to Appendix D “Notes on Logical Disk Bind”.

* Refer to the “NEC Storage Manager Data Replication User’s Manual” for the data replication function.

(b) Setup of Ownership
At Cross Call OFF, the controller must be specified.
At Cross Call ON, this setting is disabled; however, settings are made with controller 0. For information on the Cross Call, refer to 14.4.5 “Special”. The LD Ownership can be changed in (C) “Change Ownership”.

(c) Setting LD Type/Name
For the logical disk to be bound, it is also possible to simultaneously set its type and name.
The LD name needs to be unique in the disk array (no two names are allowed). Therefore, when binding two or more logical disks, LD names consisting of a specified character string to which a sequence number is added are automatically given.
Example: DiskName0000, DiskName0001, DiskName0002 ...
The details of item are the same as (G) “Setting LD Type/Name” of 13.1.2 “LD Batch Binding Screen”.

(d) Detailed Setup

- Start LD Number
  An unused numbers following the specified LD Number is allocated. When omitted (with Detailed Setup disabled), the number immediately after the maximum among the LD Numbers in use is allocated.

Example: The numbers allocated when LD Numbers 0, 1, 3 and 4 exist are as follows.
Omitted: 5, 6, 7...
0 specified: 2, 5, 6...
10 specified: 10, 11, 12...

- Format Time
  Specifies the maximum LD Format Time.
  It is possible to select 0 to 24 hours as Format Time. When 0 is specified, the formatting is performed at the maximum speed. Moreover, the time is an indication and it does not always take the time as specified.

The specified time is the standard time required. However, the actual execution time varies with the load of the disk array.

Specify 0 to complete the LD binding at the maximum speed. If the business operation I/O is preferred, specify a large value (such as 24) to lower the load to the Disk Array.

(C) Change Ownership

Changes the LD Ownership.

This button is enabled by selecting a logical disk at cross call off to display a dialog box as shown below, thus making it possible to change the Ownership.

When selecting multiple logical disks, perform operation as described below.
Select continuous logical disks: Select the first and the last logical disks while holding down the Shift key.
Select an Individual logical disk: Select a logical disk while holding down the Ctrl key.
Chapter 14  Individual Settings

Figure 14-34  Change Ownership Dialog

(D) Change Format Time
Changes the format time of logical disks being bound.
This setting, which acts upon the whole disk array, is unrelated to selecting a logical disk. Pressing this button
displays a dialog box as shown below, thus making it possible to change the Format Time.
Specifies the maximum required Format Time.
It is possible to select 0 to 24 hours as Format Time. When 0 is specified, the formatting is performed at the
maximum speed. Moreover, the time is an indication and it does not always take the time as specified.

Figure 14-35  Change Format Time Dialog
Specify 0 to complete the LD binding at the maximum speed. If the business operation I/O is preferred, specify a large value (such as 24) to lower the load to the Disk Array.

(E) Properties

Select a logical disk to display its properties. A dialog box as shown below will appear.

(F) Get Disk Array Info.

This button is used to read the current values which are set in the disk array. In the event of communication errors or some changes in the disk array, this button can be used to update the information.
14.2 Access Control

If using a disk array to which the program product “NEC Storage AccessControl(WWN)” is applied, read AccessControl(WWN) as AccessControl and NEC Storage AccessControl(WWN) as NEC Storage AccessControl, except when AccessControl as the selection function of the iSM client’s main window is explained. Note that a disk array to which the program product “NEC Storage AccessControl(WWN)” is applied is unable to perform the following operations:

- Linking the LD set that corresponds to a disk array port
- Selecting a target logical disk from [Candidate LD List] according to the port
- Changing the port mode from the WWN mode to the Port mode

The icon depicting in this manual is an image when the program product “NEC Storage AccessControl” is applied. Messages in the dialog boxes in this manual are samples displayed when “NEC Storage AccessControl” is applied. Thus, some messages are different from when “NEC Storage AccessControl(WWN)” is applied. In this case, follow the messages in the dialog boxes actually displayed.

14.2.1 Function Overview

This section describes functions available when program product “NEC Storage AccessControl” is purchased. The NEC Storage AccessControl is an optional software. The NEC Storage AccessControl provides functions to set and unset information on accessibility from the business server to logical disks.

Using these functions enables users to easily and flexibly change configuration of logical disks and perform accessibility setting.

Figure 14-37  Access Control Overview
Logical disk groups hidden from the business server by using the AccessControl function exist in this area. This area is called Preserve Group.

Contents of the logical disks are retained and existing logical disks include ordinary logical disks with no special purpose settings and replication volume (MV, RV).

Logical disk groups accessible from the business server by using the AccessControl function exist in this area. Contents of the logical disks depend on the business server, and existing logical disks include ordinary logical disks with no special purpose settings and replication volume (MV, RV). In addition, each logical disk is assigned to an LD Set.

14.2.2 Description of Operation Screens

This section describes items displayed on the screen by using “AccessControl”.

14.2.2.1 Display on Main Window

This section describes how the information on Access Control is displayed on the state monitoring screen of the iSM client. Figure 14-38 shown below is the main window of the iSM client which is displayed immediately after logging in to the iSM server. Only when an NEC Storage AccessControl product is introduced, the LD Set name is displayed as part of the information for each logical disk.

The LD Set, which results from naming an aggregate of multiple logical disks in the AccessControl, is set through 14.2.2.2 “AccessControl Tab Screen”.

![Main Window 1 of iSM Client](image-url)
Furthermore, selecting [Access Control] from the pull-down menu of this screen makes it possible to narrow down the displayed logical disks based on the LD Set name.

![Main Window 2 of iSM Client](image)

**14.2.2.2 Operations on AccessControl Tab Screen**

Pressing the [Setting Access Control] button from the Configuration- [Setting Mode] screen of the iSM client will display the following setting screen.

![AccessControl Tab Screen](image)
(1) Accessible LD List

Consists of a tree view showing the relation between the LD Set and the path information and a list view of the Logical disk List assigned to the LD Set or path information.

(a) Tree view

In the tree view, LD Sets can be selected by activating their check boxes and various information can be listed in the list view by clicking on tree items.

- In the tree view, LD Sets and path information linked with the LD Sets are displayed.
  - **LD Set item** shows all LD Sets
  - **LD Set linked with path information**
  - **LD Set unlinked with path information**

  The following two icons indicate abnormal settings. It is necessary to change the setting to the normal setting.
  - **LD Set in which a port in the WWN mode and a port in the Port mode are mixed**
  - **LD Set in which the assignment of logical disks is different for each path information**

- By clicking right-button after selecting LD Set, the pop-up menu appears allowing selection of name change of LD Set. Selecting the menu displays the LD Set name change screen.

- Check boxes are displayed for the “LD Set” item that shows all LD Sets in the tree item, each LD Set name, and path information linked with the LD Sets in the tree item.

  Furthermore, a check box for path information is activated associated with a check box for the linked LD Set.

  Check boxes are used for the following purposes:
  - Select [Add], [New Setting] logical disks target LD Set
  - Select [Link Path] target LD Set
  - Select [Delete] target LD Set
  - Select LD Set to [Delete] assigned logical disks

  However, when selecting multiple LD Sets simultaneously to [Add]/[Delete] logical disks, the assignment states of logical disks for all the LD Sets must coincide.

  When activating the check boxes, display contents of the list view are switched as follows:
  - When selecting an LD Set, the list of the logical disks assigned to the selected LD Set is displayed.
  - When selecting multiple LD Sets, if the assignment states of logical disks for all the selected LD Sets are the same, the list of logical disks is displayed.
  - If the assignment states of logical disks for the selected LD Sets do not coincide, the list of the selected LD Sets is displayed.

(b) List view

- Items displayed in the list of logical disks are as follows:
  - **LUN**
    - Order in which logical disks are recognized by the business server
    - **LUN to which logical disks are assigned**
    - **LUN to which logical disks are not assigned**

Number
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OS Type
Logical Disk Name
RAID
Capacity
Purpose
△ Ordinary disk with no special purpose settings
Replication  Replication volume set in pairs
Port (Not displayed for disk arrays of the x300 series or later)
yes Logical disk assigned to a Port mode port
△ Logical disk which is not assigned to a Port mode port
However, the port items are automatically displayed only when a Port mode port exists.

When LD Sets are not selected by using check boxes in the tree view, the list view is displayed in gray background color and LUN selection is not possible. Furthermore, when LD Sets are selected by using check boxes, the list view is not displayed by clicking on the “LD Set” item which shows all the LD Sets or by clicking on an individual LD Set.

* When clicking on the “LD Set” item which shows all the LD Sets, items displayed in the list of LD Sets are as follows:
  Platform
  ![LD Set linked with path information](image)
  ![LD Set unlinked with path information](image)
  The following two icons indicate abnormal settings. It is necessary to change the setting to the normal setting.
  ![LD Set in which a port in the WWN mode and a port in the Port mode are mixed](image)
  ![LD Set in which the assignment of logical disks is different for each path information](image)
LD Set Name
Path Count

![Accessible LD List 1](image)

* When the assignment states of logical disks for the check-marked LD Sets do not coincide, items displayed in the list of LD Sets are as follows:
  Platform
  ![LD Set linked with path information](image)
  ![LD Set unlinked with path information](image)
The following two icons indicate abnormal settings. It is necessary to change the setting to the normal setting.

- **LD Set in which a port in the WWN mode and a port in the Port mode are mixed**
- **LD Set in which the assignment of logical disks is different for each path information**

**LD Set Name**

**Pattern**

![Accessible LD List 2](image)

* If a port in the WWN mode and a port in the Port mode are mixed in a checked LD Set, the display items in the list are as follows:

  <Mixed mode list display>

  Path (port numbers and names are displayed together.)

  **Mode**

  ![Accessible LD List - Mixed Mode List Display](image)

  * If the path information (port) of a checked LD Set does not match the assignment of logical disks, the display items in the list are as follows:

  <Port information list display>

  Path (port numbers and names are displayed together.)

  **Pattern**
If the assignment of logical disks for each path information (WWPN) of a checked LD Set does not match, the display items in the list are as follows:

**Path information list display**

<table>
<thead>
<tr>
<th>Path</th>
<th>Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>00h-02h (PORT0)</td>
<td>01</td>
</tr>
<tr>
<td>00h-01h (PORT1)</td>
<td>01</td>
</tr>
<tr>
<td>01h-00h (PORT2)</td>
<td>02</td>
</tr>
<tr>
<td>01h-01h (PORT3)</td>
<td>02</td>
</tr>
</tbody>
</table>

**Logical disk list display**

- When the assignment states of logical disks of the check-marked LD Sets for each path information do not coincide, items displayed in the list are as follows:

**Logical disk list display**

<table>
<thead>
<tr>
<th>LD Set</th>
<th>RD</th>
<th>W</th>
<th>Size</th>
<th>Multiplier</th>
<th>RAID</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linux</td>
<td>0</td>
<td>0</td>
<td>3000</td>
<td>0.1</td>
<td>3000</td>
<td>60</td>
</tr>
<tr>
<td>Linux</td>
<td>1</td>
<td>0</td>
<td>1000</td>
<td>0.1</td>
<td>1000</td>
<td>20</td>
</tr>
<tr>
<td>Linux</td>
<td>1</td>
<td>0</td>
<td>2000</td>
<td>0.1</td>
<td>2000</td>
<td>40</td>
</tr>
<tr>
<td>Linux</td>
<td>1</td>
<td>0</td>
<td>3000</td>
<td>0.1</td>
<td>3000</td>
<td>60</td>
</tr>
<tr>
<td>Linux</td>
<td>1</td>
<td>0</td>
<td>4000</td>
<td>0.1</td>
<td>4000</td>
<td>80</td>
</tr>
<tr>
<td>Linux</td>
<td>1</td>
<td>0</td>
<td>5000</td>
<td>0.1</td>
<td>5000</td>
<td>100</td>
</tr>
</tbody>
</table>

**Available LD List - Logical Disk List**

**Available LD List - Path Information List**

**Available LD List - Port Information List Display**
An LD Set is a virtual concept that shows the aggregate of logical disks bound by the iSM. However, there is a possibility that the assignments of logical disks for each path may not coincide due to communication failures during setting.

Ensure consistency according to the following procedure.

Take a note of a path to which wrong logical disks are assigned (the same characters are displayed for the same contents in the Pattern column). Next, after deleting wrong paths once from the Link Path screen and checking that the LD Set icon is returned from Red to Blue in the Accessible LD List, restore necessary link paths on the Link Path screen again.

Rebuilding is also possible by assigning logical disks again by using [New Setting].

Display items can be sorted, but their order cannot be changed.

LUN to which logical disks are not assigned is made blank.

When selecting delete target logical disks, one logical disk or multiple logical disks can be simultaneously selected.

(c) Various Operation Buttons

Operation buttons shown below can be used for logical disks in the Accessible LD List.

Each button is enabled under defined conditions. For details, refer to the explanation of operation.

- Logical Disk [Add] button
- Logical Disk [New Setting] button
- Logical Disk [Delete] button

Furthermore, LD Set related operation buttons shown below can be used regardless of logical disk selection.

- LD Set [New] button
- LD Set [Delete] button
- LD Set [Link Path] button
- Right button after LD Set selection

(2) Candidate LD List

This is a list view of logical disks which can be assigned to LD Sets. Selective display is possible by entering keywords in the combo box.

(a) List view

- Display items are as follows:
  - Number
  - OS Type
  - Logical Disk Name
  - RANK
RAID
Capacity
Group
Δ Logical disk assigned to an LD Set
Preserve Logical disks in the Preserve Group
Purpose
Δ Ordinary disk with no special purpose settings
Replication Replication volume set in pairs
Port (Not displayed for disk arrays of the x300 series or later)
   yes Logical disk assigned to a port mode port
   Δ Logical disk which is not assigned to a port mode port

However, the port items are automatically displayed only when a Port mode port exists.

- Display items can be sorted, but their order cannot be changed.
- Logical disks assigned to LD Sets are also displayed.
- When selecting logical disks which are to be assigned to business, one logical disk or multiple logical disks can be simultaneously selected.

(b) Display Selection Combo Box

Using the following keywords makes it possible to narrow down the display of logical disks in the [Candidate LD List].

<table>
<thead>
<tr>
<th>Selection information</th>
<th>Display of Logical Disks</th>
</tr>
</thead>
<tbody>
<tr>
<td>“LD Set Name” (Ex. “NX:UNIX_Server01”)</td>
<td>Displays only logical disks which have already been assigned to the LD Set</td>
</tr>
<tr>
<td>“Platform: *” (Ex. “NX: *”)</td>
<td>Displays only logical disks of the Platform</td>
</tr>
<tr>
<td>“*: *”</td>
<td>Displays only logical disks whose Platform has not been set</td>
</tr>
<tr>
<td>“**h-**h (*)” (Ex. “04h-00h (Server01)”)</td>
<td>Displays only logical disks that are assigned to ports in the Port mode.</td>
</tr>
<tr>
<td>“POOL(www)”</td>
<td>Displays only undefined logical disks which do not belong to any LD Sets</td>
</tr>
<tr>
<td>“Preserve Group”</td>
<td>Displays logical disks in the Preserve Group. Target logical disks include logical disks with no special purpose settings and logical disks set in pairs for replication.</td>
</tr>
<tr>
<td>“ALL”</td>
<td>Displays all logical disks in the [Candidate LD List]. (Default settings)</td>
</tr>
</tbody>
</table>

(c) Various Operation Buttons

Operation buttons shown below can be used for logical disks in the [Candidate LD List]. Each button is enabled under defined conditions. For details, refer to the explanation of operation.

- Logical Disk [Add] button
- Logical Disk [New Setting] button
• All Selection check box

Furthermore, LD Set related operation buttons shown below can be used regardless of logical disk selection.
• LD Set [New] button
• LD Set [Delete] button
• LD Set [Link Path] button
• Right button after LD Set selection

14.2.2.3 Setting/Reference Tab Screen

Items that can be set on the Setting/Reference Tab screen are as follows:
• Setting Access Control
• Product Information (reference only)

Contents of each item and setting information are described below.

![Setting/Reference Tab Screen](image)

Figure 14-47  Setting/Reference Tab Screen

(1) “Setting Access Control” field

The following setting can be performed in this field.
• Change Port Mode
• Start Access Control
(2) “Product Information” field

This field displays information on the NEC Storage AccessControl product required for setting information on accessibility to logical disks.

- Purchase Product Classification: Displays the type of the purchased NEC Storage AccessControl product.
- Product Use Situation: Displays the maximum number of path information links permitted for the NEC Storage AccessControl product and the current number of path information links.

14.2.3 Description of Operations

This section describes the AccessControl Tab screen and the Setting/Reference Tab screen.

In 14.2.3.1 “Operations on the AccessControl Tab Screen”, with respect to the items to be set on the “AccessControl” screen in the first tab located in the AccessControl dialog screen, buttons and their functions are described.

In 14.2.3.2 “Operations on the Setting/Reference Tab Screen”, with respect to the items to be set on the “Setting/Reference” screen in the second tab located in the AccessControl dialog screen, buttons and their functions are described.

Starting in setting mode displays the following warning dialog box to warn the users:

![Warning Dialog Box at Start](image)

Similarly, the following dialog boxes also display a warning message when an attempt is made to perform operation: [05701], [05704], [05721], [05722], [05742], [05760], [05761], [05780], [05781], [05782], and [05783]
Clicking the [Cancel] button in the warning dialog box at start returns to the Configuration- [Setting Mode] screen below.
14.2.3.1 Operations on AccessControl Tab Screen

Perform individual operations for LD Sets on the following screen.

![AccessControl Tab Screen](image)

**Figure 14-51  AccessControl Tab Screen**

(1) **[Add] button**

When setting permission of access from the business server to logical disks, select LD Sets of a desirable business server from the tree view of the Accessible LD List display area, and also select logical disks to be added from the [Candidate LD List] display area, and then click on the [Add] button.

Logical disks will be added to all of the path information linked with the selected LD Sets. Furthermore, Logical disks can be added to the LD Sets which are not linked with path information. Logical disks to be added need to satisfy the following conditions.

- Logical disks must be the following disks.
  Ordinary disk
  Replication volume set in pairs

Clicking on the [Add] button will display the “LD Setting” dialog screen shown below.
The logical disk to be newly added is displayed at the end of the logical disk group which has been assigned on the “LD Setting” dialog screen, and LUN can be changed by button operation. However, the LUN selected in the Accessible LD List display area has not assigned logical disks and the number of selected logical disks coincides with the number of lines of the LUN which has not assigned logical disks or less, logical disks will be displayed after the selected LUN line. Furthermore, when selecting multiple LUNs which have not assigned logical disks, the selected LUNs must be sequential.

Only a newly added logical disk group can be moved on this dialog screen, and logical disks cannot be moved to the LUN displayed as the \[\text{icon}\]. Furthermore, the LUN to which logical disks have been assigned cannot be changed.

On the “LD Setting” dialog screen, the following buttons are operable.

- **[Top]** Moves a selected logical disk in a newly added logical disk group to the top line of the newly added logical disk group.
- **[Up]** Moves a selected logical disk in a newly added logical disk group to the previous line of the newly added logical disk group.
- **[Down]** Moves a selected logical disk in a newly added logical disk group to the following line of the newly added logical disk group.
- **[Bottom]** Moves a selected logical disk in a newly added logical disk group to the end line of the newly added logical disk group.
- **[Apply]** Clicking on this button will perform settings for the disk array.
- **[Close]** Clicking on this button will close the “LD Setting” dialog screen. Furthermore, the following dialog screen will be displayed and confirmation will be made about whether to close the “LD Setting” dialog screen or not by considering the settings invalid.
Logical disk information displayed on the “LD Setting” dialog screen is as follows:

- **LUN**
  - LUN to which newly added, movable logical disks are assigned
  - LUN whose logical disks cannot be moved
- **Number**
- **OS Type**
- **Logical Disk Name**
- **RAID**
- **Capacity**

- When performing [Add], logical disks which have been assigned to an Add target LD Set cannot be doubly added to the LD Set.
- Logical disks can be assigned to multiple LD Sets.

If the [Add] operation fails, the error dialog screen showing the failure will be displayed.

When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the isM client. Therefore, perform [Get Disk Array Info.].

**2) [Delete] button**

When setting inaccessibility from the business server to logical disks, select logical disks or LD Sets of a desirable business server from the Accessible LD List display area, and then click on the [Delete] button.

Logical disks that can be deleted are as follows:
- Ordinary disk
- Replication volume set in pairs

When selected logical disks are assigned to multiple LD Sets, the following dialog screen is displayed and the execution of the Delete operation is re-confirmed.
This operation deletes logical disks from the target LD Set only which has been selected through its check box.
Logical disks which have been deleted from all of the LD Sets belong to the Preserve Group.
The Delete operation deletes explicitly selected logical disks or the logical disks assigned to the explicitly selected LD Set. Therefore, logical disks assigned to the unselected LD Set are not deleted.

Deletion of the logical disk from the LD Set immediately reflects on the Disk Array. Therefore, if Delete operation is wrong, the business server suddenly stops recognizing the logical disk in use. It is necessary to perform Delete operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

If the [Delete] operation fails, the error dialog screen showing the failure will be displayed. When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(3) [New Setting] button

When setting permission of access from the business server to logical disks, select LD Sets of a desirable business server from the tree view in the Accessible LD List display area, and also select New Setting target logical disks from the [Candidate LD List] display area, and then click on [New Setting] button.
Assignment of logical disks by using the [New Setting] button invalidates the current assignment state of logical disks assigned to the LD Set and newly assigns the logical disks.

Logical disks can be assigned to multiple LD Sets.
Clicking on the [New Setting] button will display the “LD Setting” dialog screen shown below.

Logical disks to be modified are listed in the [Candidate LD List] display area. On the “LD Setting” dialog screen, the following buttons are operable. Moreover, one logical disk can be selected at a time to move the logical disk on this dialog screen. The logical disks in the list can be sorted into a different order according to an item other than LUN.

[Top] Moves a selected logical disk to the top line of the logical disk group.
[Up] Moves a selected logical disk to the previous line.
[Down] Moves a selected logical disk to the following line.
[Bottom] Moves a selected logical disk to the end line of the logical disk group.
[Apply] Clicking on this button will perform settings for the disk array.
[Close] Clicking on this button will close the “LD Setting” dialog screen. Furthermore, the following dialog screen will be displayed and confirmation will be made about whether to close the “LD Setting” dialog screen or not by considering the settings invalid.

Clicking on the [New Setting] button will display the “LD Setting” dialog screen shown below.

Logical disks to be modified are listed in the [Candidate LD List] display area. On the “LD Setting” dialog screen, the following buttons are operable. Moreover, one logical disk can be selected at a time to move the logical disk on this dialog screen. The logical disks in the list can be sorted into a different order according to an item other than LUN.

[Top] Moves a selected logical disk to the top line of the logical disk group.
[Up] Moves a selected logical disk to the previous line.
[Down] Moves a selected logical disk to the following line.
[Bottom] Moves a selected logical disk to the end line of the logical disk group.
[Apply] Clicking on this button will perform settings for the disk array.
[Close] Clicking on this button will close the “LD Setting” dialog screen. Furthermore, the following dialog screen will be displayed and confirmation will be made about whether to close the “LD Setting” dialog screen or not by considering the settings invalid.

Clicking on the [New Setting] button will display the “LD Setting” dialog screen shown below.

Logical disks to be modified are listed in the [Candidate LD List] display area. On the “LD Setting” dialog screen, the following buttons are operable. Moreover, one logical disk can be selected at a time to move the logical disk on this dialog screen. The logical disks in the list can be sorted into a different order according to an item other than LUN.

[Top] Moves a selected logical disk to the top line of the logical disk group.
[Up] Moves a selected logical disk to the previous line.
[Down] Moves a selected logical disk to the following line.
[Bottom] Moves a selected logical disk to the end line of the logical disk group.
[Apply] Clicking on this button will perform settings for the disk array.
[Close] Clicking on this button will close the “LD Setting” dialog screen. Furthermore, the following dialog screen will be displayed and confirmation will be made about whether to close the “LD Setting” dialog screen or not by considering the settings invalid.

Clicking on the [New Setting] button will display the “LD Setting” dialog screen shown below.

Logical disks to be modified are listed in the [Candidate LD List] display area. On the “LD Setting” dialog screen, the following buttons are operable. Moreover, one logical disk can be selected at a time to move the logical disk on this dialog screen. The logical disks in the list can be sorted into a different order according to an item other than LUN.

[Top] Moves a selected logical disk to the top line of the logical disk group.
[Up] Moves a selected logical disk to the previous line.
[Down] Moves a selected logical disk to the following line.
[Bottom] Moves a selected logical disk to the end line of the logical disk group.
[Apply] Clicking on this button will perform settings for the disk array.
[Close] Clicking on this button will close the “LD Setting” dialog screen. Furthermore, the following dialog screen will be displayed and confirmation will be made about whether to close the “LD Setting” dialog screen or not by considering the settings invalid.
Logical disk information displayed on the “LD Setting” dialog screen is as follows:

- **LUN**: LUN to which newly added, movable logical disks are assigned
- **Number**
- **OS Type**
- **Logical Disk Name**
- **RAID**
- **Capacity**

Application of the New Setting invalidates all of the current assignment settings for the logical disks and new assignment settings for the logical disk immediately reflect on the Disk Array. Therefore, if setting information is wrong, the business server suddenly stops recognizing the logical disk in use. It is necessary to perform this operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

If the [New Setting] operation fails, the error dialog screen showing the failure will be displayed. When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(4) **[New] button**

Clicking on this button will display the following dialog screen, thereby a new LD Set can be created.

For LD Set, specify the platform of the business server that accesses a logical disk via the LD set.

The following platforms can be specified:
# Individual Settings

## Chapter 14

### Table 14-3 Default for the Platform

<table>
<thead>
<tr>
<th>Platform</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A4</td>
<td>ACOS-4 system</td>
</tr>
<tr>
<td>A2</td>
<td>ACOS-2 system</td>
</tr>
<tr>
<td>NX</td>
<td>HP-UX system</td>
</tr>
<tr>
<td>WN</td>
<td>Windows system</td>
</tr>
<tr>
<td>CX</td>
<td>Solaris system</td>
</tr>
<tr>
<td>LX</td>
<td>Linux system</td>
</tr>
<tr>
<td>AX</td>
<td>AIX system</td>
</tr>
</tbody>
</table>

Furthermore, the LD Set name can be set by using arbitrary 16 characters including alphanumeric characters, “/”, and “_”.

However, when the combination of the Platform and the LD Set name have already been set to other LD Set, new settings are not possible.

A newly created LD Set has only a Platform and a name. For the business server to recognize logical disks, it is necessary to set actual path information through [Link Path] and also assign logical disks.

A single LD Set is linked with each business server. Thus, the port of the disk array to be linked and the name of the business server to be connected or the name of a business server having WWPN should be specified for the LD Set name.

If the [New] operation fails, the error dialog screen showing the failure will be displayed.

When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

### (5) [Delete] button

Select an LD Set from the tree view located in the Accessible LD List display area and then click on this button to delete the LD Set.

The following selection is available for the LD Set.

- Selection of treetop LD Set item
- Selection of single LD Set
- Selection of multiple LD Sets

By deleting an LD Set, the LD Set, logical disk information assigned to the LD Set and path information linked to the LD Set are deleted.

Clicking on this button will display the following dialog screen and the execution of Delete operation will be reconfirmed.
Deletion of the LD Set immediately reflects on the Disk Array. Therefore, if Delete operation is wrong, the business server suddenly stops recognizing the logical disk in use. It is necessary to perform Delete operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

If the [Delete] operation fails, the error dialog screen showing the failure will be displayed.

When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(6) [Link Path] button

Selecting an LD Set and clicking on this button will display the following dialog screen. Selecting an LD Set and the path information to be linked displays the screen for setting with each path information.
The [Link Path] button is enabled only when a single LD Set is selected from the tree view located in the Accessible LD List display area.

The linking of path information with an LD Set means the setting of the HBA’s WWPN of the business server that actually accesses logical disks or the setting of the port (in the Port mode) of the disk array to which the business server is connected.

The WWPN (World Wide Port Name) set for the HBA of the business server is necessary for determining whether to permit access in the WWN mode in the [Path Link] dialog box.

The WWN (World Wide Name) consists of the WWNN (World Wide Node Name) and the WWPN (World Wide Port Name), and is allocated to the HBA (Host Bus Adaptor; also called FC controller) as ID code information inherent to the HBA. For information on the acquisition method, refer to the “Access Control User’s Guide” for NEC Storage Series.
Figure 14-60  Linking of Path Information (WWPN)

Figure 14-61  Linking of Path Information (Port Number)
On this dialog screen, the following operations are possible.

- **Path Info Input Field**
  Newly added or replaced path information is entered into this area. It is necessary to enter 16 single-bit, hexadecimal digit characters into this input field.

- **Port Number Selection Field**
  The port number to be newly added or to be replaced is selected in this field. Only ports in port number are displayed in the field.

- **Current Path Info**
  Displays path information current set for the disk array and path information which has been changed by operating each button on this dialog screen.

- **[Add] button**
  When new path information is entered into the “Path Info Input Field”, clicking on this button will add the entered path information to the last line of the “Current Path Info” display area.
  
  Select a target port number from “Port Number Selection Field” and click the [Add] button. The path information of the selected port number is added to the last line of the “Current Path Info” display area.
  
  Up to 64 pieces of path information can be set for one LD Set.
  
  To apply settings for the disk array, click on the [Apply] button.

- **[Replace] button**
  After entering new path information into “Path Info Input Field” and selecting Replace target path information from the “Current Path Info” display area, clicking on this button will replace the path information selected in the “Current Path Info” display area with newly entered path information.
  
  Select a target port number from “Port Number Selection Field”, select Replace target path information from the “Current Path Info” display area, and then click the [Replace] button. The path information of the selected port number is replaced by the path information selected from the “Current Path Info” display area.
  
  Only a piece of path information can be selected at a time from the “Current Path Info” display area.
  
  To apply settings for the disk array, click on the [Apply] button.

- **[Delete] button**
  Selecting Delete target path information from the “Current Path Info” display area and clicking on this button will delete the selected path information from the “Current Path Info” display area.
  
  Only a piece of path information can be selected at a time from the “Current Path Info” display area.
  
  To apply settings for the disk array, click on the [Apply] button.
• [Apply] button

Clicking on this button will display the following Operation Confirmation dialog screen, and path information shown in the “Current Path Info” display area will be applied to the disk array.

---

Figure 14-62  Confirmation Dialog Screen 5

---

The WWPN of path information can be set even when the set value is different from the WWPN of the business server HBA which actually accesses logical disks. Therefore, pay careful attention not to set a wrong value.

---

Application of path information immediately reflects on the Disk Array. Therefore, if setting information is wrong, there is a possibility that accessing from the business server may not be possible. Pay careful attention to this. Especially, when settings are wrong for deleting or replacing path information, the business server suddenly stops recognizing the logical disk in use. It is necessary to perform operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

---

• [Close] button

When changes made on this dialog screen are not set for the disk array, the following dialog screen will appear and the execution of the operation will be confirmed.
**[Help] button**

Clicking on this button will display the Help screen concerning the “Link Path” screen.

If the [Link Path] operation fails, the error dialog screen showing the failure will be displayed. When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(7) **[Get Disk Array Info.] button**

Clicking on this button will re-acquire information from the disk array necessary for operations on the AccessControl screen.

Normally, it is not necessary to use this button to re-acquire information from the disk array. If operations for the disk array on this screen fail, causing inconsistency between the disk array setting information and the information administrated on the iSM client and making normal operation impossible, use this button. After clicking on this button and while information is being acquired from the disk array, the following dialog screen will be displayed.

When canceling the acquisition of information by clicking on the [Cancel] button while the information is being acquired, or the acquisition of information fails, there is a possibility that disk array information administrated by the iSM client may be wrong. Therefore, re-acquire information from the disk array through [Get Disk Array Info.].

(8) **[All Selection] check box**

This check box is used to perform auxiliary operation to select logical disks from the [Candidate LD List] display area.

This check box enables the auxiliary selection operation as shown below.

• Activate the check box
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Selects all logical disks displayed in the [Candidate LD List].

- Deactivate the check box
Unselect logical disks currently selected and displayed in the [Candidate LD List].

(9) Pop-up menu

- Rename LD Set

By clicking right-button after selecting LD Set, the pop-up menu appears allowing selection of name change of LD Set. Selecting the menu displays the LD Set name change screen.

For LD Set, specify the platform of the business server that accesses logical disks via the LD Set. Refer to Table 14-3 “Default for the Platform” for the platforms that can be specified.

LD Set name can be specified with 16 characters including arbitrary alphanumeric characters, “?”, and “_”. However, if a combination of Platform and LD Set name has been set, new setting can no longer be made.
When an LD Set is renamed, the disk array dynamically changes individual response control for each OS according to the platform information. Therefore, it is necessary to perform operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

(10) **[Close] button**

Clicking on this button will terminate AccessControl and return to the Configuration- [Setting Mode] screen.

(11) **[Help] button**

Clicking on this button will display the Help screen concerning AccessControl located in the first tab.
14.2.3.2 Operations on Setting/Reference Tab Screen

Perform Access Control setting by using AccessControl on the following screen.

![Setting/Reference Tab Screen](image)

Figure 14-67 Setting/Reference Tab Screen

**1. [Change Port Mode] button**

Clicking on this button will display the mode of each port of the disk array on the “Change Port Mode” dialog screen, and change to the WWN mode and Port mode becomes possible. If you want to change a port in Port mode, which is already linked with an LD Set, into WWN mode, unlink the port from the LD Set and then change to the WWN mode.

The port number indicates “Director Number - Port Number”.
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Figure 14-68  Change Port Mode

[Mode Type] Select a new port mode.
Ports cannot be changed from the WWN mode into Port mode in
AccessControl(WWN)-applied disk arrays. (If the change is necessary, consult the
maintenance person about it.)
- WWN Mode: Changes the port into WWN mode.
- Port Mode: Changes the port into Port mode.

[Batch Changing] Clicking this button sets all the ports into the mode selected in [Mode Type].
In this case, it is not necessary to select Port mode ports from the Port List.

[Change] Select a target port and click the [Change] button. The selected port is set into the
mode selected in [Mode Type]. Multiple ports can be selected and set if the port list
screen shows the same mode for them.
The Change Port Mode operation immediately reflects on the Disk Array. Therefore, if settings are wrong, there is a possibility that accessing from the business server to the LD may not be possible. It is necessary to perform operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

(2) [Start Access Control] button

Clicking on this button will validate Access Control settings from the business server to logical disks by using the WWN.

In the iSM client, once Access Control has been started, Access Control cannot be stopped. (If necessary, consult with a maintenance engineer).

The Start Access Control operation immediately reflects on the Disk Array. Therefore, if assignment of logical disks to LD Sets or Link Path settings are wrong, there is a possibility that accessing from the business server to logical disks may not be possible. It is necessary to perform operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

(3) Product Information

For description about product information, refer to 14.2.2.3 “Setting/Reference Tab Screen”.

(4) [Get Disk Array Info.] button

Clicking on this button will re-acquire information from the disk array necessary for operations on the AccessControl screen.

Normally, it is not necessary to use this button to re-acquire information from the disk array. If operations for the disk array on this screen fail, causing inconsistency between the disk array setting information and the information administrated on the iSM client and making normal operation impossible, use this button.

After clicking on this button and while information is being acquired from the disk array, the following dialog screen will be displayed.
When canceling the acquisition of information by clicking on the [Cancel] button while the information is being acquired, or the acquisition of information fails, there is a possibility that disk array information administrated by the iSM client may be wrong. Therefore, re-acquire information from the disk array through [Get Disk Array Info.].

(5) **[Close] button**

Clicking on this button will terminate AccessControl and return to the Configuration- [Setting Mode] screen.

(6) **[Help] button**

Clicking on this button will display the Help screen concerning Setting/Reference Tab screen.
14.3 LD Administrator

If using a disk array to which the program product “NEC Storage AccessControl(WWN)” is applied, read AccessControl(WWN) as AccessControl and NEC Storage AccessControl(WWN) as NEC Storage AccessControl, except when AccessControl as the selection function of the iSM client’s main window is explained. Note that a disk array to which the program product “NEC Storage AccessControl(WWN)” is applied is unable to perform the following operations:

- Linking the LD set that corresponds to a disk array port
- Selecting a target logical disk from [Candidate LD List] according to the port
- Changing the port mode from the WWN mode to the Port mode

Note the following points:

- The icon depicting in this manual is an image when the program product “NEC Storage AccessControl” is applied.
- Messages in the dialog boxes in this manual are samples displayed when “NEC Storage AccessControl” is applied. Thus, some messages are different from when “NEC Storage AccessControl(WWN) is applied. In this case, follow the messages in the dialog boxes actually displayed.

14.3.1 Function Overview

This manual describes functions available when the program product “NEC Storage ReallocationControl” is purchased. The LD Administrator is an optional software. The LD Administrator provides functions to pool spare disks in each server and dynamically add disks according to the necessity as described below.

- Setting and unsetting of information on accessibility from the business server to logical disks by using AccessControl
- Operations of logical disks inaccessible from the business server
  - Initialization of logical disk
  - Setting and unsetting of Work Disk for Optimization

Using these functions enable users to easily and flexibly change configuration of logical disks and set accessibility.
Logical disk groups hidden from the business server by the AccessControl function exist in this area. This area can be classified into two groups as shown below:

**[Preserve Group]** Logical disks hidden from the business server and inaccessible exist in this area. Contents of the logical disks are retained and existing logical disks include ordinary logical disks with no special purpose settings and replication volume (MV, RV).

**[Reserve Group]** Logical disks hidden from the business server and inaccessible exist in this area. However, contents of the logical disks are not retained. Existing logical disks include ordinary logical disks with no special purpose settings and the Work Disk for Optimization.

**[Accessible area]**
Logical disk groups accessible from the business server by using the AccessControl function. Contents of the logical disks depend on the business server, and existing logical disks include ordinary logical disks with no special purpose settings and replication volume (MV, RV). In addition, each logical disk is assigned to an LD Set.
14.3.2 Description of Operation Screen

This section explains screen items displayed through “access control”.

14.3.2.1 Display on Main Windows

The state monitoring screen of the iSM client describes how the information on Access Control is displayed. Figure 14-71 below is the main window of the iSM client, which is displayed immediately after logging in to the iSM server. Only when the AccessControl product is introduced, the LD Set name is displayed as part of the information in terms of each logical disk.

The LD Set, which results from naming an aggregate of multiple logical disks in the Access Control, is set through 14.3.2.4 “AccessControl Tab Screen”.

![Figure 14-71  Main Window 1 of iSM Client](image)

Selecting the “Access Control” part from the pull-down menu of this screen makes it possible to narrow down the logical disks to be displayed based on the LD Set name.
14.3.2.2 Configuration Setting Menu Screen

Depending on the purchase product situations, the Configuration- [Setting Mode] screen, shown below, for invoking the LD Administrator will be switched.

(1) When only an NEC Storage AccessControl product has been purchased, the following screen is displayed.

Figure 14-73  Configuration 1
(2) When both an LD Administrator product and an NEC Storage AccessControl product have been purchased, the following screen is displayed.

![Configuration Screen]

**Figure 14-74  Configuration 2**
14.3.2.3 LD Administrator Tab Screen

When the LD Administrator is invoked, this screen is displayed.

**Figure 14-75  LD Administrator Tab Screen**

(1) Accessible LD List

Consists of a tree view showing the relation between the LD Set and the path information and a list view of the logical disk List assigned to the LD Set or path information.

(a) Tree view

In the tree view, an LD Set can be selected by activating a check box and various information can be listed in the list view by clicking on a tree item.

- In the tree view, LD Sets and path information linked with the LD Sets are displayed.
  - : Item that shows all LD Sets
  - : LD Set linked with path information
  - : LD Set unlinked with path information

The following two icons indicate abnormal settings. It is necessary to change the setting to the normal setting.
  - : LD Set in which a port in the WWN mode and a port in Port mode are mixed
  - : LD Set in which the assignment of logical disks is different for each path information

- Check boxes are displayed for the “LD Set” item that shows all LD Sets in the tree item, each LD Set name, and
path information linked with the LD Sets in the tree item.
Furthermore, a check box for path information is activated associated with a check box for the linked LD Set.

Check boxes are used for the following purposes:

- Selection of [Add], [New Setting] for logical disks target LD Set
- Selection of [To Preserve] or [To Reserve] target LD Set (targets are logical disks assigned to the LD Set)

However, when selecting multiple LD Sets simultaneously to perform [Add]/[To Preserve]/[To Reserve] operations, the assignment states of logical disks for all the LD Sets must coincide.

When activating check boxes, display contents of the list view is switched as follows:

- When selecting an LD Set, the list of the logical disks assigned to the selected LD Set is displayed.
- When selecting multiple LD Sets, if the assignment states of logical disks for all the selected LD Sets are the same, the list of logical disks is displayed.

If the assignment states of logical disks for the selected LD Sets do not coincide, the list of selected LD Sets is displayed.

(b) List view

- Items displayed in the list of logical disks are as follows:
  
  LUN
  Order in which logical disks are recognized by a business server
  
  LUN : LUN to which logical disks are assigned
  Blank : LUN to which logical disks are not assigned

  Number
  OS Type
  Logical Disk Name
  RAID
  Capacity
  Purpose
  Replication Replication volume set in pairs
  Δ Ordinary disk with no special purpose settings

  Port (Not displayed for disk arrays of the x300 series or later)
  yes Logical disk assigned to a Port mode port
  Δ Logical disk which is not assigned to a Port mode port

  However, the port items are automatically displayed only when a Port mode port exists.

When LD Sets are not selected by using check boxes in the tree view, the list view is displayed in gray background color and LUN selection is not possible. Furthermore, when LD Sets are selected through check boxes, the list view is not displayed by clicking on the “LD Set” item showing all the LD Sets or by clicking on an individual LD Set.

- When clicking on the “LD Set” item showing all the LD Sets, items displayed in the list of LD Sets are as follows:
  Platform
The following two icons indicate abnormal settings. It is necessary to change the setting to the normal setting.

- : LD Set in which a port in the WWN mode and a port in Port mode are mixed
- : LD Set in which the assignment of logical disks is different for each path information

LD Set Name
Path Count
Capacity

![LD Set List 1](image1)

When the assignment states of logical disks for the check-marked multiple LD Sets do not coincide, items displayed in the list of LD Sets are as follows:

Platform

- : LD Set linked with path information
- : LD Set unlinked with path information

The following two icons indicate abnormal settings. It is necessary to change the setting to the normal setting.

- : LD Set in which a port in the WWN mode and a port in Port mode are mixed
- : LD Set in which the assignment of logical disks is different for each path information

LD Set Name
Pattern

![LD Set List 2](image2)

If a port in the WWN mode and a port in Port mode are mixed in a checked LD Set, the display items in the list are as follows:

- **<Mixed mode list display>**
  - Path (Port numbers and names are displayed together.)
If the path information (port) of a checked LD Set does not match the assignment of logical disks, the display items in the list are as follows:

Path (Port numbers and names are displayed together.)

Pattern

If the assignment of logical disks for each path information (WWPN) of a checked LD Set does not match, the display items in the list are as follows:

Path

Pattern

When the assignment states of logical disks of the check-marked LD Sets for each path information do not coincide, items displayed in the list are as follows:
An LD Set is a virtual concept that shows the aggregate of logical disks bound by the iSM. However, there is a possibility that the assignments of logical disks for each path may not coincide due to communication failures during setting.

Ensure consistency according to the following procedure.

Take a note of a path to which wrong logical disks are assigned (the same characters are displayed for the same contents in the Pattern column). Next, after deleting wrong paths once from the Link Path screen and checking that the LD Set icon is returned from Red to Blue in the Accessible LD List, restore necessary link paths on the Link Path screen again.

Rebuilding is also possible by assigning logical disks again by using [New Setting].

- Display items can be sorted, but their order cannot be changed.
- LUN to which logical disks are not assigned is made blank.
- When selecting [To Preserve] and [To Reserve] target logical disks, one logical disk or multiple logical disks can be simultaneously selected.

(c) Various Operation Buttons

Operation buttons shown below can be used for logical disks listed in the Accessible LD List.

Each button is enabled under defined conditions. For details, refer to the explanation of operation.

- [New Setting] button
- [Add] button
- [To Preserve] button
- [To Reserve] button
(2) Inaccessible LD List

This is a list view of logical disks which are not used for business. Selective display is possible by entering keywords in the combo box. The total capacity for each selective keyword is displayed on the right side of the display selection combo box.

(a) List view

- Display items are as follows:
  - Number
  - OS Type
  - Logical Disk Name
  - RANK
  - RAID
  - Capacity
  - Group
  - Preserve: Logical disks in the Preserve Group
  - Reserve: Logical disks in the Reserve Group
  - Purpose
  - Ordinary disk with no special purpose settings
  - Replication volume set in pairs
  - Work Disk for Optimization
  - Port (Not displayed for disk arrays of the x300 series or later)
  - Logical disk assigned to a Port mode port
  - Logical disk which is not assigned to a Port mode port

However, the port items are automatically displayed only when a Port mode port exists.

- Display items can be sorted, but their order cannot be changed.
- Logical disks assigned to LD Sets are not displayed.
- When selecting logical disks to be assigned to business, one logical disk or multiple logical disks can be simultaneously selected.

(b) Display Selection combo box

The Inaccessible LD List display can be selected by using the following keywords:

The total capacity for each selective keyword is displayed on the right side of the display selection combo box. The unit of capacities displayed in this dialog box can be changed. Refer to 14.3.2.5 “Setting/Reference Tab Screen” for the changing of the unit of capacities.
### Table 14-4 Selection Information 1

<table>
<thead>
<tr>
<th>Selection Information</th>
<th>Display of Logical Disks</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Preserve Group”</td>
<td>Displays logical disks in the Preserve Group.</td>
</tr>
<tr>
<td></td>
<td>Target logical disks include logical disks with no special purpose settings and logical disks set in pairs for replication.</td>
</tr>
<tr>
<td>“Preserve - Purpose ()”</td>
<td>Displays logical disks which have not been paired for replication.</td>
</tr>
<tr>
<td></td>
<td>These keywords are targeted for the Preserve Group only.</td>
</tr>
<tr>
<td>“Preserve - Purpose (Replication)”</td>
<td>Displays logical disks which have been paired for replication.</td>
</tr>
<tr>
<td></td>
<td>These keywords are targeted for the Preserve Group only.</td>
</tr>
<tr>
<td>“Reserve Group”</td>
<td>Displays logical disks in the Reserve Group.</td>
</tr>
<tr>
<td></td>
<td>Target logical disks include ordinary disks with no special purpose settings and Work Disk for Optimization.</td>
</tr>
<tr>
<td>“Reserve - Purpose ()”</td>
<td>Displays logical disks with no special purpose settings other than Work Disk for Optimization and replication volume set in pairs.</td>
</tr>
<tr>
<td></td>
<td>These keywords are targeted for the Reserve Group only.</td>
</tr>
<tr>
<td>“Reserve - Purpose (Optimization)”</td>
<td>Displays Work Disks for Optimization.</td>
</tr>
<tr>
<td></td>
<td>These keywords are targeted for the Reserve Group only.</td>
</tr>
<tr>
<td>“ALL”</td>
<td>Displays all inaccessible logical disks.</td>
</tr>
<tr>
<td></td>
<td>Attribute of target logical disks is no-attribute, replication (MV, RV), Work Disks for Optimization (Default settings)</td>
</tr>
</tbody>
</table>

**Selection/capacity display**

The total capacity for each selective keyword is displayed on the right side of the display selection combo box.

The unit of capacities displayed in this dialog box can be switched between [GB] and [Byte].

<Selection/capacity display>

![Inaccessible LD List](image)

*Inaccessible LD List*

<table>
<thead>
<tr>
<th>Selection/Capacity</th>
<th>ALL</th>
<th></th>
<th>513.4 [GB]</th>
</tr>
</thead>
</table>

- Selective keyword
- Total capacity for each selective word

**Figure 14-82 Selection/Capacity Display**

(c) Various Operation Buttons

Operation buttons shown below can be used for logical disks listed in the Inaccessible LD List.

Each button is enabled under defined conditions. For details, refer to the explanation of operation.

- [New Setting] button
- [Add] button
- [Change Group] button
- [Initialization] button
- [For Optimization] button
- All Selection check box
Perform individual operations for LD Sets on the following screen.

**14.3.2.4 AccessControl Tab Screen**

![Figure 14-83 AccessControl Tab Screen](image)

(1) Accessible LD List

Consists of a tree view showing the relation between the LD Set and the path information and a list view of the Logical disk List assigned to the LD Set or path information.

(a) Tree view

In the tree view, an LD Set can be selected by activating a check box and various information can be listed in the list view by clicking on a tree item.

In the tree view, LD Sets and path information linked with the LD Sets are displayed.

- : Item that shows all LD Sets
- : LD Set linked with path information
- : LD Set unlinked with path information

The following two icons indicate abnormal settings. It is necessary to change the setting to the normal setting.

- : LD Set in which a port in the WWN mode and a port in Port mode are mixed
- : LD Set in which the assignment of logical disks is different for each path information

- By clicking right-button after selecting LD Set, the pop-up menu appears allowing selection of name change of
LD Set. Selecting the menu displays the LD Set name change screen.

- Check boxes are displayed for the “LD Set” item that shows all LD Sets in the tree item, each LD Set name, and path information linked with the LD Sets in the tree item.

  Furthermore, a check box for path information is activated associated with a check box for the linked LD Set.

Check boxes are used for the following purposes:
- Select [Add], [New Setting] logical disks target LD Set
- Select [Link Path] target LD Set
- Select [Delete] target LD Set
- Select LD Set to [Delete] assigned logical disks

  However, when selecting multiple LD Sets simultaneously to [Add]/[Delete] logical disks, the assignment states of logical disks for all the LD Sets must coincide.

When activating check boxes, display contents of the list view are switched as follows:
- When selecting an LD Set, the list of the logical disks assigned to the selected LD Set is displayed.
- When selecting multiple LD Sets, if the assignment states of logical disks for all the selected LD Sets are the same, the list of logical disks is displayed.
  
  If the assignment states of logical disks for the selected LD Sets do not coincide, the list of the selected LD Sets is displayed.

(b) List view
- Items displayed in the list of logical disks are as follows:
  
<table>
<thead>
<tr>
<th>LUN</th>
<th>Order in which logical disks are recognized by a business server</th>
</tr>
</thead>
<tbody>
<tr>
<td>LUN</td>
<td>: LUN to which logical disks are assigned</td>
</tr>
<tr>
<td>LUN</td>
<td>: LUN to which logical disks are not assigned</td>
</tr>
<tr>
<td>Number</td>
<td>.OS Type</td>
</tr>
<tr>
<td>Logical Disk Name</td>
<td>RAID</td>
</tr>
<tr>
<td>Capacity</td>
<td>Purpose</td>
</tr>
<tr>
<td>Δ</td>
<td>Ordinary disk with no special purpose settings</td>
</tr>
<tr>
<td>Replication</td>
<td>Replication volume set in pairs</td>
</tr>
<tr>
<td>Port (Not displayed for disk arrays of the x300 series or later)</td>
<td>yes</td>
</tr>
<tr>
<td>Δ</td>
<td>Logical disk which is not assigned to a Port mode port</td>
</tr>
</tbody>
</table>

  However, the port items are automatically displayed only when a Port mode port exists.

When LD Sets are not selected by using check boxes in the tree view, the list view is displayed in gray background color and LUN selection is not possible. Furthermore, when LD Sets are selected through check boxes, the list view is not displayed by clicking on the “LD Set” item which shows all the LD Sets or by clicking on an individual LD Set.
Chapter 14  Individual Settings

- When clicking on the “LD Set” item which shows all the LD Sets, items displayed in the list of LD Sets are as follows:
  Platform
  
  ![Image](image1)

  The following two icons indicate abnormal settings. It is necessary to change the setting to the normal setting.
  
  ![Image](image2)

- When the assignment states of logical disks for the check-marked LD Sets do not coincide, items displayed in the list of LD Sets are as follows:
  Platform
  
  ![Image](image3)

  The following two icons indicate abnormal settings. It is necessary to change the setting to the normal setting.
  
  ![Image](image4)

- If a port in the WWN mode and a port in Port mode are mixed in a checked LD Set, the display items in the list are as follows:

  ![Image](image5)
Path (Port numbers and names are displayed together.)

Mode

- If the path information (port) of a checked LD Set does not match the assignment of logical disks, the display items in the list are as follows:
  <Port information list display>
  Path (Port numbers and names are displayed together.)

Pattern

- If the assignment of logical disks for each path information (WWPN) of a checked LD Set does not match, the display items in the list are as follows:
  <Path information list display>
  Path

Pattern
• When the assignment states of logical disks of the check-marked LD Sets for each path information do not coincide, items displayed in the list are as follows:

<LD List display>

![Accessible LD List](image)

Figure 14-89  Accessible LD List 4

An LD Set is a virtual concept that shows the aggregate of logical disks bound by the iSM. However, there is a possibility that the assignments of logical disks for each path may not coincide due to communication failures during setting.

Ensure consistency according to the following procedure.

Take a note of a path to which wrong logical disks are assigned (the same characters are displayed for the same contents in the Pattern column). Next, after deleting wrong paths once from the Link Path screen and checking that the LD Set icon is returned from Red to Blue in the Accessible LD List, restore necessary link paths on the Link Path screen again.

Rebuilding is also possible by assigning logical disks again by using [New Setting].

(c) Various Operation Buttons

Operation buttons shown below can be used for logical disks listed in the [Accessible LD List].

• Logical Disk [Add] button
• Logical Disk [New Setting] button
• Logical Disk [Delete] button

Furthermore, LD Set related operation buttons shown below can be used regardless of logical disk selection.

• LD Set [New] button
• LD Set [Delete] button
• LD Set [Link Path] button
• Right button after LD Set selection

(2) Candidate LD List

This is a list view of logical disks which can be assigned to LD Sets. Selective display is possible by entering keywords in the combo box.

(a) List view
• Display items are as follows:
  Number
  OS Type
  Logical Disk Name
  RANK
  RAID
  Capacity
  Group
  Δ Logical disk assigned to an LD Set
  Preserve Logical disks in the Preserve Group
  Purpose
  Δ Ordinary disk with no special purpose settings
  Replication Replication volume set in pairs
  Optimization Work Disks for Optimization
  Port (Not displayed for disk arrays of the x300 series or later)
  yes Logical disk assigned to a Port mode port
  Δ Logical disk which is not assigned to a Port mode port

However, the port items are automatically displayed only when a Port mode port exists.

(b) Display Selection combo box

The following keywords make it possible to narrow down the display of logical disks in the [Candidate LD List].

<table>
<thead>
<tr>
<th>Selection information</th>
<th>Display of Logical Disks</th>
</tr>
</thead>
<tbody>
<tr>
<td>“LD Set Name” (Ex. “NX: UNIX_Server01”)</td>
<td>Displays only logical disks which have already been assigned to the LD Set</td>
</tr>
<tr>
<td>“Platform: *”(Ex. “NX: *”)</td>
<td>Displays only logical disks of the Platform</td>
</tr>
<tr>
<td>“*: *”</td>
<td>Displays only logical disks whose Platform has not been set</td>
</tr>
<tr>
<td>Setting</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>**h-<strong>h (</strong>) (Ex. “04h-00h (Server01)”’)</td>
<td>Displays only logical disks that are assigned to ports in Port mode.</td>
</tr>
<tr>
<td>“POOL (WWN)”</td>
<td>Displays only undefined logical disks which do not belong to any LD Sets</td>
</tr>
<tr>
<td>“Preserve Group”</td>
<td>Displays logical disks in the Preserve Group.</td>
</tr>
<tr>
<td></td>
<td>Target logical disks include logical disks with no special purpose settings and logical disks set in pairs for replication.</td>
</tr>
<tr>
<td>“ALL”</td>
<td>Displays all logical disks in the [Candidate LD List]. (Default settings)</td>
</tr>
</tbody>
</table>

(c) Various Operation Buttons

Operation buttons shown below can be used for logical disks listed in the [Candidate LD List]. Each button is enabled under defined conditions. For details, refer to the explanation of operation.

- Logical Disk [Add] button
- Logical Disk [New Setting] button
- All Selection check box

Furthermore, LD Set related operation buttons shown below can be used regardless of logical disk selection.

- LD Set [New] button
- LD Set [Delete] button
- LD Set [Link Path] button
- Right button after LD Set selection
14.3.2.5 Setting/Reference Tab Screen

Items that can be set on the Setting/Reference Tab screen are as follows:

- Setting Access Control
- Initialization Options
- Product Information (reference only)

Contents of each item and setting information are described below.

Figure 14-90  Setting/Reference Tab Screen

(1) “Setting Access Control” field
The following setting can be performed in the “Setting Access Control” field.
- Change Port Mode
- Start Access Control

(2) “Initialization Options” field
The following setting is possible in this field.
- EVN Initialization
  This is a function to initialize a logical disk and simultaneously return its type and name to the initial settings for the disk array.

In the Confirmation dialog screen displayed at the initialization of a logical disk, it is possible to change default settings for the confirmation item about whether to initialize EVN or not.

  With Initialization: “With Initialization of EVN” is displayed as default settings for the confirmation item.
With No Initialization: “With No Initialization of EVN” is displayed as default settings for the confirmation item. Furthermore, the change of “With” or “With No” Initialization of EVN made on the Confirmation dialog screen is a temporary change. The change does not reflect on the default setting.

- Initialization Time
It is possible to change the standard time required for Initialization of a logical disk. The specification range is from 0 hour (default setting) to 24 hours. When 0 hour is set, a logical disk is initialized at the maximum speed.

Please note that actual Initialization Time varies with the load of the disk array. Also, pay careful attention because Initialization may affect logical disks located on the same RANK which is accessed by the business server.

(3) “Product Information” field
This field displays information on the NEC Storage AccessControl product required for setting information on accessibility to logical disks.

- Purchase Product Classification ... Displays the type of the purchased NEC Storage AccessControl product.
- Product Use Situation ... Displays the maximum number of path information links permitted for an NEC Storage AccessControl product and the current number of path information links.

(4) “Display Option” field
The following setting can be performed in the “Display Option” field.

- Capacity Display Unit
The items of a list view displayed in each screen and a newly selected capacity unit can be displayed.
  GB (G): Capacities are displayed in gigabytes.
  Byte (B): Capacities are displayed in bytes.

14.3.3 Description of Operations

This section describes the LD Administrator Tab screen, the AccessControl Tab screen and the Setting/Reference Tab screen.

In 14.3.3.1 “Operations of the LD Administrator Tab Screen”, with respect to the items to be set on the “LD Administrator” screen in the first tab located in the LD Administrator dialog screen, buttons and their functions are described.

In 14.3.3.2 “Operations on the AccessControl Tab Screen”, with respect to the items to be set on the “AccessControl” screen in the second tab located in the LD Administrator dialog screen, buttons and their functions are described.

In 14.3.3.3 “Operations on the Setting/Reference Tab Screen”, with respect to the items to be set on the “Setting/Reference” screen in the third tab located in the LD Administrator dialog screen, buttons and their functions are described.
Starting in setting mode displays the following warning dialog box to warn the users:

![Figure 14-91 Warning Dialog Box at Start](image)

Similarly, the following dialog boxes also display a warning message when an attempt is made to perform operation: [05701], [05704], [05721], [05722], [05723], [05732], [05733], [05742], [05760], [05761], [05780], [05781], [05782], and [05783]

![Figure 14-92 Sample of Warning Message Display](image)
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Clicking the [Cancel] button in the warning dialog box at start returns to the Configuration- [Setting Mode] screen below.

![Configuration- [Setting Mode] Screen](image)

Figure 14-93  Configuration- [Setting Mode] Screen
14.3.3.1 Operations of LD Administrator Tab Screen

Perform LD Administrator operation on the following screen.

![LD Administrator Tab Screen](image)

**1. Add button**

When setting permission of access from the business server to logical disks, select LD Sets of a desirable business server from the tree view of the Accessible LD List display area, and also select logical disks to be added from the Inaccessible LD List display area, and then click on the [Add] button.

Before adding logical disks of the Reserve Group, it is necessary to perform Change Group operation beforehand by using the [Change Group] button. Moreover, with regard to a logical disk which is being initialized or being performance optimized, Change Group operation is not possible until the processing is completed.

When logical disks to be added do not belong to the Preserve Group located in the Inaccessible LD List, the operation warning dialog screen shown below is displayed.

![Operation Warning Dialog Screen](image)

Figure 14-94  LD Administrator Tab Screen

Figure 14-95  Confirmation Dialog Screen 7
When conditions for addition are met, the “LD Setting” dialog screen below is displayed at the time of clicking on the [Add] button.

![LD Setting dialog screen](image)

**Figure 14-96  LD Setting**

The logical disk to be newly added is displayed at the end of the logical disk group which has been assigned on the “LD Setting” dialog screen, and LUN can be changed by button operation. However, the LUN selected in the Accessible LD List display area has not assigned logical disks and the number of selected logical disks coincides with the number of lines of the LUN which has not assigned logical disks or less, logical disks will be displayed after the selected LUN line. Furthermore, when selecting multiple LUNs which have not assigned logical disks, the selected LUNs must be sequential.

Only a newly added logical disk group can be moved on this dialog screen, and logical disks cannot be moved to the LUN displayed as the icon. Furthermore, the LUN to which logical disks have been assigned cannot be changed.

The following button can be operated on the “LD Setting” dialog screen.

- **[Top]** Moves a selected logical disk in a newly added logical disk group to the top line of the newly added logical disk group.
- **[Up]** Moves a selected logical disk in a newly added logical disk group to the previous line of the newly added logical disk group.
- **[Down]** Moves a selected logical disk in a newly added logical disk group to the following line of the newly added logical disk group.
- **[Bottom]** Moves a selected logical disk in a newly added logical disk group to the end line of the newly added logical disk group.
- **[Apply]** Clicking on this button will perform settings for the disk array.
- **[Close]** Clicking on this button will close the “LD Setting” dialog screen. Furthermore, the following dialog screen will be displayed and confirmation will be made about whether to close the “LD Setting” dialog screen or not by considering the settings invalid.

**IV-98**
Logical disk information displayed on the “LD Setting” dialog screen is as follows:

<table>
<thead>
<tr>
<th>LUN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>: LUN to which newly added, movable logical disks are assigned</td>
<td></td>
</tr>
<tr>
<td>: LUN whose logical disks cannot be moved</td>
<td></td>
</tr>
</tbody>
</table>

Number
OS Type
Logical Disk Name
RAID
Capacity

- When performing [Add], logical disks which have been assigned to an Add target LD Set cannot be doubly added to the LD Set.
- Logical disks can be assigned to multiple LD Sets.

If the [Add] operation fails, the error dialog screen showing the failure will be displayed. When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(2) **[New Setting] button**

When setting permission of access from the business server to logical disks, select LD Sets of a desirable business server from the tree view in the Accessible LD List display area, and also select New Setting target logical disks from the Inaccessible LD List display area, and then click on [New Setting] button.

Assignment of logical disks by using the [New Setting] button invalidates the current assignment state of logical disks assigned to the LD Set and newly assigns the logical disks.

Logical disks can be assigned to multiple LD Sets.

Before assigning logical disks of the Reserve Group, it is necessary to perform Change Group operation by using
the [Change Group] button. Moreover, with regard to a logical disk which is being initialized or being performance optimized, Area change is not possible until the processing is completed.

When logical disks to be assigned do not belong to the Preserve Group located in the Inaccessible LD List, the operation warning dialog screen below is displayed.

![Figure 14-98  Confirmation Dialog Screen 9](image)

When conditions for assignment are met, the “LD Setting” dialog screen below is displayed at the time of clicking on the [New Setting] button.

![Figure 14-99  LD Setting](image)

Logical disks to be modified are listed in the Inaccessible LD List display area.

On the “LD Setting” dialog screen, the following buttons are operable.

- **[Top]** Moves a selected logical disk to the top line of the logical disk group.
- **[Up]** Moves a selected logical disk to the previous line.
- **[Down]** Moves a selected logical disk to the following line.
- **[Bottom]** Moves a selected logical disk to the end line of the logical disk group.
- **[Apply]** Clicking on this button will perform settings for the disk array.
- **[Close]** Clicking on this button will close the “LD Setting” dialog screen. Furthermore, the following
dialog screen will be displayed and confirmation will be made about whether to close the “LD Setting” dialog screen or not by considering the settings invalid.

![Figure 14-100  Confirmation Dialog Screen 10](image)

Logical disk information displayed on the “LD Setting” dialog screen is as follows:

<table>
<thead>
<tr>
<th>LUN</th>
<th>LUN to which newly added, movable logical disks are assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>OS Type</td>
</tr>
<tr>
<td>Logical Disk Name</td>
<td>RAID</td>
</tr>
<tr>
<td>Capacity</td>
<td></td>
</tr>
</tbody>
</table>

When new setting is applied, the currently set LD assignments are all invalidated, and the new LD assignment is immediately reflected into the disk array. Therefore, if set information is wrong, the business server suddenly stops recognizing the logical disk in use. It is necessary to perform operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

If the [New Setting] operation fails, the error dialog screen showing the failure will be displayed. When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(3) **[To Preserve] button**

When setting inaccessibility from the business server to logical disks, select logical disks or LD Sets of a desirable business server from the Accessible LD List display area, and then click on the [To Preserve] button. Logical disks which can be moved to the Preserve Group are as follows:

- Ordinary disk
- Replication volume set in pairs

When selected logical disks are assigned to multiple LD Sets, the following dialog screen is displayed and the execution of the [To Preserve] operation will be reconfirmed.
The [To Preserve] operation targets logical disks assigned to all LD Sets. Therefore, when moving logical disks from a particular LD Set to the Preserve Group, it is necessary to perform operation by using AccessControl located in the second tab.

The [To Preserve] operation immediately reflects on the disk array. Therefore, if this operation is wrong, the business server suddenly stops recognizing the logical disk in use. It is necessary to perform this operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

If the [To Preserve] operation fails, the error dialog screen showing the failure will be displayed. When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(4) [To Reserve] button

When setting inaccessibility from the business server to logical disks, select logical disks or LD Sets of a desirable business server, which are to be reserved for Initialization or the use of Work Disks for Optimization, from the Accessible LD List display area, and then click on the [To Reserve] button.

Logical disks which can be moved to the Reserve Group are as follows:
- Ordinary disk
- Logical disks which are not being performance optimized

When pair settings for replication are performed, the operation warning dialog screen below is displayed.

When selected logical disks are assigned to multiple LD Sets, the following dialog screen is displayed and the execution of the [To Reserve] operation will be reconfirmed.
The [To Reserve] operation targets logical disks assigned to all LD Sets. Therefore, when moving logical disks from a particular LD Set to the Reserve Group, it is necessary to perform operation by using AccessControl located in the second tab.

The [To Reserve] operation immediately reflects on the disk array. Therefore, if this operation is wrong, the business server suddenly stops recognizing the logical disk in use. It is necessary to perform this operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

If the [To Reserve] operation fails, the error dialog screen showing the failure will be displayed. When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(5) [Change Group] button

It is possible to change the group of logical disks listed in the Inaccessible LD List. When performing Change Group of logical disks, select Change Group target logical disks from the [Inaccessible LD List], and then click on the [Change Group] button.

Logical disks in the Preserve Group can be moved to the Reserve Group.

Logical disks which can be moved are as follows:
- Ordinary disks
- Logical disks which are not being performance optimized

When pair settings for replication are performed, the operation warning dialog screen below is displayed.
Logical disks of the Reserve Group can be moved to the Preserve Group.

Logical disks which can be moved are as follows:
- Logical disks other than Work Disks for Optimization
- Logical disks which are not being initialized

When these conditions are not met, the operation warning dialog screen below is displayed.

A Work Disk for Optimization has to be converted to an ordinary disk by unsetting the performance optimization using the [For Optimization] button before changing the group.

Logical disks which are being initialized cannot be changed until the Initialization is completed.

Clicking on the [Change Group] button will display the following dialog screen and the execution of the operation will be confirmed.

[Change to the Preserve Group]
If the [Change Group] operation fails, the error dialog screen showing the failure will be displayed.
When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(6) **[Initialization] button**

It is possible to initialize logical disks of the Reserve Group located in the Inaccessible LD List.
When initializing logical disks, select logical disks to be initialized from the Inaccessible LD List, and click on the [Initialization] button.
Logical disks that can be initialized are as follows:
- Logical disks other than Work Disk for Optimization
- Logical disks which are not being initialized
When these conditions are not met, the operation warning dialog screen below is displayed.

Clicking on this button will display the following dialog screen and the execution of the operation will be confirmed.
Moreover, when changing the initial setting for EVN Initialization option radio buttons displayed on this dialog screen, refer to 14.3.2.5 “Setting/Reference Tab Screen”.

![Confirmation Dialog Screen](image)

**Figure 14-109  Confirmation Dialog Screen 18**

To check the progress of logical disk Initialization, terminate the configuration setting function once and then check the progress ratio on the “Logical Disk Related Information List Screen” of the iSM main window. During configuration setting, completion of logical disk Initialization is not automatically recognized. Therefore, terminate the configuration setting function once or perform [Get disk array Info.] and acquire the latest state of the disk array into the iSM client.

If the [Initialization] operation fails, the error dialog screen showing the failure will be displayed. When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.]

(7) **[For Optimization]** button

It is possible to perform setting/unsetting of Work Disk for Optimization with respect to logical disks of the Reserve Group located in the Inaccessible LD List.

When performing setting/unsetting of performance optimization of logical disks, select target logical disks from the Inaccessible LD List, and then click on the [For Optimization] button.

The [For Optimization] button is not displayed unless a performance optimization product has not been purchased.

Logical disks that can be set for Work Disks for Optimization are as follows:

- Logical disks of the Reserve Group
- Logical disks which are not being initialized

However, multi-RANK logical disks cannot be set.
When these conditions are not met, the operation warning dialog screen below is displayed.

![Figure 14-110 Confirmation Dialog Screen 19](image)

Figure 14-110 Confirmation Dialog Screen 19

Logical disks that can be unset for Work Disks for Optimization are as follows:

- Work Disks for Optimization
- Logical disks which are not being performance optimized

When these conditions are not met, the operation warning dialog screen below is displayed.

![Figure 14-111 Confirmation Dialog Screen 20](image)

Figure 14-111 Confirmation Dialog Screen 20

It is not possible to set logical disks which are being initialized for Work Disks for Optimization until the initialization is completed.

It is not possible to unset logical disks which are being performance optimized for Work Disks for Optimization until the performance optimization is completed.

Clicking on the [For Optimization] button will display the following dialog screen and the execution of the operation will be confirmed.
During the configuration setting, completion of logical disk performance optimization is not automatically recognized. Therefore, terminate the configuration setting function once or perform [Get disk array Info.] and acquire the latest state of the disk array into the iSM client.

If the [For Optimization] operation fails, the error dialog screen showing the failure will be displayed. When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(8) [Get Disk Array Info.] button

Clicking on this button will re-acquire information from the disk array necessary for operations on the LD Administrator screen. Normally, it is not necessary to use this button to acquire information again from the disk array. If operations for the disk array on this screen fail, causing inconsistency between the disk array setting information and the information administrated on the iSM client and making normal operation impossible, use this button.

After clicking on this button and while information is being acquired from the disk array, the following dialog screen will be displayed.
When canceling the acquisition of information by clicking on the [Cancel] button while the information is being acquired, or the acquisition of information fails, there is a possibility that disk array information administrated by the iSM client may be wrong. Therefore, acquire information again from the disk array through [Get Disk Array Info.].

(9) [All Selection] check box

This check box is used to perform auxiliary operation to select logical disks from the [Inaccessible LD List] display area.

This check box enables the auxiliary selection operation as shown below.

- Activate the check box
  Selects all logical disks displayed in the [Inaccessible LD List].

- Deactivate the check box
  Unselect logical disks currently selected and displayed in the “Inaccessible LD List”.

(10) [Close] button

Clicking on this button will terminate LD Administrator and return to the Configuration- [Setting Mode] screen.

(11) [Help] button

Clicking on this button will display the Help screen concerning the LD Administrator Tab screen.
Perform individual operations for LD Sets on the following screen.

Figure 14-115  AccessControl Tab Screen

1) [Add] button

When setting permission of access from the business server to logical disks, select LD Sets of a desirable business server from the tree view of the Accessible LD List display area, and also select logical disks to be added from the [Candidate LD List] display area, and then click on the [Add] button.

Logical disks will be added to all of the path information linked with the selected LD Sets. Furthermore, logical disks can be added to the LD Sets which are not linked with path information. Logical disks to be added need to satisfy the following conditions.

- Logical disks must be the following disks.
  - Ordinary disk
  - Replication volume set in pairs

Clicking on the [Add] button will display the following “LD Setting” dialog screen.
The logical disk to be newly added is displayed at the end of the logical disk group which has been assigned on the “LD Setting” dialog screen, and LUN can be changed by button operation. However, the LUN selected in the Accessible LD List display area has not assigned logical disks and the number of selected logical disks coincides with the number of lines of the LUN which has not assigned logical disks or less, logical disks will be displayed after the selected LUN line. Furthermore, when selecting multiple LUNs which have not assigned logical disks, the selected LUNs must be sequential.

Only a newly added logical disk group can be moved on this dialog screen, and logical disks cannot be moved to the LUN displayed as the icon.

Furthermore, the LUN to which logical disks have been assigned cannot be changed.

On the “LD Setting” dialog screen, the following buttons are operable.

[Top] Moves a selected logical disk in a newly added logical disk group to the top line of the newly added logical disk group.

[Up] Moves a selected logical disk in a newly added logical disk group to the previous line of the newly added logical disk group.

[Down] Moves a selected logical disk in a newly added logical disk group to the following line of the newly added logical disk group.

[Bottom] Moves a selected logical disk in a newly added logical disk group to the end line of the newly added logical disk group.

[Apply] Clicking on this button will perform settings for the disk array.

[Close] Clicking on this button will close the “LD Setting” dialog screen. Furthermore, the following dialog screen will be displayed and confirmation will be made about whether to close the “LD Setting” dialog screen or not by considering the settings invalid.
Logical disk information displayed on the “LD Setting” dialog screen is as follows:

| LUN | Number | OS Type | Logical Disk Name | RAID | Capacity |

- When performing [Add], logical disks which have been assigned to an Add target LD Set cannot be doubly added to the LD Set.
- Logical disks can be assigned to multiple LD Sets.

If the [Add] operation fails, the error dialog screen showing the failure will be displayed.

When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(2) [Delete] button

When setting inaccessibility from the business server to logical disks, stop the assignment, and select logical disks or LD Sets of a desirable business server from the Accessible LD List display area, and then click on the [Delete] button.

Logical disks that can be deleted are as follows:

- Ordinary disk
- Replication volume set in pairs

When selected logical disks are assigned to multiple LD Sets, the following dialog screen is displayed and the execution of the Delete operation is re-confirmed.
This operation deletes logical disks from the target LD Set only which has been selected through its check box. Logical disks which have been deleted from all of the LD Sets belong to the Preserve Group. The Delete operation deletes explicitly selected logical disks or the logical disks assigned to the explicitly selected LD Set. Therefore, to delete logical disks assigned to an unselected LD Set, perform Delete operation from the LD Administrator screen located in the first tab.

Deletion of the logical disk from the LD Set immediately reflects on the disk array. Therefore, if Delete operation is wrong, the business server suddenly stops recognizing the logical disk in use. It is necessary to perform Delete operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

If the [Delete] operation fails, the error dialog screen showing the failure will be displayed. When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(3) [New Setting] button

When setting permission of access from the business server to logical disks, select LD Sets of a desirable business server from the tree view in the Accessible LD List display area, and also select New Setting target logical disks from the [Candidate LD List] display area, and then click on [New Setting] button. Assignment of logical disks by using the [New Setting] button invalidates the current assignment state of logical disks assigned to the LD Set and newly assigns the logical disks.

Logical disks can be assigned to multiple LD Sets.

Clicking on the [New Setting] button will display the following “LD Setting” dialog screen.
Logical disks to be modified are listed in the [Candidate LD List] display area. On the “LD Setting” dialog screen, the following buttons are operable. Moreover, one logical disk can be selected at a time to move the logical disk on this dialog screen. The logical disks in the list can be sorted into a different order according to an item other than LUN.

[Top] Moves a selected logical disk to the top line of the logical disk group.

[Up] Moves a selected logical disk to the previous line.

[Down] Moves a selected logical disk to the following line.

[Bottom] Moves a selected logical disk to the end line of the logical disk group.

[Apply] Clicking on this button will perform settings for the disk array.

[Close] Clicking on this button will close the “LD Setting” dialog screen. Furthermore, the following dialog screen will be displayed and confirmation will be made about whether to close the “LD Setting” dialog screen or not by considering the settings invalid.

Logical disk information displayed on the “LD Setting” dialog screen is as follows:

LUN

: LUN to which newly added, movable logical disks are assigned

Number

OS Type

Logical Disk Name

RAID

Capacity
Application of the New Setting invalidates all of the current assignment settings for the logical disks and new assignment settings for the logical disk immediately reflect on the disk array. Therefore, if setting information is wrong, the business server suddenly stops recognizing the logical disk in use. It is necessary to perform this operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

If the [New Setting] operation fails, the error dialog screen showing the failure will be displayed. When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(4) [New] button

Clicking on this button will display the following dialog screen, thereby a new LD Set can be created.

![New LD Set dialog screen](image)

Figure 14-121  New LD Set

For LD Set, specify the platform of the business server that accesses a logical disk via the LD set.

The following platforms can be specified:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A4</td>
<td>ACOS-4 system</td>
</tr>
<tr>
<td>A2</td>
<td>ACOS-2 system</td>
</tr>
<tr>
<td>NX</td>
<td>HP-UX system</td>
</tr>
<tr>
<td>WN</td>
<td>Windows system</td>
</tr>
<tr>
<td>CX</td>
<td>Solaris system</td>
</tr>
<tr>
<td>LX</td>
<td>Linux system</td>
</tr>
<tr>
<td>AX</td>
<td>AIX system</td>
</tr>
</tbody>
</table>

Furthermore, the LD Set name can be set by using arbitrary 16 characters including alphanumeric characters, “/”, and “_”.

However, when the combination of the Platform and the LD Set name have already been set to other LD Set, new
settings are not possible.

A newly created LD Set has only a Platform and a name. For the business server to recognize logical disks, it is necessary to set actual path information through [Link Path] and also assign logical disks. A single LD Set is linked with each business server. Thus, the port of the disk array to be linked and the name of the business server to be connected or the name of a business server having WWPN should be specified for the LD Set name.

If the [New] operation fails, the error dialog screen showing the failure will be displayed. When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(5) [Delete] button

Select an LD Set from the tree view located in the Accessible LD List display area and then click on this button to delete the LD Set.

The following selection is available for the LD Set.

- Selection of treetop “LD Set” item
- Selection of single LD Set
- Selection of multiple LD Sets

By deleting an LD Set, the LD Set, logical disk information assigned to the LD Set and path information linked to the LD Set are deleted. Clicking on this button will display the following dialog screen and the execution of Delete operation will be reconfirmed.
Deletion of the LD Set immediately reflects on the disk array. Therefore, if Delete operation is wrong, the business server suddenly stops recognizing the logical disk in use. It is necessary to perform Delete operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

If the [Delete] operation fails, the error dialog screen showing the failure will be displayed.

When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(6) [Link Path] button

Selecting an LD Set and clicking on this button will display the following dialog screen. Selecting an LD Set and the path information to be linked displays the screen for setting with each path information.
The [Link Path] button is enabled only when a single LD Set is selected from the tree view located in the Accessible LD List display area.
The linking of path information with an LD Set means the setting of the HBA’s WWPN of the business server that actually accesses logical disks or the setting of the port (in Port mode) of the disk array to which the business server is connected.

The WWPN (World Wide Port Name) set for the HBA of the business server is necessary for determining whether to permit access in the WWN mode in the [Path Link] dialog box.
The WWN (World Wide Name) consists of the WWNN (World Wide Node Name) and the WWPN (World Wide Port Name), and is allocated to the HBA (Host Bus Adaptor; also called FC controller) as ID code information inherent to the HBA. For information on the acquisition method, refer to the “Access Control User’s Guide” for NEC Storage Series.
Figure 14-124  Linking of Path Information (WWPN)

Figure 14-125  Linking of Path Information (Port Number)
Chapter 14  Individual Settings

On this dialog screen, the following operations are possible.

- **Path Info Input Field**
  Newly added or replaced path information is entered into this area. It is necessary to enter 16 single-bit, hexadecimal digit characters into this input field.

- **Port Number Selection Field**
  The port number to be newly added or to be replaced is selected in this field. Only ports in Port number are displayed in the field.

- **Current Path Info**
  Displays path information current set for the disk array and path information which has been changed by operating each button on this dialog screen.

- **[Add] button**
  When new path information is entered into the “Path Info Input Field”, clicking on this button will add the entered path information to the last line of the “Current Path Info” display area.

  Select a target port number from “Port Number Selection Field” and click the [Add] button. The path information of the selected port number is added to the last line of the “Current Path Info” display area.

  Up to 64 pieces of path information can be set for one LD Set.

  To apply settings for the disk array, click on the [Apply] button.

- **[Replace] button**
  After entering new path information into “Path Info Input Field” and selecting Replace target path information from the “Current Path Info” display area, clicking on this button will replace the path information selected in the “Current Path Info” display area with newly entered path information.

  Select a target port number from “Port Number Selection Field”, select Replace target path information from the “Current Path Info” display area, and then click the [Replace] button. The path information of the selected port number is replaced by the path information selected from the “Current Path Info” display area.

  Only a piece of path information can be selected at a time from the “Current Path Info” display area.

  To apply settings for the disk array, click on the [Apply] button.

- **[Delete] button**
  Selecting Delete target path information from the “Current Path Info” display area and clicking on this button will delete the selected path information from the “Current Path Info” display area.

  Only a piece of path information can be selected at a time from the “Current Path Info” display area.

  To apply settings for the disk array, click on the [Apply] button.

When the [Add] button is pressed, the product purchase situation is checked. If the upper limit of the Path Count permitted for the product is reached in the Disk Array as a whole, an error dialog screen appears in this stage, which makes the linking impossible. Furthermore, a WWPN or Port Number linked with another LD Set cannot be registered dually for another LD Set. If an error message showing the situation, specify a different WWPN or Port Number.
• [Apply] button

Clicking on this button will display the following Operation Confirmation dialog screen, and path information shown in the “Current Path Info” display area will be applied to the disk array.

![Confirmation Dialog Screen](image)

The WWPN of path information can be set even when the set value is different from the WWPN of the business server HBA which actually accesses logical disks. Therefore, pay careful attention not to set a wrong value.

Application of path information immediately reflects on the disk array. Therefore, if setting information is wrong, there is a possibility that accessing from the business server may not be possible. Pay careful attention to this. Especially, when settings are wrong for deleting or replacing path information, the business server suddenly stops recognizing the logical disk in use. It is necessary to perform operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.
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- [Close] button
  When changes made on this dialog screen are not set for the disk array, the following dialog screen will appear and the execution of the operation will be confirmed.

![Confirmation Dialog Screen](image)

Figure 14-127  Confirmation Dialog Screen 28

- [Help] button
  Clicking on this button will display the Help screen concerning the “Link Path” screen.

If the [Link Path] operation fails, the error dialog screen showing the failure will be displayed.

When an operation request is in error, there is a possibility of inconsistency between the disk array setting information and the information administrated on the iSM client. Therefore, perform [Get Disk Array Info.].

(7) [Get Disk Array Info.] button

Clicking on this button will re-acquire information from the disk array necessary for operations on the LD Administrator screen.

Normally, it is not necessary to use this button to re-acquire information from the disk array. If operations for the disk array on this screen fail, causing inconsistency between the disk array setting information and the information administrated on the iSM client and making normal operation impossible, use this button.

After clicking on this button and while information is being acquired from the disk array, the following dialog screen will be displayed.

![Information Being Acquired](image)

Figure 14-128  Information Being Acquired

When canceling the acquisition of information by clicking on the [Cancel] button while the information is being acquired, or the acquisition of information fails, there is a possibility that disk array information administrated by the iSM client may be wrong. Therefore, re-acquire information from the disk array through [Get Disk Array Info.].
(8) [All Selection] check box

This check box is used to perform auxiliary operation to select logical disks from the [Candidate LD List] display area.

This check box enables the auxiliary selection operation as shown below.

- Activate the check box
  
  Selects all logical disks displayed in the [Candidate LD List].

- Deactivate the check box
  
  Unselect logical disks currently selected and displayed in the [Candidate LD List].

(9) Pop-up menu

- Rename LD Set

After selecting LD Set, right-click on mouse displays a popup menu allowing selection of changing name of LD Set. Selecting this displays Rename LD Set screen.

<table>
<thead>
<tr>
<th>Accessible LD List</th>
<th>LUN</th>
<th>Number</th>
<th>OS Type</th>
<th>Logical Disk Name</th>
<th>RAID</th>
<th>Cap...</th>
<th>Pw</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1000-6866-6856-6856</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000-6866-6856-6856</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 14-129  LD Set Pop-up Menu Screen

Figure 14-130  Rename LD Set Screen

For LD Set, specify the platform of the business server that accesses logical disks via the LD Set. Refer to Table
14-3 “Default for the Platform” for the platforms that can be specified.
LD Set name can be specified with 16 characters including arbitrary alphanumeric characters, “/”, and “_”.
However, if a combination of Platform and LD Set name has been set, new setting can no longer be made.

When an LD Set is renamed, the disk array dynamically changes individual response control for each OS according to the platform information. Therefore, it is necessary to perform operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

(10) [Close] button
Clicking on this button will terminate LD Administrator and return to the Configuration- [Setting Mode] screen.

(11) [Help] button
Clicking on this button will display the Help screen concerning the AccessControl Tab screen.
14.3.3.3 Operations on Setting/Reference Tab Screen

Perform Access Control setting by using LD Administrator on the following screen.

![Setting/Reference Tab Screen](image)

**Figure 14-131 Setting/Reference Tab Screen**

(1) **[Change Port Mode] button**

Clicking on this button will display the mode of each port of the disk array on the “Change Port Mode” dialog screen, and change to the WWN mode and Port mode becomes possible. If you want to change a port in Port mode, which is already linked with an LD Set, into WWN mode, unlink the port from the LD Set and then change to the WWN mode.

The port number indicates “Director Number - Port Number”.
Figure 14-132  Change Port Mode

[Mode Type]  Select a new port mode.

- Ports cannot be changed from the WWN mode into Port mode in
  AccessControl(WWN)-applied disk arrays.  (If the change is necessary, consult the
  maintenance person about it.)
  - WWN Mode: Changes the port into WWN mode.
  - Port Mode: Changes the port into Port mode.

[Batch Changing]  Clicking this button sets all the ports into the mode selected in [Mode Type].
In this case, it is not necessary to select Port mode ports from the Port List.

[Change]  Select a target port and click the [Change] button.  The selected port is set into the
mode selected in [Mode Type].  Multiple ports can be selected and set if the port list
screen shows the same mode for them.
The Change Port Mode operation immediately reflects on the Disk Array. Therefore, if settings are wrong, there is a possibility that accessing from the business server to the LD may not be possible. It is necessary to perform operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

(2) [Start Access Control] button

Clicking on this button will validate Access Control settings from the business server to logical disks by using the WWN.

In the iSM client, once Access Control has been started, Access Control cannot be stopped. (If necessary, consult with a maintenance engineer)

The Start Access Control operation immediately reflects on the disk array. Therefore, if assignment of logical disks to LD Sets or Link Path settings are wrong, there is a possibility that accessing from the business server to logical disks may not be possible. It is necessary to perform operation after checking the operation state. Furthermore, stop business or the business server according to the necessity.

(3) Initialization Option

For description of Initialization Options, refer to 14.3.2.5 “Setting/Reference Tab Screen”.

(4) Product Information

For description of Product Information, refer to 14.3.2.5 “Setting/Reference Tab Screen”.

(5) Display option information

Refer to 14.3.2.5 “Setting/Reference Tab Screen” for details on display option information.

(6) [Get Disk Array Info.] button

Clicking on this button will re-acquire information from the disk array necessary for operations on the LD Administrator screen.

Normally, it is not necessary to use this button to re-acquire information from the disk array. If operations for the disk array on this screen fail, causing inconsistency between the disk array setting information and the information administrated on the iSM client and making normal operation impossible, use this button.

After clicking on this button and while information is being acquired from the disk array, the following dialog screen will be displayed.
When canceling the acquisition of information by clicking on the [Cancel] button while the information is being acquired, or the acquisition of information fails, there is a possibility that disk array information administrated by the iSM client may be wrong. Therefore, re-acquire information from the disk array through [Get Disk Array Info.].

(7) [Close] button
Clicking on this button will terminate LD Administrator and return to the Configuration- [Setting Mode] screen.

(8) [Help] button
Clicking on this button will display the Help screen concerning Setting/Reference Tab screen.
14.4 Settings of Disk Array

In this section, nicknames are given and settings affecting the entire disk array, etc. Can be performed with regard to the disk array.

The Setting disk array screen appears by pressing the [Setting disk array setting] button of the “Configuration-[Setting Mode]” screen. The screen contains five tabs “Nickname”, “Platform”, “Network”, “License”, “Special”, which are described in 14.4.1 “Nickname”, 14.4.2 “Platform”, 14.4.3 “Network”, 14.4.4 “License”, 14.4.5 “Special” respectively. Note that some tabs may not be displayed because the support function varies depending on the disk array series.

14.4.1 Nickname

(1) Nickname screen

The Nickname screen, which is as shown below, can change the disk array name and the port name.

![Image of Nickname Screen]

(A) Disk Array Subsystem Information

Product ID: The disk array’s product ID is displayed.
Serial Number: The disk array serial number is displayed.

(B) Setting Disk Array Name

Disk Array Name: The current disk array name is displayed.
New Disk Array Name: Refers to the field for entering the disk array name to change.

Enter a new name into the [New Disk Array Name] and then press the [Apply] button to output a message as shown below to change the disk array name.

(C) Setting Port Name

Port Number: Enter the port number for the disk array.
Port Name: Enter the port name for the disk array.
Mgt Port Name: Enter the management port name for the disk array.
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(C)  Setting Port Name

Port Number: The port existing in the disk array is output to the pull-down menu. The displayed format is the “director number - port number (port name)”.

Port Name Displays the current port name of the port selected for “Port Number”.

New Port Name Refers to the field for entering the port name to change.

Enter a new name and then press the Apply button with regard to the port selected from the Port Number to output a message as shown below to change the port name.

Unless the disk array name and the port name to enter abide by the rules below, settings cannot be made.

Number of available characters: 1 to 32 characters

Available characters: Alphabet A to Z (a to z) * Upper- and lower-case characters are distinguished.

Numerals: 0 to 9

Underbar: _

Slash: /

* All the characters must be in single bits.
14.4.2 Platform

To display the setting disk array dialog box with the “Platform” tab added, select a disk array supporting platforms, and
click the “Setting Disk Array” button on the main dialog box in setting mode.

(1) Platform screen

The “Platform” pull-down menu displays a list of platforms that can be set for the disk array.
If a platform, which cannot be set for the target disk array, is specified, the system displays the following message
and prompts you to enter a registered platform.
The initial value of the “Platform” pull-down menu is blank. If the “Apply” button is clicked in blank state, the system displays the following message and prompts you to specify a platform.

![Message for No Specification of Platform](image)

**Figure 14-139  Message for No Specification of Platform**

Up to two characters can be entered for the “Platform” pull-down menu.

### 14.4.3 Network

Various network settings can be made in disk arrays that support Network Setting.

![Setting Disk Array Dialog Box (Network Tab)](image)

**Figure 14-140  Setting Disk Array Dialog Box (Network Tab)**

The warning dialog box in Figure 14-141 appears when the [Apply] button is clicked after the current IP Address is changed.
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Figure 14-141  Warning Dialog Box

The setting change confirmation dialog box in Figure 14-142 appears when the [Apply] button is clicked without the current IP Address being changed in the dialog box in Figure 14-140 or when the [OK] button is clicked in the warning dialog box in Figure 14-141.

Figure 14-142  Setting Change Confirmation Dialog Box

Be careful that if the network setting of a disk array is changed incorrectly, the disk array becomes invisible from iSM.

(1) Set up Disk Array TCP/IP Information
   Specify the IP (Internet Protocol) of the disk array. The current value is displayed before the IP Address is changed.

(2) Set up SCSI Socket
   Specify the iSM server that monitors the target disk array through the Ether path.
Chapter 14  Individual Settings

Figure 14-143  Set up SCSI Socket Screen

- Accept SCSI Socket packets from any IP Address
  The target disk array can be monitored by any of the iSM servers connected on the network on which the disk array is connected.

- Accept SCSI Socket packets from these IP Address
  The target disk array can be monitored by only the IP-address-registered one of the iSM servers connected on the network on which the disk array is connected.

To specify the IP Address of an iSM server, click the [Add] button. The Add IP Address screen in Figure 14-144 appears.

Figure 14-144  IP Address Addition Screen

To edit an IP Address, select the IP Address of an added iSM server from the list on the “Set up SCSI Socket Screen”, and click the [Edit] button. The Edit IP Address screen in Figure 14-145 appears.

Figure 14-145  IP Address Edit Screen
To delete an IP Address, select the IP Address of an added iSM server from the list on the “Set up SCSI Socket Screen”, and click the [Delete] button.

(3) Set up SNMP

Set the SNMP (Simple Network Management Protocol) information of the disk array.

![Set up SNMP Screen](image)

- **Community Name**
  Specify a community name with up to 62 characters (ASCII characters).
- **Trap Information button**
  “Trap Information screen (Figure 14-147)” appears. Register trap information on the screen. Enter each trap information with up to 79 characters (ASCII characters).
- **Trap Transmission Place**
  The system sends trap information to the registered IP Address.
- **Accept SNMP packets from any IP Address**
  The system accepts SNMP requests from all hosts having requests.
- **Accept SNMP packets from these IP Address**
  The system accepts SNMP requests from the registered IP Address.

Figure 14-146 Set up SNMP Screen
For the NEC Storage S1200/S1300/S2200/S2300 (or the succeeding models), set information with up to 40 characters.

Figure 14-147 Trap information Screen

- **Trap Sense Interval**: Set an interval at which the disk array monitors the causes of traps.
- **Unit Contact**: Enter administrator’s information such as the disk array’s administrator, management department, or where to contact.
- **Unit Name**: Enter the disk array name or the name of the host to be used.
- **Unit Location**: Enter the location where the disk array is installed.
- **Unit Info**: Enter other information necessary for management.

(4) Copy the network setup information

If the disk array contains more than one Service Processor, the network settings of a Service Processor can be copied into a selected Service Processor.
Copy the network setup information on the chosen service processor.

**Object service processor**
- Copy origin: the service processor 00h
- Copy place: the service processor 01h

**Object item**
- Set up IP Address of the Disk Array
- Set up SCSI Socket
- Set up SNMP

Figure 14-148  Copy Screen
14.4.4 License

The screen below is provided to unlock the license of a purchased product.

![Setting Disk Array Dialog Box (License)](image)

Figure 14-149  Setting Disk Array Dialog Box (License)

Enter the license key, which is provided with the purchased product, with 30 characters (6-6-6-6-6) in half size, and click the [Unlock] button.

The contents of the product of which license is to be unlocked are displayed.

![Product Contents Confirmation Screen](image)

Figure 14-150  Product Contents Confirmation Screen

Click the [Yes] button to unlock the license.

If the license has been unlocked, the message in Figure 14-151 is displayed.
If the license for NEC Storage DynamicDataReplication is unlocked for the first time in the NEC Storage 2000 series, the disk array needs to be restarted. If it is upgraded, the disk array does not need to be restarted.
14.4.5 Special

(1) Special screen

The screen shown below can be used to make various settings for the disk array. Activate the check boxes of the functions (such as Cross Call, Spare and Expand LUN) to enable them and then press the Apply button at lower right to change the settings. Items that are disabled through deactivation of their boxes are not set. Moreover, immediately after the screen has been displayed or after the setting has been made, current settings for the disk array are activated through radio buttons.

![Setting Disk Array](image)

- **(A) Cross Call**
  
  Can set Cross Call function ON/OFF.
  
  - Cross Call ON state
    
    This can be set when two controllers exist. In this state, all the logical disks can be accessed from the two controllers. The Auto Assignment function is disabled.

  - Cross Call OFF state
    
    Refers to the disk array’s initial state. The logical disk can be accessed only from the controller which has the Ownership.

    In this case, it becomes possible to set the Auto Assignment function.
• Auto Assignment function
  Enabled when two controllers are available. The purpose of this function is automatically switching to the
  access to another controller when the primary controller goes down.

When the Cross Call is set to OFF, there may exist logical disks which can no longer be accessible from OS,
according to the Ownership and the connected controller. In this case, please change the Ownership.

(B) Spare
  Can set the data rebuild operation when one of the physical disks configuring logical disks fails.
  • Auto Repair: The repair operation is automatically started when unused spare disks exist.
  • Manually Repair: Placed in the rebuild wait state without automatically performing repair operations.
    When placed in the rebuild wait state, the repair start instruction can be given on the RANK/Spare Screen.

Even when Manually Repair is set during repair operation, the repair operation is not stopped. The setting applies
only from the next repair operation.
Even when Auto Repair is set in the rebuild wait state, the repair operation does not start. The setting applies only
from the next repair operation.

(C) Expand LUN
  When connecting to HP-UX, it is possible to expand the number of logical disks which can be detected from the
  OS, thus making it possible to specify them in terms of each connected port.
  Select the Port Number from the pull-down menu and then select ON or OFF from the radio button located below
to be able to set them by pressing the [Apply] button at lower right.
  The Port Number is represented in terms of the “directory number - port number”.

As a result of changing this setting, the disk array may stop being accessible from OS. Careful attention needs to be
directed in changing the setting. For details, refer to the disk array user’s manual.

(D) Change Time
  Can change the disk array time.
  If “Set the Date and Time of Disk Array Subsystem according to server Date&Time of Server” is selected, the
date/time of the iSM server monitoring the disk array is set. When “Set the Date and Time of Disk Array
Subsystem manually” is activated, the disk array date can be changed to arbitrary date. However, this is not
possible for automatic setting.
Moreover, for the information on Auto/Manual setting change, refer to the “NEC Storage Manager User’s Manual”.

![Change Disk Array Time Dialog](image1)

**Figure 14-154** Change Disk Array Time Dialog

(E) Get Log

Outputs the internal log data in the disk array to any file.

Press this button to output the check message as shown below.

![Internal Log Data Output Check Message](image2)

**Figure 14-155** Internal Log Data Output Check Message

Here, press the [OK] button to display the output destination Save As dialog as shown below.

Specify any file name and then press the Save button to start saving file.

![Save As Dialog](image3)

**Figure 14-156** Save As Dialog
Chapter 15  Get Configuration Setting Information

In Chapter 15 “Get Configuration Setting Information” operation during the configuration setting are described.

“Get Configuration” can be selected from the “Configuration- [Setting Mode]”. Procedures for displaying the configuration setting menu are described below.

1. Select the disk array from the iSM client’s main screen to start “Configuration”, and the “Select Operation Mode” dialog screen will appear.
2. Click on “Setting” or “Reference” on the “Select Operation Mode” dialog screen to display the “Configuration- [Setting Mode]”.
3. During the Setting mode, the monitoring of the selected disk array is stopped, thereby causing the disk array to enter the occupied state. *2*3
   During the Reference mode, the monitoring of the selected disk array is not stopped (the monitoring is continued). Although the disk array is not occupied, the server is occupied.

*1 At this time, even the server is occupied thus making it impossible to open “Configuration- [Setting Mode]” screen from other clients connected to this server. On the other hand, if the server has already been occupied, it fails to open the “Configuration- [Setting Mode]” screen.
*2 If the disk array is occupied, it is no more possible to make settings by using a maintenance PC, etc.
*3 Occupation of the server and the disk array are cancelled simultaneously with the end of “Configuration Setting”.

Figure 15-1  Configuration-[Setting Mode]
15.1 Get Configuration Information

To save configuration information, follow the procedure below.

(1) Operation

Press the [Get Configuration Setting Info] button from the “Configuration- [Setting Mode]” screen, shown in Figure 15-1, to save configuration information of the selected disk array on a file.

Specify the file name to save on the dialog screen, shown in Figure 15-2, and then press the “Save” button to acquire configuration information of the disk array and save it on a file.

![Figure 15-2 Get Configuration Setting Information Dialog Screen](image)

When configuration information of the disk array has been acquired and saved on a file, the message shown in Figure 15-3 will appear.

![Figure 15-3 Save File Confirmation Message](image)
This chapter explains how to operate the configuration setup command that is performed through the Command Line Interface (CLI) from the iSM server.

16.1 Network Relief Setting Command (iSMnetconf)

The iSMnetconf command sets the IP Address, Subnet Mask, and Gateway Address of a target disk array’s Service Processor, limits permission for access from the monitoring server, and refers to the information. The iSMnetconf command operates on the iSM server that is connected with the disk array through FC. Make Service Processor settings for general operation through iSM client’s configuration setting (GUI) 14.4.3 “Network”. Use the iSMnetconf command if monitoring via the Ether path is disabled due to wrong operation or the like. The iSMnetconf command is installed at the same time the “NEC Storage Manager Volume List” or “NEC Storage ReplicationControl” is installed.

16.1.1 Start and Stop of Network Relief Setting Command

(1) Start of the iSMnetconf command

To start the command, enter iSMnetconf in the command line. If options are omitted, the program version and the usage are displayed as shown below.

```
iSMnetconf   Version 2.1.001
Usage : iSMnetconf {-arrayname <Array Name> | -specialfile <Special File>}
       | [{-ipaddress <IP Address> } | {-subnetmask <Subnet Mask>}] |
       | [{-gateway <Gateway Address> } | {-scsiguardinvalid {on | off}}] |
       | {-ipcheckinvalid {on | off}} [-number <Resource Number>] [-force]
iSMnetconf   {-arrayname < Array Name> | -specialfile <Special File>}
       | [-number <Resource Number>] -view
```

* The above is a display sample. The actual program version is displayed for Version.

(2) iSMnetconf command options

The following explains the functions of the iSMnetconf command and the corresponding options:

- `arrayname option`: Specifies the name of the target disk array.
  Since the relationship between the disk array name and special file name is acquired from “volume information/data”, it is necessary to
confirm that “volume information/data” has been updated to the latest one.

For how to update “volume information/data”, refer to the “volume list command” explained in the “NEC Storage Manager User’s Manual” of your OS.

-force option: Forcibly makes settings even during configuration setting by another configuration setup command.

-gateway option: Sets a Gateway Address. Specify the Gateway Address in the input format of “aaa.bbb.ccc.ddd” (in decimal).

-ipaddress option: Sets the IP Address of the target disk array. Specify the IP Address in the input format of “aaa.bbb.ccc.ddd” (in decimal).

-ipcheckinvalid option: Enables the omission of a check on if the IP Address specified in the ipaddress option is already used by another network equipment. The option also enables the omission of a check on if the IP Address specified in the “ipaddress”, “subnetmask”, or “gateway” option is invalid.

-number option: Specifies the target Service Processor number.

-scsiguardinvalid option: Determines whether to validate/invalidate the limit for access from monitoring servers connected through Ether. If “off” is specified, the limit for access from monitoring servers becomes valid, and only monitoring servers at registered IP Addresses are permitted to make access. If “on” is specified, the limit for access from monitoring servers becomes invalid, and monitoring servers at any IP Addresses are permitted to make access. Therefore, be careful in specifying “on” for this option.

-specialfile option: Specifies the special file name of the target disk array.

The special file name is displayed by the “volume list command”. For details on the command, refer to the “volume list command” explained in the “NEC Storage Manager User’s Manual” of your OS.

-subnetmask option: Sets a Subnet Mask. Specify the Subnet Mask in the input format of “aaa.bbb.ccc.ddd” (in decimal). The subnet of the disk array’s IP Address is set by specifying this option.

-view option: Displays Service Processor information. If a Service Processor number is specified in the “number” option, the information of only the specified Service Processor is displayed. If the “number” option is omitted, the information of all the Service Processors is displayed.

(3) Termination of the iSMnetconf command

When the iSMnetconf command terminates normally, a message is displayed indicating successful operation if a setting option is specified. If a reference option is specified, the item for the option is displayed.
16.2 Example of Displaying Options

(1) Setting of a Service Processor

The following shows the setting of the Service Processor of a target disk array.

```
> iSMnetconf -arrayname NECStorage2100 -number 00h -ipaddress 192.168.0.1 -scsiguardinvalid off
iSMnetconf 001 : Command Complete Successfully.
```

(2) Reference to various types of Service Processor information

The following shows reference to various types of Service Processor information of a target disk array. If the -number option is omitted, the information of all the Service Processors in the target disk array is displayed.

```
> iSMnetconf -arrayname NECStorage2100 -number 00h -view

--- Service Processor Information ---
Number(h) : 00
State     : ready

--- Disk Array TCP/IP Information ---
IP Address      : 192.168.0.1
Subnet Mask     : 255.255.255.0
Gateway Address : 192.168.0.254

--- SCSI Socket Information ---
SCSI Socket Guard Invalid : off
SCSI Socket Valid IP Address : 192.168.0.2
```

The display items are as follows:

① Service Processor Information
   Displays the information of a target Service Processor.
   Number(h): Service Processor number
   State: Service Processor state

② Disk Array TCP/IP Information
   Displays the TCP/IP information of a target disk array.
   IP Address: IP Address of the disk array
   Subnet Mask: Subnet Mask of the disk array
   Gateway Address: Gateway Address of the disk array
SCSI Socket Information
Displays the information of monitoring servers.

SCSI Socket Guard Invalid:
Indicates that the limit for access from monitoring servers connected through Ether is valid/invalid.

on: The limit for access from monitoring servers connected through Ether becomes invalid, and monitoring servers at any IP Addresses are permitted to make access.

off: The limit for access from monitoring servers connected through Ether becomes valid, and only monitoring servers at registered IP Addresses are permitted to make access.

SCSI Socket Valid IP Address:
IP Address of a monitoring server that is permitted to make access. “---” is displayed if no IP Addresses are registered.
Appendix A Specifications

A.1 Specified Number of Disk Array to Be Set

At most one disk array can be set from the iSM client (not including LD Batch Binding and Pair Batch Setting).

A.2 Specified Number of Paths to Be Set for LD Set

At most 64 paths can be set for a LD Set.
Cause and solution of troubles that may occur during configuration setting are described below.

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impossible to recognize the disk array</td>
<td>When your OS is Windows2000 or Solaris and the disk array is monitored through the FC path, if the OS is rebooted in a state where all logical disks are unset, the disk array cannot be recognized.</td>
<td>Terminate your OS, turn off the power to the disk array, and then start the disk array and reboot the OS. Then, the disk array can be recognized.</td>
</tr>
<tr>
<td>iSM14402 (status failed) message is written into the operation log</td>
<td>There is a possibility that a fault might have occurred to the disk array or control path.</td>
<td>After the fault has been recovered, disconnect the iSM client for which configuration setting was performed, and then connect it again.</td>
</tr>
</tbody>
</table>
The word RAID was first introduced in the thesis “A Case for Redundant Arrays of Inexpensive Disks” released by professors of the University of California at Berkeley of the U.S.A. in 1987. The initials RAID of “Redundant Arrays of Inexpensive Disks” mean literally “a set of redundant and inexpensive disks”. However, RAID has been generally explained with “Inexpensive” replaced by “Independent” in these days. Large-capacity hard disks were very expensive at that time, but I/O performance was not high enough for the costs. Disk access was a bottleneck in system performance. RAID was created for the following purposes:

- Reducing costs by using inexpensive small-capacity disks
- Improving performance by concurrently accessing multiple disks
- Increasing reliability by adding redundant data

RAID levels 1 to 5 are defined in the thesis mentioned above. The table below shows the features of RAID0, RAID1, RAID5, and RAID10. Strictly speaking, RAID0 (striping) does not conform to the RAID definition, but it is generally used. RAID10 is a combination of RAID0 and RAID1.

Each RAID number is used simply to sort out data division methods or repair methods, and the RAID numbers do not indicate any priority.

<table>
<thead>
<tr>
<th>RAID level</th>
<th>Redundancy</th>
<th>Required number of PDs</th>
<th>Decrease in capacity</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAID 0</td>
<td>None</td>
<td>1 or more *1</td>
<td>None</td>
<td>Quick access</td>
<td>Inaccessible when even a single disk fails</td>
</tr>
<tr>
<td>RAID 1</td>
<td>Dual configuration</td>
<td>2</td>
<td>50%</td>
<td>Highest reliability</td>
<td>Costly</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No performance deterioration in reduced state</td>
<td></td>
</tr>
<tr>
<td>RAID 5</td>
<td>Parity</td>
<td>3 or more</td>
<td>Equivalent to capacity of 1 disk</td>
<td>Concurrent processing for multiple R/W commands</td>
<td>Parity data read required for writing Performance deterioration in reduced state</td>
</tr>
<tr>
<td>RAID10</td>
<td>Dual configuration</td>
<td>4 or more *2</td>
<td>50%</td>
<td>Quick access</td>
<td>Costly</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High reliability</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No performance deterioration in reduced state</td>
<td></td>
</tr>
</tbody>
</table>

*1: Disk array of the NEC Storage 1000/2000 series: 1, 3, 5, 10, or 15 disks
*2: Disk array of the NEC Storage 1000/2000 series: 4, 6, 8, 10, 12, or 14 disks
(1) **RAID0**

This method slices data (sent from the host) in a striping size and distributes the data to the physical disks of the RAID.

If processing is performed concurrently for the physical disks of the RAID, the data transfer time is reduced to \(1/\text{(number of PDs)}\) and data can be accessed quickly. Since RAID0 has no redundant data, 100% of the disk capacity is available. However, data cannot be accessed when even a single disk fails.

**<Advantage>**

- Quick access
- Highest availability of the disk capacity

**<Disadvantage>**

- RAID0 has no redundant data. Thus, it is inaccessible when even a single disk fails.
- Since more than one physical disk is used, reliability becomes \(1/\text{number of PDs}\).

Since RAID0 has no redundancy, all the data is lost when even a single disk fails. NEC Storage Manager does not recommend RAID0. Use another RAID configuration.
(2) RAID1

This method writes data (sent from the host) onto two disks (or into 2 disk groups). (Mirroring)

RAID1 has the same data in dual configuration. Thus, even if one disk fails, the other disk enables access to the data.
In comparison with a single disk, RAID1 achieves the equivalent performance in write operation, and up to the double throughput as performance in read operation by accessing two disks containing the same data.
RAID1 offers data reliability higher than any other RAIDs do, but redundant data takes up 50% of the disk capacity.

<Advantage>
• Highest reliability among the RAIDs
• No performance deterioration when a single disk fails
• Performance in read operation can be up to twice as high as the throughput of a single disk.

<Disadvantage>
• Redundant data takes up a half of the disk capacity.
Appendix C  RAID

(3) RAID5

This method performs striping for data (sent from the host) in blocks and distributes the data to the physical disks of the RAID. It also distributes the parity data to the disks.

Since RAID5 distributes parity data to multiple disks, it enables concurrent processing at disk access. Thus, RAID5 is suitable for processing which often makes random access to small files in size of several kilobytes.

Even if one of the disks fails, access can be made to the parity data. However, performance in read operation lowers in this case.

<Advantage>
- Concurrent processing by using distributed parity data
- Availability of processing which often makes random access

<Disadvantage>
- If one of the physical disks constituting logical disks fails, performance in read operation lowers.
(4) RAID10

This method performs striping for data (sent from the host) and distributes (RAID0) the data to pairs of mirrored disks (RAID1).

RAID10, which is a combination of RAID1 and RAID0, is called “RAID one zero”.

Since RAID10 distributes data to multiple disks, it enables concurrent processing and makes quick access. In addition, it has the same data in dual configuration. Even if one of the disks fails, the other disk enables access to the data.

Reliability is about $1/n$ ($n$: number of paired sets of RAID1 disks) of RAID1 consisting of two disks. Reliability is lower than that of a single RAID1, but it is still high enough.

<Advantage>
- High reliability
- Quick access
- No performance deterioration when a single disk fails

<Disadvantage>
- Redundant data takes up a half of the disk capacity.
Appendix D  Notes on Logical Disk Bind

D.1 Logical Disk Bind

The NEC Storage S1000/S2000 series enables users and SEs to bind logical disks. The capacities of logical disks to be bound vary depending on the RAID configuration.

If you want to bind logical disks which are to be used with DataReplication, the disks to be paired must have the same capacity. If having purchased or planning to purchase the products such as DataReplication, keep in mind that the following assists in easily updating the system configuration later:

• Getting logical disks to have the same capacity
• Selecting RAID configuration in which logical disks having the same capacity are easy to be bound

iSM can also bind logical disks through the CLI (Command Line Interface). However use of GUI is recommended. This appendix mainly explains how to bind logical disks through the GUI. If use of DataReplication is not for binding logical disks, read the description of “RV”*1 as “logical disks having the same capacity” in the explanation below.

A logical disk’s capacity smaller than 0.1GB*2 is shown rounded on the configuration setting summary display. Note that different capacities may appear to be identical.

*1: RV (Replication Volume) is a copy volume in using DataReplication.
*2: iSM processes data with 1MB = 1024KB.

D.2
Appendix D  Notes on Logical Disk Bind

Recommended RAID Configuration

Table D-1 shows RAID configurations recommended if you want to get logical disks to have the same capacity when using DataReplication.

Table D-1  Recommended Combinations of RAID Configurations

<table>
<thead>
<tr>
<th>MV</th>
<th>RAID1 (1+1)*1</th>
<th>RAID5 (4+P)*1</th>
<th>RAID5 (6+P)*1</th>
<th>RAID5 (8+P)*1</th>
<th>RAID5 (2+P)*2</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAID1(1+1)</td>
<td>⊙</td>
<td>⊙</td>
<td>−</td>
<td>⊙</td>
<td>⊙</td>
</tr>
<tr>
<td>RAID5(4+P)</td>
<td>⊙</td>
<td>⊙</td>
<td>−</td>
<td>⊙</td>
<td>⊙</td>
</tr>
<tr>
<td>RAID5(6+P)</td>
<td>−</td>
<td>−</td>
<td>⊙</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>RAID5(8+P)</td>
<td>⊙</td>
<td>⊙</td>
<td>−</td>
<td>⊙</td>
<td>⊙</td>
</tr>
<tr>
<td>RAID5(2+P)*2</td>
<td>⊙</td>
<td>⊙</td>
<td>−</td>
<td>⊙</td>
<td>⊙</td>
</tr>
</tbody>
</table>

*1: Can be specified through both Batch Setting and Individual Setting.
*2: Can be specified through only Individual Setting.

[How to read the table]

The table shows RAID configurations in which RV having the same capacity as for MV can be bound. The symbols in the table are as follows:

⊙: RV can be bound.
−: RV (= a logical disk having the same capacity as for MV) may not be bound if the RAID configurations of RV and MV are different.

[Supplementary information]

If operating logical disks in a configuration other than the above, bind the logical disks in combination of RAIDs in which RV can be bound. Refer to D.3 “Capacity Except Recommended RAID Configuration” for details.

D.3
Capacity Except Recommended RAID Configuration

D.3.1 Concept of Logical Disk Bind Capacity

This section explains disk array specifications and software specifications, according to which the capacities of logical disks in the NEC Storage series are to be determined. The section mainly explains the capacities of logical disks which are to be bound in a non-recommended RAID configuration. Use “Individual Setting” of Configuration Setting (GUI) to bind logical disks in a non-recommended RAID configuration.

(1) Disk array specifications

The NEC Storage series requires that the capacity of a logical disk of the RAID type (RAID0, RAID10, or RAID5) using the striping feature is a multiple of “striping size \( \times \) number of data disks”.

The striping size for the NEC Storage series is defined as 128KB. Thus, “128KB \( \times \) number of data disks” is the capacity unit of logical disks to be bound.

\[
\begin{align*}
\text{Physical disk} & \quad \text{128KB} \times \text{number of data disks} \\
1 & \quad 2 \quad \ldots \quad n
\end{align*}
\]

Figure D-1 Capacity Unit in Binding

*: A data disk is a physical disk, which is used to save data in RAID configuration. The number of data disks is 1 in configuration of RAID1(1+1); it is 4 in configuration of RAID5(4+P). In other words, if a RAID configuration is expressed as RAID5(n+P) or RAID10(n+n), “n” is equal to the number of data disks.
(2) Specifications common to Configuration Settings (GUI and CLI)

Configuration Settings (GUI and CLI) process logical disk capacities in megabytes. According to “(1) Disk array specifications” and common specifications in combination, the capacity unit of logical disks to be bound is the lowest common multiple of “128KB × number of data disks” and “1MB (= 1024KB)” as shown in Table D-2.

Table D-2  Capacity Unit of Logical Disks to be Bound

<table>
<thead>
<tr>
<th>Number of Data Disks</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity Unit (MB)</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>9</td>
<td>5</td>
<td>11</td>
<td>3</td>
<td>13</td>
<td>7</td>
<td>15</td>
</tr>
</tbody>
</table>

If RAID such as RAID1, which does not use the striping feature, is in use, data is processed in megabytes. Thus, the capacity unit is “1”. If a capacity is specified, the system recognizes it as the capacity that the user can use. In this case, logical disks are bound in the specified capacity + 2MB (disk management area).

(3) Specifications specific to Configuration Setting (GUI)

Configuration Setting (GUI) specifies a capacity in units of 0.1GB. The capacity is calculated with 0.1GB = 1024MB/10. In this case, obtain the capacity as follows:

* With Capacity Specification (Individual Setting):
  Specified capacity × 1024 → (Decimal places rounded up) → (+2MB) → (Alignment) → Capacity of LD to be bound

* With Disk Count Specification (Individual Setting):
  Free space in RANK/specified number of data disks → (Decimal places rounded up) → (Alignment) → Capacity of LD to be bound

*1: The value with decimal places being rounded up ensures that the specified capacity is allocated from the free space in a selected RANK. If the RANK does not contain free space large enough, a logical disk cannot be bound.

*2: A disk management area is added.

*3: Alignment means obtaining a multiple (an outer value for Capacity Specification, and an inner value for Disk Count Specification) of the capacity (in megabytes) calculated from Table D-2.
Examples of obtaining capacities of LD to be bound through Individual Setting of Configuration Setting (GUI)

The following are examples of capacities obtained by specifying a capacity or the number of data disks when a logical disk is bound. Refer to D.3.3 “Method of Specifying Configuration Setting” for details on “Capacity Specification” and “Disk Count Specification”.

Examples 1) Binding with Capacity Specification

1. Capacity obtained when a logical disk is bound with 1.1GB specified for RAID5 (4+P):
   
   \[1.1\text{GB} \times 1024 = 1126.4\text{MB} \rightarrow (\text{Decimal place rounded up}) \rightarrow 1127\text{MB} \rightarrow (+2\text{MB})^{*1} \rightarrow 1129\text{MB} \rightarrow (\text{Alignment}) \rightarrow 1129\text{MB}\]

2. Capacity obtained when a logical disk is bound with 1.1GB specified for RAID5 (3+P):

   \[1.1\text{GB} \times 1024 = 1126.4\text{MB} \rightarrow (\text{Decimal place rounded up}) \rightarrow 1127\text{MB} \rightarrow (+2\text{MB})^{*1} \rightarrow 1129\text{MB} \rightarrow (\text{Alignment}) \rightarrow 1131\text{MB}\]

*1: A logical disk is bound in the user-specified capacity + 2MB as the disk array management area.

Examples 2) Binding with Disk Count Specification

1. Capacity obtained when 3 logical disks are bound with 266.7GB as the capacity of RAID5 (4+P):

   \[266.7\text{GB} \times 1024/3 = 91033.6\text{MB} \rightarrow (\text{Decimal place rounded down}) \rightarrow 91033\text{MB} \rightarrow (\text{Alignment})^{*1} \rightarrow 91033\text{MB}^{*2}\]

2. Capacity obtained when 3 logical disks are bound with 200GB as the capacity of RAID5 (3+P):

   \[200\text{GB} \times 1024/3 = 68266.66\text{MB} \rightarrow (\text{Decimal places rounded down}) \rightarrow 68266\text{MB} \rightarrow (\text{Alignment})^{*1} \rightarrow 68265\text{MB}^{*2}\]

*1: The capacity unit is aligned according to Table D-2. In RAID5, (13+P) is the greatest, and the maximum value (MB as the capacity unit) is 13MB.

*2: The capacity of the bound logical disks includes 2MB as the disk array management area.
## Detailed Combination of RAID Configuration

The NEC Storage series defines that the capacity unit of logical disks to be bound depends on the RAID configuration. Therefore, RV may not be bound in RAID configuration different from that of MV.

Table D-3 shows the combinations of RAID configurations in which RV having the same capacity as for MV can be bound.

<table>
<thead>
<tr>
<th>Number of MV Data Disks</th>
<th>Number of RV Data Disks*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>2</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>3</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>4</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>5</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>6</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>7</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>8</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>9</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>10</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>11</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>12</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>13</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>14</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
<tr>
<td>15</td>
<td>☒ ☒ Δ ☒ Δ Δ Δ ☒ Δ Δ Δ Δ Δ Δ</td>
</tr>
</tbody>
</table>

*: The number of data disks is the number of physical disks, which are used to save data in RAID configuration. The number of data disks is 1 in configuration of RAID1(1+1); it is 4 in configuration of RAID5(4+P). In other words, if RAID is expressed as RAID0(n), RAID5(n+P), or RAID10(n+n), “n” is equal to the number of data disks shown in Table D-3.

[How to read the table]
The table shows RAID configurations (depending on the number of data disks in actual operation) in which RV having the same capacity as for MV can be bound. The symbols in the table are as follows:

- ☒: RV can be bound.
- ☐: Configuration Setting (GUI) may be unable to bind RV depending on the MV capacity. In this case, use Configuration Setting (CLI) to bind RV.
- Δ: Both Configuration Setting (GUI) and Configuration Setting (CLI) may be unable to bind RV depending on the MV capacity.

Examples)
1. With MV bound in configuration of RAID5(4+P)
   - Configuration Setting (GUI) can bind RV in configuration of RAID1, RAID5(2+P, 4+P, 8+P), RAID10(2+2, 4+4), or RAID0(1).
2. With MV bound in configuration of RAID5(6+P)
   - Configuration Setting (GUI) can bind RV in configuration of RAID0(3), RAID5(3+P, 6+P, 12+P), or RAID10(3+3, 6+6). Configuration Setting (CLI) can bind RV in configuration of RAID1, RAID5(2+P, 4+P, 8+P), or RAID10(2+2, 4+4).
D.3.3 Method of Specifying Configuration Setting

There are two methods (Batch Setting and Individual Setting) for binding logical disks through Configuration Setting (GUI). Each method includes another three specification methods “Disk Count Specification”, “Capacity Specification”, and “Disk Count and Capacity Specification”. There are six specification methods in total.

As a rule, bind RV by the same specification method as when binding MV. Table D-4 shows the combinations of specification methods.

Table D-4  Combinations of Specification Methods

<table>
<thead>
<tr>
<th>MV</th>
<th>RV</th>
<th>Batch Setting</th>
<th>Individual Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Disk Count</td>
<td>Capacity</td>
<td>Disk Count</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Specification</td>
</tr>
<tr>
<td>Batch</td>
<td>Disk Count</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Setting</td>
<td>Specification</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specification</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disk Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>and Capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual Setting</td>
<td>Disk Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specification</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specification</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disk Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>and Capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[How to read the table]

The table shows the combinations of specification methods that can bind RV having the same capacity as for MV. The symbols in the table are as follows:

○: RV can be bound.
×: RV cannot be bound.

If there is difference between capacities obtained by the combinations of specification methods in Table D-4, the capacity of a logical disk varies depending on the specification method. Table D-5 shows the capacities of bound logical disks for each specification method.
Appendix D  
Notes on Logical Disk Bind

Table D-5  Bound LD Capacity by Specification Method

<table>
<thead>
<tr>
<th>Setting Method</th>
<th>Specification Method</th>
<th>How to Obtain Capacity</th>
<th>Capacity Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batch Setting</td>
<td>Disk Count Specification</td>
<td>Divide the recommended maximum capacity*2, which is within the RANK capacity, by the number of data disks.</td>
<td>1MB</td>
</tr>
<tr>
<td></td>
<td>Capacity Specification*1</td>
<td>Specified capacity</td>
<td>0.1GB*3</td>
</tr>
<tr>
<td></td>
<td>Disk Count and Capacity Specification*1</td>
<td>Specified capacity</td>
<td>0.1GB*3</td>
</tr>
<tr>
<td>Individual Setting</td>
<td>Disk Count Specification</td>
<td>Divide the RANK capacity by the number of data disks.</td>
<td>1MB</td>
</tr>
<tr>
<td></td>
<td>Capacity Specification*1</td>
<td>Specified capacity</td>
<td>0.1GB*3</td>
</tr>
<tr>
<td></td>
<td>Disk Count and Capacity Specification*1</td>
<td>Specified capacity</td>
<td>0.1GB*3</td>
</tr>
</tbody>
</table>

*1: For “Disk Count and Capacity Specification”, Capacity has a higher priority than Disk Count. Thus, the capacity of the bound logical disk is the same as when it is obtained by “Capacity Specification”.

*2: Recommended capacity = 2128MB \times n (n = 1, 2, 3, ...)

If the RANK capacity is 266.7GB (= 273100.8MB), the recommended capacity is 2128MB \times 128 = 272384MB.

*3: A capacity must be specified in units of 0.1GB (0.1GB = 1024MB/10).

Examples 1) Binding with Capacity Specification

1. Capacity obtained when a logical disk is bound with 1.1GB specified for RAID5 (4+P):
   Both Batch Setting and Individual Setting can bind a logical disk of the same capacity.
   1.1GB \times 1024 = 1126.4MB \rightarrow (Decimal place rounded up) \rightarrow 1127MB \rightarrow (+2MB)* \rightarrow 1129MB \rightarrow (Alignment) \rightarrow 1129MB

2. Capacity obtained when a logical disk is bound with 1.1GB specified for RAID5 (3+P):
   Only Individual Setting can bind a logical disk in configuration of RAID5 (3+P).
   1.1GB \times 1024 = 1126.4MB \rightarrow (Decimal place rounded up) \rightarrow 1127MB \rightarrow (+2MB)* \rightarrow 1129MB \rightarrow (Alignment) \rightarrow 1131MB

*: A logical disk is bound in the user-specified capacity + 2MB as the disk array management area.

Examples 2) Binding with Disk Count Specification

1. Capacity obtained when 3 logical disks are bound with 266.7GB as the RANK capacity of RAID5 (4+P): Batch Setting and Individual Setting bind the logical disks of different capacities.
   (With Batch Setting)
   266.7GB \times 1024 = 273100.8MB \times 2128MB \times n \rightarrow 2128MB \times 128 \rightarrow 272384MB \rightarrow
   272384MB/3 = 90794.66MB \rightarrow (Decimal places rounded down) \rightarrow 90794MB \rightarrow (Alignment) \rightarrow 90794MB*
   (With Individual Setting)
   266.7GB \times 1024/3 = 91033.6MB \rightarrow (Decimal place rounded down) \rightarrow 91033MB \rightarrow
   (Alignment) \rightarrow 91033MB*
Appendix D  Notes on Logical Disk Bind

2. Capacity obtained when 3 logical disks are bound with 200GB as the capacity of RAID5 (3+P):
   Only Individual Setting can bind logical disks in configuration of RAID5 (3+P).
   
   $200\text{GB} \times 1024/3 = 68266.66\text{MB} \rightarrow \text{(Decimal places rounded down)} \rightarrow 68266\text{MB} \rightarrow$
   
   $\text{(Alignment)} \rightarrow 68265\text{MB}$*

   *: The capacity of the bound logical disks includes 2MB as the disk array management area.

Examples 3) Binding with Disk Count and Capacity Specification

1. Capacity obtained when a logical disk is bound with 1.1GB specified for RAID5 (4+P):
   Both Batch Setting and Individual Setting can bind 3 logical disks of the same capacity.
   
   $1.1\text{GB} \times 1024 = 1126.4\text{MB} \rightarrow \text{(Decimal place rounded up)} \rightarrow 1127\text{MB} \rightarrow (+2\text{MB})^* \rightarrow$
   
   $1129\text{MB} \rightarrow \text{(Alignment)} \rightarrow 1129\text{MB}$

2. Capacity obtained when a logical disk is bound with 1.1GB specified for RAID5 (3+P):
   Only Individual Setting can bind a logical disk in configuration of RAID5 (3+P). Three logical disks of the same capacity can be bound.
   
   $1.1\text{GB} \times 1024 = 1126.4\text{MB} \rightarrow \text{(Decimal place rounded up)} \rightarrow 1127\text{MB} \rightarrow (+2\text{MB})^* \rightarrow$
   
   $1129\text{MB} \rightarrow \text{(Alignment)} \rightarrow 1131\text{MB}$

   *: A logical disk is bound in the user-specified capacity + 2MB as the disk array management area.
A pair setting file enables Pair Batch Setting. The following shows the format of the pair setting file and a setting sample.

(1) **Pair setting file format**

1. A pair setting file is a text file (*.txt, *.csv) in ASCII character format.
2. Data from a semicolon (;) or sharp (#) to the end of the line is processed as comments.
3. Uppercase and lowercase characters are distinguished. Be careful in writing characters.
4. Write “Pair Name List” in the first line except comment lines.
5. In the lines following “Pair Name List”, specify the items in the format below.
   “MV DiskArrayName”,“MV Vol Type”,“MV Vol Name”,[“RV DiskArrayName”],“RV Vol Type”,“RV Vol Name”[]
   (Items enclosed in brackets [] can be omitted.)

<SYNTAX>

**MV DiskArrayName**
- Specify the name of the disk array to which Master Volume (MV) belongs.
- The disk array name can be specified with up to 32 characters.

**MV Vol Type**
- Specify the type of Master Volume.

**MV Vol Name**
- Specify the logical disk name of Master Volume.
- The logical disk name can be specified with up to 24 characters.

**RV DiskArrayName**
- Specify the name of the disk array to which Replication Volume (RV) belongs.
- The disk array name can be specified with up to 32 characters.
- If omitted, the system assumes that RV belongs to the disk array of MV.

**RV Vol Type**
- Specify the type of Replication Volume.

**RV Vol Name**
- Specify the logical disk name of Replication Volume.
- The logical disk name can be specified with up to 24 characters.
(2) Pair setting sample

<table>
<thead>
<tr>
<th>Pair Name List</th>
<th>...(a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>;MV DiskArrayName, MV Vol Type, MV Vol. Name, RV DiskArrayName, RV Vol Type, RV VolName</td>
<td>...(b)</td>
</tr>
<tr>
<td>#MV DiskArrayName, MV Vol Type, MV Vol. Name, RV DiskArrayName, RV Vol Type, RV VolName</td>
<td>...(b)</td>
</tr>
<tr>
<td>DiskArrayName1, NX, DEV001, DiskArrayName2, NX, DEV101</td>
<td>...(c)</td>
</tr>
<tr>
<td>DiskArrayName1, NX, DEV001, DiskArrayName2, NX, DEV102</td>
<td>...(c)</td>
</tr>
<tr>
<td>DiskArrayName1, NX, DEV011, NX, DEV021</td>
<td>...(d)</td>
</tr>
</tbody>
</table>

<Explanation>

(a) If the first line except the comment line does not contain this character string, an error ("[05254] It is not a file for Batch Setting.") is posted.

(b) A line starting with a semicolon (:) or sharp (#) in a CSV-format text file is processed as a comment line. Use a comment line mainly as the title of an item.

(c) If pairing a single MV with multiple RVs, create a line for each pair.

(d) If the disk array name of RV is omitted, the system assumes that the RV belongs to the disk array of the MV.

- Use a half-size space between characters.
- Do not enter a space preceding or following a character string.
- If Pair Name List is not written in the first line of the file, an error ("[05254] It is not a file for Batch Setting.") is posted.
- If a character string is preceded by a space or followed by a space, an error ("[05254] It is not a file for Batch Setting.") is posted.
<table>
<thead>
<tr>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>A2</td>
</tr>
<tr>
<td>A4</td>
</tr>
<tr>
<td>Access Control</td>
</tr>
<tr>
<td>Access Control setting</td>
</tr>
<tr>
<td>access management</td>
</tr>
<tr>
<td>Access permission</td>
</tr>
<tr>
<td>AccessControl tab screen</td>
</tr>
<tr>
<td>accessible area</td>
</tr>
<tr>
<td>Accessible LD List</td>
</tr>
<tr>
<td>adapter card</td>
</tr>
<tr>
<td>Add</td>
</tr>
<tr>
<td>All Selection</td>
</tr>
<tr>
<td>array</td>
</tr>
<tr>
<td>array group</td>
</tr>
<tr>
<td>attn</td>
</tr>
<tr>
<td>auto assignment</td>
</tr>
<tr>
<td>AX</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>back board</td>
</tr>
<tr>
<td>basic cabinet</td>
</tr>
<tr>
<td>battery</td>
</tr>
<tr>
<td>business server</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>cache module</td>
</tr>
<tr>
<td>Candidate LD List</td>
</tr>
<tr>
<td>capacity expansion</td>
</tr>
<tr>
<td>Change Format Time</td>
</tr>
<tr>
<td>Change Group</td>
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<td>Change Port Mode</td>
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<td>Change Rebuild Time</td>
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<tr>
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<td>D</td>
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<td>data replication</td>
</tr>
<tr>
<td>Delete</td>
</tr>
<tr>
<td>disk array name</td>
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<tr>
<td>disk array name setting</td>
</tr>
<tr>
<td>disk director</td>
</tr>
<tr>
<td>display selection</td>
</tr>
<tr>
<td>DynamicDataReplication</td>
</tr>
<tr>
<td>E</td>
</tr>
<tr>
<td>ether</td>
</tr>
<tr>
<td>extended cabinet</td>
</tr>
<tr>
<td>F</td>
</tr>
<tr>
<td>failure (busy)</td>
</tr>
<tr>
<td>failure (communication)</td>
</tr>
<tr>
<td>failure (i/o error)</td>
</tr>
<tr>
<td>failure (invalid)</td>
</tr>
<tr>
<td>failure (LINK path)</td>
</tr>
<tr>
<td>failure (nnh)</td>
</tr>
<tr>
<td>failure (RPL pair)</td>
</tr>
<tr>
<td>failure (same name)</td>
</tr>
<tr>
<td>fan</td>
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<tr>
<td>fault</td>
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<tr>
<td>For Optimization</td>
</tr>
<tr>
<td>formatting the user definition file</td>
</tr>
<tr>
<td>G</td>
</tr>
<tr>
<td>Get Disk Array Info</td>
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<tr>
<td>Group</td>
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<tr>
<td>GUI</td>
</tr>
<tr>
<td>H</td>
</tr>
<tr>
<td>HBA</td>
</tr>
<tr>
<td>host director</td>
</tr>
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<td>I</td>
</tr>
<tr>
<td>inaccessible area</td>
</tr>
<tr>
<td>Inaccessible LD List</td>
</tr>
<tr>
<td>info</td>
</tr>
<tr>
<td>information on accessibility</td>
</tr>
<tr>
<td>Initialization</td>
</tr>
<tr>
<td>Initialization of EVN</td>
</tr>
<tr>
<td>Initialization Options</td>
</tr>
<tr>
<td>Initialization Time</td>
</tr>
<tr>
<td>installation</td>
</tr>
<tr>
<td>J</td>
</tr>
<tr>
<td>junction box</td>
</tr>
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