User Manual
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About this Manual
This Manual is applicable to Storage System.
The Manual includes instructions for using and managing the product. Pictures, charts, images and all other information hereinafter are for description and explanation only. The information contained in the Manual is subject to change, without notice, due to firmware updates or other reasons. Please find the latest version in the company website (http://overseas.hikvision.com/en/).

Please use this user manual under the guidance of professionals.

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Regulatory Information

FCC Information

FCC compliance: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The device is advised to note that as a seller or a business user (Class A) Devices and intended for use outside the Home area.

FCC Conditions

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

EU Conformity Statement

This product and - if applicable - the supplied accessories too are marked with "CE" and comply therefore with the applicable harmonized European standards listed under the EMC Directive 2014/30/EU, the RoHS Directive 2011/65/EU, the LVD Directive 2014/35/EU.

2012/19/EU (WEEE directive): Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see: www.recyclethis.info

2006/66/EC (battery directive): This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg). For proper recycling, return the battery to your supplier or to a designated collection point. For more information see: www.recyclethis.info

Industry Canada ICES-003 Compliance

This device meets the CAN ICES-3 (A)/NMB-3(A) standards requirements.
Safety Instruction

These instructions are intended to ensure that user can use the product correctly to avoid danger or property loss.

The precaution measure is divided into “Warnings” and “Cautions”

**Warnings:** Serious injury or death may occur if any of the warnings are neglected.

**Cautions:** Injury or equipment damage may occur if any of the cautions are neglected.

<table>
<thead>
<tr>
<th>Warnings</th>
<th>Cautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow these safeguards to prevent serious injury or death.</td>
<td>Follow these precautions to prevent potential injury or material damage.</td>
</tr>
</tbody>
</table>

**Warnings**

- Proper configuration of all passwords and other security settings is the responsibility of the installer and/or end-user.
- In the use of the product, you must be in strict compliance with the electrical safety regulations of the nation and region. Please refer to technical specifications for detailed information.
- Input voltage should meet both the SELV (Safety Extra Low Voltage) and the Limited Power Source with 100~240 VAC or 12 VDC according to the IEC60950-1 standard. Please refer to technical specifications for detailed information.
- Do not connect several devices to one power adapter as adapter overload may cause over-heating or a fire hazard.
- Please make sure that the plug is firmly connected to the power socket.
- If smoke, odor or noise rise from the device, turn off the power at once and unplug the power cable, and then please contact the service center.
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Chapter 1  Overview

Purpose:
DS-A80&81 series storage system is a high-performance and highly reliable storage system. Designed with four enterprise-class gigabyte network interfaces, it provides a bandwidth with 4 to 8G bps transmission capability and a huge storage space. It is integrated with multiple advanced technologies, including a 64-bit hexa-core processors, stable architecture, and the RAID 6 storage technology, thus to run reliably and protect user data security effectively.

Figure 1. 1 GUI and Table 1. 1 GUI Introduction introduce the elements appear in the GUI (Graphical User Interface) and clarify names for each element.

![GUI Image]

**Figure 1. 1 GUI**

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Banner and device model</td>
<td>Shows the device model.</td>
</tr>
<tr>
<td>2</td>
<td>Running status</td>
<td>A shortcut for obtaining the real-time running status.</td>
</tr>
<tr>
<td>3</td>
<td>Navigation Bar</td>
<td>Lists the storage system menu.</td>
</tr>
<tr>
<td>4</td>
<td>Help and logout</td>
<td>A shortcut for accessing user manuals, downloading software, and logout.</td>
</tr>
<tr>
<td>5</td>
<td>Operation window</td>
<td>Lists the parameters. You can configure parameters in the area.</td>
</tr>
</tbody>
</table>
Chapter 2  Getting Started

Purpose:
The chapter introduces HDD installation steps, web browser access steps, and login steps.

Table 2.1 Module Description

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDD Installation</td>
<td>Describes the steps of HDD installation.</td>
</tr>
<tr>
<td>Web Browser Access</td>
<td>You can get access to the storage system via a server with the web browser installed.</td>
</tr>
<tr>
<td>Login</td>
<td>Introduces login storage system steps.</td>
</tr>
</tbody>
</table>

Key Words:
HDD Installation, Web Browser Access, Login
2.1 HDD Installation

*NOTE*

In the event of device appearance shown in following steps conflicts with real device, the later prevails.

**Before you start:**
Prepare the following equipment and accessories.

- A storage system
- Hard HDDs
- A pair of anti-static gloves
- A screwdriver

**Steps:**
1. Press the blue button. Then the handle pops up.

![Figure 2. 2 Press the Blue Button](image1)

2. Hold the hander and pull the HDD dummy out of the slot.

![Figure 2. 3 Pull out the HDD Dummy](image2)

3. Use the screwdriver to uninstall the baffle in the bottom of HDD slot.

4. Place an HDD in the HDD dummy. The SATA interface must face the HDD dummy rear.
5. Adjust the HDD position. Ensure the HDD rear aligning with HDD dummy rear and the two screw holes aiming at the holes that marked with red frame in Figure 2.5 HDD Position.

![Figure 2.5 HDD Position](image)

6. Use a screwdriver to fasten the four screws into the screw holes in both sides.

![Figure 2.6 Install Screws](image)

7. Push the HDD dummy back into the slot.

![Figure 2.7 Push the HDD Dummy into Slot](image)

### 2.2 Accessing by Web Browser

#### NOTE

You shall acknowledge that the use of the product with Internet access might be under network security risks. For avoidance of any network attacks and information leakage, please strengthen your own protection. If the product does not work properly, please contact with your dealer or the nearest service center.

**Purpose:**

You can get access to the storage system via a server with a web browser installed, without needing to install any other software. The recommended web browsers are Internet Explorer 8 and Internet Explorer 11.

**Before you start:**
1. Use a network cable to connect the system Ethernet port and the storage system management network interface.
2. Configure the server IP address. Ensure it is in the same network segment with the IP address of management network interface is 10.254.254.254.

Steps:
1. Open web browser.
3. Press Enter.

2.3 Login

Steps:
- If the device has not been activated, you need to activate the device first before login.
  1. Set the password for the admin user account.
  2. Click OK to login to the device.

⚠️STRONG PASSWORD RECOMMENDED—we highly recommend you create a strong password of your own choosing (Using a minimum of 8 characters, including at least three of the following categories: upper case letters, lower case letters, numbers, and special characters.) in order to increase the security of your product. And we recommend you reset your password regularly, especially in the high security system, resetting the password monthly or weekly can better protect your product.

- If the device is already activated:
  1. Select Login account as Basic Management or HYBRID SAN Sub-system.
     - Basic Management: Used to configure basic parameters of the storage system.
     - HYBRID SAN Sub-system: Used to Log into the HYBRID SAN sub-system.
  2. Select User name.
  3. Enter Password.
  4. Mode is Advanced by default and is not selectable.
  5. Click Login to log in the system.

![Login](image.png)
Chapter 3  Maintenance

Purpose:
Maintenance function enables you to view login and iSCSI information, monitor running status, restore default settings, check and download logs, upgrade storage system, and so forth.

Table 3. 1 Module Description

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>● A shortcut for reboot and shutdown.</td>
</tr>
<tr>
<td></td>
<td>● Lists the login user information and iSCSI connection information.</td>
</tr>
<tr>
<td>Performance</td>
<td>Shows you the real-time graph and data of system performance, including</td>
</tr>
<tr>
<td></td>
<td>bandwidth usage, memory usage, CPU usage, IO status, and Vmstatus.</td>
</tr>
<tr>
<td>General</td>
<td>You can view system version, reset system, view logs, upgrade system, and</td>
</tr>
<tr>
<td></td>
<td>add check and repair strategy.</td>
</tr>
<tr>
<td>Graphical Display</td>
<td>Provides a graph to show the front view status and a pie chart to show the</td>
</tr>
<tr>
<td></td>
<td>storage information.</td>
</tr>
<tr>
<td>Environmental</td>
<td>Shows the fan information, module temperature, fan control panel version,</td>
</tr>
<tr>
<td></td>
<td>and chassis power.</td>
</tr>
</tbody>
</table>

Key words:
System, Performance, General, Graphical Display, Environmental

Figure 3. 2 Maintenance
3.1 System

**Purpose:**
Once you log into the storage system, system menu appears. System menu is a shortcut for reboot and shutdown and lists the login users and iSCSI connection information.

**Steps:**
1. Click Maintenance in navigation bar and choose System to enter System interface.
2. Reboot, power off, or view login information or iSCSI connection info.
   - Click Reboot or Power off to restart or shut down the storage system.
   - The logged in users and IP addresses are listed in the Login info.
   - The LUN ID, iSCSI ID, and Initiator name are listed in iSCSI connection info, which shows which devices are connecting iSCSI.

3.2 Performance

**Purpose:**
Performance menu shows you the real-time graph and data of system performance, including bandwidth usage, memory usage, CPU usage, IO status, and system performance.

**Steps:**
1. Click Maintenance in navigation bar and choose Performance to enter Performance interface.
2. Click Enable Graphical to show the real-time graphs of bandwidth usage, memory usage, and CPU usage.
3. Optionally, click Disable Graphical to fold the graphs.
4. Click **System Performance** to pop up system performance window. System performance updates per second.

5. Click of **View IP Performance** to unfold input/output status.

6. Optionally, click of **View IP Performance** to fold input/output status.
3.3 General

**Purpose:**
You can view system version, reset system, view logs, and upgrade system.

**Step:**
Click Maintenance in navigation bar and choose General.

![Figure 3.6 General](image)

### 3.3.1 Viewing Version Information

**Purpose:**
Version information interface lists information including SMI, HYBRID SAN, Support, and so on.

**Steps:**
1. Click Version information to pop up version information window.
2. Click Cancel to close the window.

![Figure 3.7 Version Information](image)
3.3.2 Default Settings

*Purpose:*
You can reset system to factory defaults when system is abnormal. You are recommended to reset system under the direction of professional technical support.

*Steps:*
1. Click **Reset system** to pop up reset system dialog.

   ![Figure 3.8 Reset System](image)

2. Enter **yes** or **YES** in text field and click **OK** to reset.

3.3.3 Managing Maintenance Log

*Purpose:*
When system is abnormal, you can download the maintenance log to analyze problems.

*Steps:*
For details, refer to 9.1 Operation Log.

3.3.4 Modifying Password

*Purpose:*
You can modify password for basic management system and HYBRID SAN sub-system user.

*Steps:*
1. Click **Modify password**. And modify password window appears.

2. Select **User Name** as **web_admin** or **nvr_admin**.
   - **web_admin**: Basic management system user name.
   - **nvr_admin**: HYBRID SAN sub-system user name.

3. Enter **Old Management Password** and the same password in **New Management Password** and **Confirm Management Password**.

*NOTE*
- The security level of modified password should not be lower than low security.
- Password can only contain numbers, lowercase, uppercase, and underline for your password.
4. Click **OK** and click **OK** in popup message dialog to save the new password.

- Once password is modified, it jumps to login interface. You need to enter the new password to log in.
- Another controller password changes with the current controller password.

### 3.3.5 SNMP Configuration

**Purpose:**

By configuring SNMP parameters, you can log in PRTG Traffic Grapher tool to monitor the system status, including exception information, CPU usage, and so forth.

**Steps:**

1. Click **SNMP Configuration** button.

2. **SNMP Version** is V2(v2c) by default and is not editable.
3. Enter **User Name**, **Contact**, and **Physical address**.
4. Click **OK** to save the settings. Then you can view system status by logging in PRTG Traffic Grapher Tool.

### 3.3.6 Modifying Host Name

**Steps:**

1. Click **Modify** and text field appears.
2. Enter host name in the text field.
3. Click **Modify** to activate the new host name.

![Current Master Identification](image)

**Figure 3.11 Modify Host Name**

Only letters (a to z and A to Z), numbers (0 to 9), and underline (_) can be input.

### 3.3.7 Viewing Service Status

**Purpose:**
Whether the services are running or not. You can enable, disable, or restart the services.

**Steps:**
- Click **Enable** to start the service that is not running.
- Click **Disable** to shut down the running service.
- Click **Restart** to restart services.

![Enabling and Disabling of Services](image)

**Figure 3.12 Service Status**

### 3.3.8 System Upgrade

**Purpose:**
You are recommended to upgrade system under the help of professional support.

**Steps:**
1. Click **System upgrade** in Common menu to enter Application Service interface.

![Current Upgrade File](image)

**Figure 3.13 Application Service**

2. Click **Browser** and choose the upgrade package.
3. Click **Upload** to upgrade. After upgrade succeeded, reboot the storage system to activate the new version.
4. Optionally, you can click **Restore** to restore to previous version.

![NOTE](image)

You can only restore to the last upgraded version.
3.4 Graphical Display

**Purpose:**
The storage system provides a graph to show the front view status and a pie chart to show the storage information.

**Step:**
Click **Maintenance** in navigation bar and choose **Graphical Display** to enter Graphical Display interface.

![Graphical Display Interface](image)

**Figure 3.14 Graphical Display**

3.4.1 Front View

**Purpose:**
Front view can show you the HDD status.

**Steps:**
1. Click **Front View** in Graphical Display menu to show front view.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top indicator</td>
<td>Unlit</td>
<td>HDD doesn’t exist.</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>HDD is connected and recognized.</td>
</tr>
<tr>
<td>Bottom indicator</td>
<td>Green</td>
<td>HDD is normal.</td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>Reading and writing normally.</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>HDD is rebuilding.</td>
</tr>
</tbody>
</table>

2. Positioning the pointer in a green indicator slot. Then the message dialog appears.

![HDD Information](image)

**Figure 3.15 HDD Information**

3. Click **Overview** to view information of all HDD.
4. Optionally, click **Refresh** in top-right corner to update the front view.

### 3.4.2 Pie Chart

**Purpose:**
Pie chart shows the free size of all storage modules, including system, LUN, snapshot, HYBRID SAN, iSCSI, and FC.

**Steps:**
1. Click **Pie Chart** in Graphical Display to enter Pie Chart interface.
2. Positioning the pointer in the part you want to view. **Free size** and free size **Percentage** appear in a dialog.
3. Optionally, click **Refresh** in top-right corner to update the information.

### 3.5 Environmental

**Purpose:**
Environmental shows the fan information, module temperature, fan control panel version, and chassis power.

**Steps:**
1. Click **Maintenance** in navigation bar and choose **Control Message** to enter Control Message interface. Fan RPM (Revolutions per Minute), temperature, and other information are shown.

**Note:**
You can install or uninstall fans. Up to 6 fans’ formation can be connected.
2. Click **Mute** in top-right corner to turn off system audible warning.

3. To find out which controller is working, click **Position** in top-right corner and click **OK** in popup dialog. The FN indicator of working controller would light up and flash for 10 minutes.

4. Set fan speed.
   1) Click **Speed Regulation** in top-right corner to pop up dialog box.

   ![Fan Speed Regulation dialog box](image)

   Figure 3. 19 Fan Speed

   2) Choose speed as **Low speed**, **Medium speed**, or **High speed** in dropdown list.

   3) Click **OK** to save the settings.
Chapter 4  Storage Management

Purpose:
Storage management provides configuration including HDD management, array, storage pool, LUN (logical Volume), and storage settings.

Table 4.1 Module Description

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDD Management</td>
<td>You can:</td>
</tr>
<tr>
<td></td>
<td>● View HDD information and status.</td>
</tr>
<tr>
<td></td>
<td>● Rescan, positioning, initialize, and detect HDDs.</td>
</tr>
<tr>
<td>Array</td>
<td>You can:</td>
</tr>
<tr>
<td></td>
<td>● Create arrays.</td>
</tr>
<tr>
<td></td>
<td>● Add hot spare.</td>
</tr>
<tr>
<td></td>
<td>● View array and hot spare information.</td>
</tr>
<tr>
<td></td>
<td>● Delete array and hot spare.</td>
</tr>
<tr>
<td>Storage pool</td>
<td>You can:</td>
</tr>
<tr>
<td></td>
<td>● Add, delete, and positioning storage pools.</td>
</tr>
<tr>
<td></td>
<td>● Remove and positioning HDDs.</td>
</tr>
<tr>
<td></td>
<td>● View system total and free capacity.</td>
</tr>
<tr>
<td>LUN (Logical volume)</td>
<td>You can</td>
</tr>
<tr>
<td></td>
<td>● Add and delete LUNs.</td>
</tr>
<tr>
<td></td>
<td>● Rename, expand, clone, and snapshot LUNs.</td>
</tr>
<tr>
<td>Configurations</td>
<td>You can</td>
</tr>
<tr>
<td></td>
<td>● Set array synchronization speed.</td>
</tr>
<tr>
<td></td>
<td>● Set array synchronization type.</td>
</tr>
<tr>
<td></td>
<td>● Set flicking frequency for HDD positioning indicator.</td>
</tr>
</tbody>
</table>

Key words:
HDD Management, Array, Storage Pool, LUN (Logical Volume), Configuration

Figure 4.2 Storage
4.1 Managing Local HDD

*Purpose:*
You can view the HDD information here, including HDD location, supplier, model, size, status, and belonging group.

*Step:*
Click **Storage** in navigation bar and choose **HDD Management**.

![HDD Management](image)

**Figure 4.3 HDD Management**

4.1.1 Viewing HDD Status

*Purpose:*
You can view status of one HDD or all HDDs.

4.1.1.1 One HDD

*Steps:*
1. In the HDD information list, click **Details** of an HDD. HDD state dialog appears.
2. Click **SMART** to view the HDD SMART detection information.

![HDD Status](image)

**Figure 4.4 HDD Status**

4.1.1.2 All HDDs

*Steps:*
1. Click **HDD Status** in the upper left corner.
2. Click **SMART** of an HDD to view its SMART detection information.
There are totally 6 kinds of status for an HDD.

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>HDD works normally.</td>
</tr>
<tr>
<td>Undetected</td>
<td>HDD failed the HDD detection.</td>
</tr>
<tr>
<td>Lost</td>
<td>HDD is unrecognized.</td>
</tr>
<tr>
<td>Risky</td>
<td>Exception occurs during HDD detection. But it can still work.</td>
</tr>
<tr>
<td>Bad</td>
<td>HDD is kicked out by an array.</td>
</tr>
<tr>
<td>Warning</td>
<td>HDD read and writing speed is higher than 10 MB/S during pressure test.</td>
</tr>
</tbody>
</table>

### 4.1.2 Rescanning HDD

**Step:**
- If detecting a newly installed HDD failed, click **Rescan** to find the HDD.
- If an HDD is uninstalled from the storage system, click **Rescan** to remove it from the HDD interface.

Rescanning HDDs may result in HDD status appearing as Unknown. Fresh the interface or click **Rescan** again to solve the problem.

### 4.1.3 Positioning HDD

**Purpose:**
HDD bottom indicator flickers after enabling the function. It enables you to find a certain HDD more easily.

**Before you start:**
Set the flickering time first. For details, refer to 4.5.2 Flickering Time.
Steps:
1. Check the checkbox of HDD you want to find.
2. Click Position and click OK in popup dialog box. Then HDD indicator keeps flickering in red for the set flickering time.

4.1.4 HDD Initialization

Purpose:
To recover an HDD when its status is uninitialized or when it is kicked out by an array, you can initialize it.

Steps:
1. Check the checkbox of HDD you want to initialize.
2. Click Initialize and click OK in popup dialog box to start initializing.

4.1.5 HDD Detection

Purpose:
To recognize an HDD which is added to a storage system for the first time, detect it.

Steps:
1. Check the checkboxes of HDDs to detect.
2. Click Detect.

3. Select the Detection Mode as Rapid or Comprehensive.
   - Rapid: Detect parts of all HDD blocks. It takes shorter time than Comprehensive.
   - Comprehensive: Detect all HDD blocks. It takes longer time than Rapid.

   ![HDD Detection](image)

   Figure 4. 6 HDD Detection

   - It is recommended to operate rapid detection when system is under low pressure.
   - You are recommended to operate comprehensive detection for the first use HDD.
   - To keep data safe, detect an HDD every 3 months.

4. Click Start to start detecting. The selected detection mode, detection progress, and detection time are listed in the top part of the interface.
5. Optionally, click **Refresh** to update the detection status, detection process and detection time. Or you can click **Stop** to end all detections.

![NOTE] There are 3 kinds of detection status: Unsubmitted, Detecting, and Completed.

<table>
<thead>
<tr>
<th>Check Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncommitted</td>
<td>HDD detection has not been committed.</td>
</tr>
<tr>
<td>Detecting</td>
<td>HDD is being detected.</td>
</tr>
<tr>
<td>Waiting</td>
<td>Another HDD is being detected. You need to wait till the detection is finished.</td>
</tr>
</tbody>
</table>

### 4.2 Array

**Purpose:**
You can create and manage array.

**Step:**
Click **Storage** in navigation bar and choose **Array**.

![Figure 4. 7 Array](image)

#### 4.2.1 Creating Array

**Purpose:**
You can use available HDDs to create array.

**Steps:**
1. Click **Create Array**.
2. Input Array Name in text field.

3. Select Array Type in drop-down list. RAID 0, RAID 1, RAID 3, RAID 5, RAID 6, RAID 10, and RAID 50 are selectable.

![Figure 4. 8 Create Array](image)

4. Select Array Block Size(KB) in drop-down list.

5. Select I/O Priority as Performance Priority, Protection Priority, Balanced, or Smart.
   - **Performance Priority**: To guarantee external I/O task performance, internal I/O task is totally stopped.
   - **Protection Priority**: To guarantee internal I/O task performance, external I/O task would only take the rest channel.
   - **Balanced**: When both internal and external I/O task exist, Balance ensures internal I/O task occupy certain channel without influencing external I/O task.
   - **Smart**: Without external I/O task, array is initialized in the highest speed. Or array is initialized in the lowest speed.

![Figure 4. 9 Required HDD Quantity](image)

<table>
<thead>
<tr>
<th>Array Type</th>
<th>Required HDD Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAID 0</td>
<td>At least 2 HDDs.</td>
</tr>
<tr>
<td>RAID 1</td>
<td>At least 2 HDDs.</td>
</tr>
<tr>
<td>RAID 3</td>
<td>At least 3 HDDs.</td>
</tr>
<tr>
<td>RAID 5</td>
<td>Valid range: [3, 12].</td>
</tr>
<tr>
<td>RAID 6</td>
<td>At least 4 HDDs.</td>
</tr>
<tr>
<td>RAID 10</td>
<td>RAID is made of RAID 0 and RAID 1 which requires at least 4 even HDDs.</td>
</tr>
<tr>
<td>RAID 50</td>
<td>RAID is made of RAID 0 and RAID 5 which requires at least 6 even HDDs.</td>
</tr>
</tbody>
</table>

If RAID level is RAID 0, I/O priority is unavailable.
6. Select the Available HDDs to create RAID.
   Or select Available arrays to create RAID.
   Or select the combination of Available HDDs and Available arrays.

   **NOTE**
   - Only enterprised HDDs are listed in Available HDDs list.
   - In order to increase the performance of created RAID, it is recommended to use HDDs of the same model and capacity when creating a RAID.

7. Click OK to create array. The successfully created array lists in Array information list. Once created, the array starts initializing.

### 4.2.2 Array Exception

**Purpose:**
If HDD failure occurs, array degrades. When more HDDs fail, array fails. Degraded array can keep working. However, failed array cannot work. Notification area will notify you once array degraded or failed. Refer to following table for array degraded and failed condition.

<table>
<thead>
<tr>
<th>RAID Level</th>
<th>Degraded Condition</th>
<th>Failed Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAID 0</td>
<td>RAID 0 will not degrade.</td>
<td>One HDD fails.</td>
</tr>
<tr>
<td>RAID 1</td>
<td>N-1 HDDs fail.</td>
<td>All HDDs fail.</td>
</tr>
<tr>
<td>RAID 3</td>
<td>One HDD fails.</td>
<td>Two HDDs fail.</td>
</tr>
<tr>
<td>RAID 5</td>
<td>N-1 HDDs fail.</td>
<td>More than three HDDs fail.</td>
</tr>
<tr>
<td>RAID 6</td>
<td>One HDD fails.</td>
<td>Two HDDs fail in either contained RAID.</td>
</tr>
<tr>
<td>RAID 10</td>
<td>One HDD fails.</td>
<td>Two HDDs fail in either contained RAID.</td>
</tr>
</tbody>
</table>

   **NOTE**
   - If array in storage pool degrades, physical volume degrades.
   - If array in storage pool fails, physical volume fails.

### 4.2.3 Rebuilding Array

**Purpose:**
Rebuilding refers to the process of using a normal HDD or array to virtually replace a failed HDD in a degraded array. The normal HDD can be hot spare HDD, newly inserted HDD, and so forth.

   **NOTE**
   - During rebuilding process, if the rebuilding HDD fails, the array stays degraded.
   - During rebuilding process, if a normal HDD in array fails, the array becomes failed.
   - During rebuilding process, if I/O error occurs to the rebuilding HDD, you need to change rebuilding HDD.

### 4.2.3.1 Rebuilding with Hot Spare

**Before you start:**
Add global, area, or local hot spare HDD or array for array.

**Step:**
Once the array degraded, hot spare HDD or hot spare array automatically rebuilds the array.

When the degraded array possesses both global and local hot spare, it rebuilds with local hot spare preferentially.

### 4.2.3.2 Rebuilding with Available HDD

**Before you start:**
Ensure there is at least one available HDD which isn’t included in any array or storage pool.

**Steps:**
1. Click **Maintenance** of a degraded array in Array information list.
2. Click **Rebuild** to pop up Array rebuild interface.
3. Select an **Available HDD** or **Available Array**.
4. Click **OK** to start rebuilding.

### 4.2.4 Detecting Array

**Purpose:**
You can detect whether the data bit and parity data in an array match or not.

If array in storage pool starts detecting, the physical volume status is detecting.

**Steps:**
1. Click **Maintenance** of a degraded array in Array information list.
2. Click **Detect** to start detecting.

### 4.2.5 Repairing Array

**Purpose:**
You can repair the data bit and parity data mismatch issue.

If array in storage pool starts repairing, physical volume status is repairing.

**Steps:**
1. Click **Maintenance** of a degraded array in Array information list.
2. Click **Repair** to start repairing.

### 4.2.6 Renaming Array

**Steps:**
1. Click **Maintenance** of an array in Array information list.
2. Click **Rename**.
3. Enter a new name.
4. Click **OK** to save the new name.

### 4.2.6.1 Modify I/O Priority

**Steps:**
1. Click **Maintenance** of an array in Array information list.
2. Click **Modify**.
3. Select **I/O Priority** in dropdown list.
4. Click **OK**.

### 4.2.6.2 Pause Initialization/Rebuilding/Detection/Repair

**Purpose:**
When the array is initializing, rebuilding, detecting, or repairing, you can pause.

**Steps:**
1. Click **Maintenance** of an array in Array information list.
2. Click **Pause** to pause current process.
3. You can click **Keep** to resume.

### 4.2.7 Deleting Array

**Steps:**
1. Check the checkbox of array you want to delete.
2. Click **Delete** button to delete.

If the array has been added to a storage pool, you need to remove it from storage pool first, or it can't be deleted.

### 4.2.8 Adding Hot Spare

**Purpose:**
The hot spare HDD can replace failed HDD in the degraded array. In order to protect data from damage in case of HDDs in array fail, it is recommended to add hot spare HDDs for a created array.

**Steps:**
1. Click **Add Hot Spare Disk** to enter Add hot spare interface.
2. Select **Group** as **Global**, **Area**, or **Local**.
   - **Global**: Global hot spare HDDs can replace failed HDDs in any degraded arrays of storage devices in the same system.
   - **Area**: Area hot spare HDDs replace failed HDDs in any degraded arrays of one storage system.
   - **Local**: Local hot spare HDDs replace failed HDDs in designated array.
Priority of hot spare: Local hot spare › area hot spare › global hot spare

3. If Group is Area, select available array in Area dropdown list.
   If Group is Local, select array in Array dropdown list.

4. Select at least one Available HDD.
   Or select at least one Available array.
   Or select the combination of Available HDD or Available array.

5. Click OK to create hot spare.

![Diagram](image.png)

Figure 4. 10 Add Hot Spare

### 4.2.9 Deleting Hot Spare

**Steps:**

1. Select arrays you want to delete.
2. Click ![Delete](image.png) button to delete.

### 4.3 Storage Pool

**Purpose:**

Storage pool, which is made of physical volumes and contains arrays and HDDs, is designed for central management of storage capacity.

**Step:**

Click Storage in navigation bar and choose Storage Pool.
Table 4. 5 Interface Description

<table>
<thead>
<tr>
<th>Area</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Information Area</td>
<td>Lists the storage pool total size, free size, LUN size, snapshot size,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HYBRID SAN size, iSCSI size, and FC size.</td>
</tr>
<tr>
<td>2</td>
<td>Configuration Area</td>
<td>You can add, delete, and positioning created physical volume here.</td>
</tr>
</tbody>
</table>

4.3.1 Adding Storage Pool

**Purpose:**
You need to create physical volumes to build storage pool.

**Before you start:**
Ensure available array or HDD exists in the storage system.

**Steps:**
1. Click **Add**.

2. Select at least one array or HDD as storage pool. Or select the combination of array or HDD.

3. Input **PV Name** in text field.
4. Click **OK** to add the storage pool.

![Figure 4. 13 Storage Pool](image)

### 4.3.2 Deleting Storage Pool

*Purpose:*
You can delete storage pool by deleting the added physical volumes.

*Steps:*
1. Check the checkboxes of physical volumes you want to delete.
2. Click **Delete** or **Remove** button to delete them.

Idle physical volumes can be deleted except the first created physical volume.

### 4.3.3 Positioning Storage Pool

*Before you start:*
Set the flickering time first. For details, refer to 4.5.2 *Flickering Time*.

*Steps:*
1. Check the checkbox of physical volume you want to positioning.
2. Click **POSITION** button. Then the HDD bottom indicator keeps flickering in green for the set flickering time.

### 4.4 Logical Volume

*Purpose:*
Logical volume is the virtual HDD which is made of physical HDD.

*Step:*
Click **Storage** in navigation bar and choose **LUN**.

![Figure 4. 14 Logical Volume](image)
4.4.1 Creating Logical Volume

**Purpose:**
You can create logical volumes by using available physical volumes.

**Steps:**
1. Click Create.

![Create Logical Volume](image)

2. Enter Name.
3. Enter Capacity (MB).
4. Select Block Size (Byte) from dropdown list.
5. Choose Available Physical Volume.
6. Click OK to create logical volume. Created logical volume is listed in logical volume information list.

4.4.2 Deleting Logical Volume

**Steps:**
1. Select the logical volume you want to delete.
2. Click Delete button to delete them.

The working logical volume can be deleted. Only free logical volume can be deleted.

4.4.3 Renaming Logical Volume

**Steps:**

You can only rename the free logical volumes.
1. Click button of the logical volume you want to rename.
2. Enter a new name.
3. Click OK to save the new name.

4.4.4 Enlarging Logical Volume

*Purpose:*
You can enlarge the size of created logical volume.

*NOTE*
You can only enlarge the idle logical volumes.

*Steps:*
1. Click button of the logical volume you want to extend.

![Extend Logical Volume](image)

Figure 4.16 Extend LUN

2. Enter New Capacity (MB).
3. Select Available Physical Volume used to extend.
4. Click OK to extend.

4.5 Configuration

*Purpose:*
You can set the array synchronization speed type and flickering time of positioning indicator.

*Step:*
Click Storage in navigation bar and choose Configuration.
4.5.1 Synchronization Speed and Type

**Purpose:**
Array synchronization speed and synchronization type is editable.

**Steps:**
1. Click Modify of Array Synchronization Speed.
2. Select Array Synchronization Speed as High, Medium, Low, or None.
   
   ![NOTE]
   The faster the speed is, the highest the internal IO percentage is.
3. Click OK.
4. Click Modify of Array Synchronization Type.
5. Select Array Synchronization Type as Serial or Parallel.
6. Click OK.

4.5.2 Flickering Time

**Purpose:**
When positioning an HDD, the HDD bottom indicator keeps flickering for the set time.

**Steps:**
1. Enter a number as flickering time in HDD Positioning Flickering Time (s).
   
   ![NOTE]
   Valid flickering time ranges from 5 to 300 and the unit is second.
2. Click Modify.
Chapter 5  SAN

Purpose:
You can add iSCSI disks and FC (Fiber Channel) disks in your computer.

Table 5.1 Module Description

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>iSCSI</td>
<td>You can add iSCSI disks in your computer.</td>
</tr>
<tr>
<td>FC</td>
<td>You can add FC disks in your computer.</td>
</tr>
</tbody>
</table>

Keywords:
iSCSI, FC

Figure 5.2 SAN
5.1 iSCSI

Purpose:
You can add iSCSI HDDs in your computer.

Step:
Click SAN in navigation bar and choose iSCSI to enter iSCSI interface.

5.1.1 Adding CHAP User

Purpose:
When enabling iSCSI, you can select an added CHAP user as a way to verify your computer permission.

Steps:
1. Click Add/Modify CHAP button to enter Add CHAP User interface.

2. Enter CHAP User Name, New Password, and Confirm password.
   - **User Name**: Only letters, numbers, and underline are allowed.
   - **New Password**: Only 12 to 16 characters, including letters, numbers, and underline, are allowed.
   - **Confirm Password**: It must be the same as New Password.

3. Click OK and click OK in confirmation dialog box to add the CHAP user.

5.1.2 Modifying CHAP User

Purpose:
You can modify the password of added users.

**Before you start:**
If the CHAP going to be modified is linked to one or more iSCSIs and these iSCSIs are connecting with computers, you need to disconnect them from computer first.

**Steps:**
1. Click **Add/Modify CHAP** button to enter Modify CHAP User Interface.
2. Enter the CHAP username you want to modify in the text field.
3. Enter a new **Password** and **Confirm password**.
4. Click **OK** and click **OK** in confirmation dialog box to modify the CHAP user.

### 5.1.3 Enabling iSCSI

**Purpose:**
Enabling iSCSI in the storage system makes it possible for you to add iSCSI HDDs in computer.

**Steps:**
1. Click **Enable iSCSI** button to pop up Enable iSCSI interface.

   ![Enable iSCSI Interface]
   
   **Figure 5. 5 Enable iSCSI**

2. Enter **Client IP** and **iSCSI ID**.
   - **Client IP**: To turn on iSCSI for a specified client (computer), enter the client IP address. To turn on iSCSI for multiple clients, enter 0.0.0.0 in the text field.
3. Select the identity authentication method in the dropdown list of **CHAP User**.
   - **Disable**: There is no limit for client access.
   - **Other CHAP user**: Correct CHAP user name and password are needed for client to get access to LUN.
4. Select the logical volume **Access Mode** as **Read/Write**, **Write-Through**, **Read Only**, or **Intelligent Read-Only**.
   - **Read/Write**: Read and writing permission.
   - **Intelligent Read-Only**: Even though writing operation succeeded, data wouldn’t be written into LUN. It is mainly used to test the storage system performance.
➤ **Write-Through:** It writes the data into HDDs directly without writing into HDD buffer. A low writing speed makes the data complete.

5. Choose an available **Logical Volume**.

6. Click **OK** to enable the iSCSI.

When multiple iSCSIs share the same LUN, only one iSCSI server access mode can be R/W and other servers should be RO or IRO, or file system may be damaged or data may lose.

### 5.1.4 Disabling iSCSI

**Purpose:**
For the unnecessary iSCSIs, you can disable them, thus to keep the storage system safe and stable.

**Before you start:**
Disconnect the storage system from the clients for which you want to disable iSCSI.

**Steps:**
1. Check the checkbox of iSCSI you want to disable.
2. Click ![Delete](image) and click **OK** in confirmation dialog box.

### 5.1.5 Modifying iSCSI Port

**Purpose:**
iSCSI port is needed when accessing via computer. It can be edited.

**Before you start:**
Disconnect all iSCSIs first, or iSCSI enabled under pervious iSCSI port couldn’t be deleted.

**Steps:**
1. Click **SAN** in navigation bar and choose **Setting** to enter **Setting** interface.
2. Enter a number between 3000 and 65534 except 7402 in **Current target port** text field.
3. Click **Modify**, click **OK** in confirmation dialog box, and click **OK** in second popup dialog box.

### 5.2 FC (Optional)

**Purpose:**
You can add FC HDDs in your computer.
Before you start:
1. Install fiber Ethernet adapter and fiber Ethernet adapter drive in both the storage system and the client server.
2. Connect the storage system and client server to fiber channel switch with fiber.

Step:
Click SAN in navigation bar and choose FC to enter FC interface.

5.2.1 Enabling FC

Purpose:
Enabling FC in the storage system makes it possible for you to add FC HDDs in computer. To visit FC HDD via computer, the storage system and the computer should locate in an optical fiber network. You can enable FC service for:

- A specified fiber channel.
- All available fiber channels.
- A specified FC port.
- All available FC ports.

Before you start:
- Install optical fiber card first.
- Create at least one LUN first. For detailed steps, refer to 4.4 Logical Volume.

Steps:
1. Click Enable FC to enter Enable FC interface.

2. According to actual connection, select Fiber Channel as Fiber Channel0, Fiber Channel1, Fiber Channel2, or Fiber Channel3. If you are not sure about selecting which one, select Available channels. The storage system can automatically connect the client with an available channel.
Fiber Channel 0 refers to fiber port 1 in real panel. Fiber Channel 1 refers to fiber port 2 in rear panel. And so on.

3. To specify a client, enter **Client WWPN** of 16 numbers.

   **Client WWPN**: The client fiber Ethernet adapter WWPN. You can use a fiber client to obtain WWPN. If no client is available, enter 0000000000000000. The storage system connects all available clients WWPN and share FC with all connected clients.

4. Select available LUN in the dropdown list of **LUN name**.

5. Choose **Logical LUN ID** as **Auto** or **Manual**.
   - **Auto**: The storage system automatically specifies a free LUN ID.
   - **Manual**: It is recommended to choose **Manual**. The logical LUN ID which is the first manual one must be 0.

6. Select LUN access mode as **R/W**, **SR/W**, **RO**, or **IRO**.
   - **R/W**: Read and writing permission.
   - **IRO** (Intelligent Read Only): Even though writing operation succeeded, data wouldn’t be written into LUN. It is mainly used to test the storage system performance.
   - **RO**: Read only
   - **SR/W** (Synchronous Read/Write): It writes the data into HDDs directly without writing into HDD buffer. A low writing speed makes the data complete.

7. Click **OK** and click **OK** in confirmation dialog box to enable FC.

### 5.2.2 Disabling FC

**Purpose:**
You can disable FC service for:
- A specified fiber channel.
- All available fiber channels.
- A specified FC port
- All available FC ports.

**Steps:**
1. Check the checkbox of FC you want to disable.
2. Click **Delete** and click **OK** in confirmation dialog box.
Chapter 6 HYBRID SAN

Purpose:
You can configure HYBRID SAN and N+1 parameters.

Table 6.1 Module Description

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
</table>
| HYBRID SAN | You can:  
  ● Configure private volume, HYBRID SAN configuration, create record volume, and extend record volume.  
  ● HYBRID SAN one-key configuration.  
  ● Manage N+1.  
  ● Log in HYBRID SAN sub-system to add encoders, add strategy, search video, and so forth. |
| N+1 | A storage system whose HYBRID SAN service has started can serve as a backup HYBRID SAN for other HYBRID SANs. |

Keywords:
HYBRID SAN, N+1

Figure 6.2 HYBRID SAN
6.1 One-Key Configuration

**Purpose:**
Quick-setting creating helps you to create HYBRID SAN quickly.

**Before you start:**
Ensure there is neither storage pool nor array in the storage system.

**Steps:**
1. Click the **One-Key Configuration** button in the upper right corner to start quick settings.
2. Click **OK** to confirm. Quick-setting takes 3 to 15 minutes. During the quick-settings, following operations are performed automatically.
   1) Add HDDs to storage pool. Or create RAID and add them to storage pool.
      
      The whole HDDs are added to storage pool with no more free capacity. You can view the storage pool usage in Storage > Storage Pool.
   2) Create private volume, reserved volume, and record volume. If more than 3 LUNs are created, one archive volume is created.

![Figure 6.3 HYBRID SAN Settings Interface](image)

- Bad HDD, risky HDD, and warning HDD would not be added to storage pool.
- Non-enterprise HDD is added to storage pool by single-HDD mode.
- Quick-setting takes longer if any undetected HDD exists.
- If HDDs in the storage system are less than 6, they are added to storage pool by single-HDD mode.
- If HDDs in the storage system are not less than 6 and HDDs in storage enclosure is less than 6, the storage system HDDs are added by array mode and the storage enclosure HDDs won’t be added.
- If HDDs in the storage system and HDDs in storage enclosure are both not less than 6, they are both added to storage pool by array mode.
- If only one HDD exists, no reserved volume is created. In single-HDD mode, no reserved volume is created in the last HDD of the storage system. In array mode, two reserved volumes are created in each RAID.
- By default, a 50 GB size private volume and a 50 GB size reserved volume should be created.

6.2 HYBRID SAN Configuration

**Purpose:**
You can start and reset HYBRID SAN and create record volume.

**Step:**

Click the **Configure HYBRID SAN** button in upper right corner.

![Configure Hybrid SAN](image)

**Figure 6.4 HYBRID SAN**

### 6.2.1 Starting HYBRID SAN

**Purpose:**

You can start HYBRID SAN after private volumes are created.

**Before you start:**

1. To create storage pool, do one of the following:
   - Single-HDD mode: Add HDDs to storage pool.
   - Array mode: Create arrays and add them to storage pool.
2. Create at least 5 LUNs. Ensure at least 4 of them are larger than 20 GB. The four LUNs are used to create private volume, reserved volume. Other LUNs are used to create record volume.

   ![NOTE]

   - If record volume size is fewer than 120T, then private volume 1 and private volume 2 size should both larger 50G.
   - If record volume size ranges from 120T to 180T, then private volume 1 and private volume 2 size should both larger 60G.
   - If record volume enlarges by 60T, record volume 1 and record volume 2 should both enlarge by 10G.

**Steps:**

1. Click the **Configure Private Volume** tab.
2. Check the checkbox of **Enable HYBRID SAN** after finishing.

3. Optionally, check the checkbox of **Allocate private volume's reserved space** and **Enable private volume's reserved space**.

   **Enable private volume's reserved space**: Create a spare volume for private volume. The spare volume works as a backup volume. When error occurs to the two private volumes, the two spare LUNs would replace them.

   ![NOTE]

   It is not recommended to use a spare volume in the same physical volume with the private volume.

4. To add private volume 1, choose a **Free LUN** and click **Private volume 1 >>** button.

5. To add private volume 2, choose a **Free LUN** and click **Private volume 2 >>** button.

   ![NOTE]

   - HYBRID SAN configuration information is saved in private volume 1 and private volume 2.
   - It is not recommended to use the LUN created by the HDD first added to storage pool to create private volume 1.
   - The chosen LUNs’ capacity should meet the demand shown in red frames in Figure 6.5 HYBRID SAN Configuration.
   - If **Allocate private volume's reserved space** and **Enable private volume's reserved space** are selected, the storage system automatically select two free LUN as the spare volumes.

6. Click **OK** to start creating the two private volumes. After private volumes are created, HYBRID SAN starts running.
### Table 6.2 HYBRID SAN Status Description

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not configured or incomplete</td>
<td>HYBRID SAN is not configured.</td>
</tr>
<tr>
<td>Running</td>
<td>HYBRID SAN is correctly started.</td>
</tr>
<tr>
<td>Stopped</td>
<td>Click <strong>Stop HYBRID SAN</strong> to stop HYBRID SAN service. Once HYBRID SAN is stopped, you are not able to view encoder information and videos. You can click <strong>Start HYBRID SAN</strong> to recover to Running status.</td>
</tr>
<tr>
<td>Running and Recovering</td>
<td>Indicators HYBRID SAN is working normally and in automatic recovery process.</td>
</tr>
<tr>
<td>Stopped and Recovering</td>
<td>Indicators HYBRID SAN is stopped and in automatic recovery process.</td>
</tr>
</tbody>
</table>

### 6.2.2 Resetting HYBRID SAN

**Purpose:**

You can delete HYBRID SAN videos, encoders, and other configurations by resetting HYBRID SAN. After reset, HYBRID SAN status restores to not configured or incomplete.

**Steps:**

1. Enter HYBRID SAN configuration menu.
2. Click HYBRID SAN Service Reset.
3. Enter yes or YES in text field to start reset.

6.2.3 Record Volume

*Purpose:*  
Record volume is the logical volume stores videos.

6.2.3.1 Creating Record Volume

*Steps:*  
1. Click Create Record Volume menu.

![Figure 6.8 Create Record Volume](image)

2. Enter the Record Volume Name in text field.
3. Select Overwrite Strategy as Overwrite or Do Not Overwrite.
   - Overwrite: Once the record volume is full, videos can still write into it by covering the earliest videos.
   - Do Not Overwrite: Once the record volume is full, videos cannot be written in it
4. Select Record Volume Usage as Video Storage or Picture Storage.
5. If you want to create record volume based on local HDD or array, select Logical Volume Source as Local. If you want to create it based on IP SAN, select LUN source as IP SAN.
6. Select one or more Usable LUN.

![Note](image)

If the capacity of private volume 1 and private volume 2 are both larger than 50 GB, maximum capacity of each LUN of record volume is 8 TB.
7. Click OK to create the record volume. The created record volumes are listed in Record Volume list.

6.2.3.2 Clearing, Modifying, and Deleting Record Volume

*Purpose:*  
The created record volumes are listed in Record Volume list. You can clear videos saved in it, modify its configuration, and delete it.
Table 6.3 Icon Description

<table>
<thead>
<tr>
<th>Icon</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clear data</td>
<td>You can clear videos saved in the record volume.</td>
</tr>
<tr>
<td></td>
<td>Modify</td>
<td>You can modify record volume name, usage, and data overlay strategy.</td>
</tr>
<tr>
<td></td>
<td>Delete</td>
<td>You can delete the record volume. Data saved in it is removed.</td>
</tr>
</tbody>
</table>

Do not delete record volume when linked encoder is recording.

If a record volume consists of two or more LUNs, you can delete one of them according to following steps:

**Steps**
1. Click the record volume name.

![Figure 6.9 LUNs](image)

2. Click action icon of the LUN you want to delete.
3. Enter yes or YES in text field to delete it. After it is deleted, data saved in the LUN is deleted and the LUN status is Free.

6.2.3.3 Extending

**Purpose:**
When the record volume capacity is insufficient, you can use the free LUNs to extend it.

**Steps:**
1. Click Extend Record Volume menu.
2. Select the record volume you want to extend in **Record Volume Name** dropdown list.
3. Select the **Usable LUN** used to extend.
4. Click **OK** to start extending.

### 6.3 Backup and Restoring

**Purpose:**
The chapter introduces the video backup and HYBRID SAN restoring steps.

**Step:**
Click **Backup and Restore** button in upper right corner.

#### 6.3.1 Viewing Private Volume Information

**Step:**
Click **Private volume information** menu to enter Private Volume information interface. LUNs making up private volume 1 and private volume 2 are listed.

### 6.3.2 Restoring

**Purpose:**
When error occurs to HYBRID SAN, restoring HYBRID SAN can recover it. Restoring may cause data loss, so you need to contact us for professional help. We are not responsible for error caused by unprofessional operation.

**Step:**
Click **Execute Restoration Task** menu to enter Restore interface.

![Figure 6.12 Restore](image)

### 6.3.3 Backup

**Purpose:**
The storage system backs up the index of all videos every hour. You can manually back up all videos’ index according to following steps. The backed up index is saved in database.

![NOTE]

The function backs up video index instead of videos.

**Steps:**
1. Click **Execute Backup Task** tab.
2. Click **OK** to start backing up.
6.3.4 Recovering Video Data

**Purpose:**
If you reset HYBRID SAN, deleted record volume, or cleared record volume by mistake, you can contact us for professional help, we would help you to recover these data. We are not responsible for error caused by unprofessional operation.

**Step:**
Click **Execute Record Data Restoration** tab.

---

Figure 6. 13 Backup

Figure 6. 14 Record Data Recovery
6.4 N+1 Management

Purpose:
A storage system whose HYBRID SAN service has started can serve as a backup HYBRID SAN for other HYBRID SANs. When one or more master HYBRID SANs fail, the backup HYBRID SAN would record the videos from encoders. Master HYBRID SAN error includes network error, private volumes damaged, database error, and HYBRID SAN service error. After the master HYBRID SANs recovers to normal, backup HYBRID SAN would upload videos back to master HYBRID SANs.

Before you start:
Start HYBRID SAN service in both master HYBRID SANs and backup HYBRID SAN.

Step:
Click N+1 in navigation bar and choose N+1 to enter HYBRID SAN interface.

![Figure 6.15 N+1 Management](image)

- Log into master HYBRID SAN and add backup HYBRID SAN for master HYBRID SAN first. And then Log into backup HYBRID SAN and add master HYBRID SAN for backup HYBRID SAN.
- A storage system can be either backup HYBRID SAN or master HYBRID SAN.
- Ensure the system time of backup HYBRID SAN and master HYBRID SAN are the same. For detailed steps of modifying system time, refer to Chapter 8.3 Time.
- Once master HYBRID SAN can only link to one backup HYBRID SAN.
- It is not recommended that encoding devices added in backup HYBRID SAN have duplicate name.

6.4.1 Adding Backup HYBRID SAN

Purpose:
Add backup HYBRID SAN in master HYBRID SAN first.

Before you start:
Log into master HYBRID SAN and enter N+1 Management interface.

Steps:
1. Click the Add Backup HYBRID SAN button.
2. Enter the backup HYBRID SAN IP address.
3. Click OK to add.
4. Optionally, you can check the checkboxes of Synchronization and Delete the videos saved in backup HYBRID SAN after synchronization succeeded, and click Modify to enable them.
   - Synchronization: Once master HYBRID SAN recovers to normal, backup HYBRID SAN uploads the videos back to master HYBRID SAN.
   - Delete the videos saved in backup HYBRID SAN after synchronization succeeded: Delete the videos in backup HYBRID SAN once they are uploaded to master HYBRID SAN.

### 6.4.2 Deleting Backup HYBRID SAN

**Steps:**
1. Check the checkbox of backup HYBRID SAN you want to delete.
2. Click the Delete button and click OK in confirmation dialog box.

### 6.4.3 Adding Master HYBRID SAN

**Before you start:**
1. Log into backup HYBRID SAN and enter N+1 Management interface.
2. Add the same encoding devices in backup HYBRID SAN, which have been added in master HYBRID SAN. For details, refer to chapter 7.3.2 Adding Encoding Device. Ensure the name of encoding devices from different backup HYBRID SANs varies from each other.
3. Delete the added encoding devices in step 2.
4. Add schedules for encoding devices in backup HYBRID SAN the same as schedule in master HYBRID SAN.

**Steps:**
1. Click the Add Master HYBRID SAN button.
2. Enter master HYBRID SAN IP address.

3. Click OK to add. The added master HYBRID SAN is listed in HYBRID SAN master list.

4. Enter Maximum Taking Over Number and click Modify. If maximum taken-over master HYBRID SAN is 4 and 7 master HYBRID SANs are added, when 5 master HYBRID SANs are abnormal, the backup HYBRID SAN would take over the first added 4 master HYBRID SANs. After one or more of the 4 HYBRID SANs recovers, other master HYBRID SANs would be taken over.

NOTE

The max. taken-over number cannot be more than 10. If input 0 or input nothing, system regards it as 10.

<table>
<thead>
<tr>
<th>Backup HYBRID SAN Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby</td>
<td>When master HYBRID SAN is normal, backup HYBRID SAN is standby.</td>
</tr>
<tr>
<td>Working</td>
<td>When master HYBRID SAN is abnormal, backup HYBRID SAN takes over the tasks. Now backup HYBRID SAN status is working and master HYBRID SAN status is taken-over. When master HYBRID SAN recovers, backup HYBRID SAN recovers to standby.</td>
</tr>
</tbody>
</table>
Chapter 7  HYBRID SAN  Sub-System

**Purpose:**
You can configure the parameters for HYBRID SAN sub-system.

**Table 7.1 Module Description**

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td>Encoding device, record schedule, and record volume information are listed.</td>
</tr>
<tr>
<td>Encoding Device</td>
<td>You can add and manage encoding devices, adjust HYBRID SAN sub-system time, count remaining recording capacity, and analyze video loss.</td>
</tr>
<tr>
<td>Preview and Record</td>
<td>You can view encoding device status and live view image, and start and stop manual record of one or more encoding devices.</td>
</tr>
<tr>
<td>Strategy and Alarm</td>
<td>You can configure recording schedule, create uploading task and schedule, and configure alarm parameter.</td>
</tr>
<tr>
<td>Download and play</td>
<td>You can search, archive, backup, lock, play, and download recorded videos.</td>
</tr>
<tr>
<td>User Management</td>
<td>You can switch system language and edit display rows in each page.</td>
</tr>
<tr>
<td>System Config</td>
<td>You can configure system alarms and view HYBRID SAN version.</td>
</tr>
<tr>
<td>Log Management</td>
<td>Log helps you figure out HYBRID SAN history actions. You can search, export, and clear logs.</td>
</tr>
</tbody>
</table>

**Key Words:**
Information, Encoding Device, Preview and Record, Strategy and Alarm, Download and play, User Management, System Config, Log Management

*Figure 7.2 HYBRID SAN Sub-System*
7.1 Access by Web Browser

Steps:
1. Open web browser.
3. Press Enter. Then login interface appears.
4. Enter Password of HYBRID SAN sub-system and click Login to log in.

**STRONG PASSWORD RECOMMENDED**—We highly recommend you create a strong password of your own choosing (Using a minimum of 8 characters, including at least three of the following categories: upper case letters, lower case letters, numbers, and special characters.) in order to increase the security of your product. And we recommend you reset your password regularly, especially in the high security system, resetting the password monthly or weekly can better protect your product.

7.2 Information

**Purpose:**
Encoding device, record schedule, and record volume information are listed.

**Step:**
Click Information in navigation bar.
Table 7.2 Status Description

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free</td>
<td>Connection is normal and it is recording.</td>
</tr>
<tr>
<td>No video input</td>
<td>It appears when encoding device amount reaches the limit or HYBRID SAN is rebooting.</td>
</tr>
<tr>
<td>Recording</td>
<td>Encoding device is recording.</td>
</tr>
<tr>
<td>Password or user name error</td>
<td>Incorrect user name or password for encoding device.</td>
</tr>
<tr>
<td>Not load</td>
<td>When HYBRID SAN starts, loading encoding device failed.</td>
</tr>
<tr>
<td>Unknown</td>
<td>HYBRID SAN is error.</td>
</tr>
<tr>
<td>Not connected</td>
<td>Failed to get stream for encoding device.</td>
</tr>
<tr>
<td>Recording... Archiving</td>
<td>Encoding device is recording and archiving.</td>
</tr>
<tr>
<td>Recording... Uploading</td>
<td>Encoding device is recording and receiving videos from front-end devices.</td>
</tr>
<tr>
<td>Archiving</td>
<td>Encoding device isn’t recording, but is archiving.</td>
</tr>
<tr>
<td>Uploading</td>
<td>Encoding device isn’t recording, but is receiving videos from cameras.</td>
</tr>
</tbody>
</table>

7.3 Encoding Device

Purpose:
You can add and manage encoding devices, adjust HYBRID SAN sub-system time, count remaining recording capacity, and analyze video loss.

Step:
Click Encoding Device in navigation bar.

7.3.2 Adding Encoding Device

Steps:
1. Click Add Encoding Device.
2. Enter Encoding Device Name.
3. According to encoding device acutal parameters, select Encoding Device Type, enter IP/Host, Port, Channel, Login user, and Password.
4. Optionally, you can enable stream media server by checking the checkbox of Enable SMS (Stream Media System), inputting IP address:port (e.g., 192.168.0.2:554) in SMS, and select URL Mark and Transmission Method.
5. Optionally, you can enable other function according to your needs.
   - Enable streaming according to needs: The storage system releases occupied bandwidth, when no
stream requirement for the encoding device. If selected, the encoding device Attribute marks as P.

- **ANR (Automatic Network Replenishment):** When the storage system disconnects with the encoding device, the encoding device records video and stores in its own storage device, like SD card. Once connection recovers, encoding device sends the video to the storage system. If selected, the encoding device Attribute marks as T.

- **Enable sub-stream to preview and record:** If selected, when you preview and record via sub-stream, it takes lower bandwidth. But sub-stream video quality and bitrate is lower than main stream. And the encoding device Attribute would mark as S. If record strategy exists, HYBRID SAN gets stream according to strategy.

- **Enable Arming:** If selected, when alarm occurs to encoding device, HYBRID SAN can trigger alarm record. And the encoding device Attribute would mark as A.

6. Select related record volume in **Link to Record Volume**.
7. Click **OK** and click **OK** in confirmation dialog box to add the encoding device.

![Figure 7. 6 Add Encoding Device](image)

- Repeat above steps to add more encoding devices. Up to 1024 encoding devices can be added.
- If the encoding device you add isn’t in the List of Compatible of Encoding Device, the Attribute would mark as B. You can ask technical support for the List of Compatible of Encoding Device.

### 7.3.3 Modifying and Deleting

**Steps:**
- To delete encoding devices, do following steps:
  1. Check the checkbox of encoding device you want to delete.
  2. Click **Delete encoding device**.
To modify encoding device parameters, do following steps:
1. Click of encoding device you want to modify.
2. Edit the parameters you want to modify.
3. Click OK and click OK in confirmation dialog box to save the settings.

To modify linked record volume, do following steps:
1. Check the checkbox encoding device you want to modify.
2. Select the target record volume in the dropdown list.

### 7.3.4 Exporting and Importing Encoding Device

**Purpose:**
For the purpose of modifying a large number of encoding device in batch, you can export them, modify their parameters, and import them back to HYBRID SAN sub-system.

**Steps:**
1. To export encoding devices, do following steps:
   1. Click Export and click OK in confirmation dialog box.
   2. Select file saving path and click OK to save it.

   The exported file is a .csv file. You can view and edit it via Microsoft Excel. The content of exported file is shown in [Figure 7.8 Exported File](#).

2. To import encoding devices, do following steps:
   1. Click Import.
   2. Click Browse and select the target file.
   3. Optionally, you can select the **Operation Options**.
      - **Update Duplicate Device**: When the contents of HOST and CHANNEL column of several encoding devices are the same, HYBRID SAN judges them as duplicate encoding device. If it is selected, HYBRID SAN would add all of the duplicate encoding devices and update the previous encoding devices' parameters. Or duplicated wouldn't be added.
      - **Update encoding device with the same name**: If selected, when encoding devices in HYBRID SAN sub-system and importing file share the same name, once imported, the encoding devices in importing file would replace the one in HYBRID SAN sub-system.
> **Auto link record volume**: If selected, when encoding devices in importing file have no linked record volume, once imported they would link to the first record volume in HYBRID SAN sub-system.

> **Auto Rename**: If selected, when duplicated name exists during add and modifying, the name of added encoding devices would be renamed as “previous name _1”.

4. Click **OK** and click **OK** in confirmation dialog box to import. The encoding device list would be updated according to imported file.

![Import](image)

Figure 7.9 Import

### 7.4 Previewing and Recording

**Purpose:**

Do following steps to start or stop recording manually.

**Steps:**

Click **Preview and Record** in navigation bar.

![Preview and Record](image)

Figure 7.10 Preview and Record

- To start or stop manual recording for specified encoding devices, do following steps:
  1. Check the checkboxes of encoding devices you want to start manual record.
  2. Click **Turn on videos** to start recording. And you can click **turn off videos** to stop recording.

- To start or stop manual recording for all encoding devices, do following step:
  1. Click **Turn on All** to start recording for all. And you can click **Turn off All** to stop recording for all.

![NOTE](image)

If the encoding device is recording according to record schedule, click Stop recording or All stop wouldn’t stop recording, for record schedule would start recording again. For schedule details, refer to 7.5 *Strategy and Alarm.*
7.5 Strategy and Alarm

**Purpose:**
You can configure recording schedule, create uploading task and schedule, and configure alarm parameter.

**Step:**
Click **Strategy and Alarm** in navigation bar.

![Strategy and Alarm](image)

Figure 7.11 Strategy and Alarm

### 7.5.1 Record Plan

**Purpose:**
Set the record plan, and then the encoding devices automatically starts and stops recording according to the configured plan.

**Step:**
Click **Record Strategy** in navigation bar.

![Record Strategy](image)

Figure 7.12 Record Strategy

It is recommended to configure either simple record plan or advanced record plan.
7.5.1.2 Simple Record Plan

**Purpose:**
Set the simple record plan, and then the specified encoding devices automatically start/stop recording according to the configured plan.

**Steps:**
1. Click **Create record plan**.
2. Enter in the encoding device name and click **OK** to select the encoding device. Repeat the step to add more. Or select encoding devices or groups in the list.

![Select Encoding Devices](image)

Figure 7. 13 Select Encoding Devices

3. Select the **Date** on which you want to set schedule.

![Date Selection](image)

Figure 7. 14 Date

4. In **Record mode**, to schedule an all-day recording, check the checkbox of **Whole-day Video**. Or you can select the one or more time segments to set start time and end time.

![Record Mode](image)

Figure 7. 15 Record

Up to 8 periods can be configured for each day. And the time periods can’t be overlapped with each other.

5. Optionally, you can select one or more **Dispatch options**.
   - **Disabled by Default**: If selected, schedule status is **Stopped**. And encoding device wouldn’t start recording. Other Schedule options wouldn’t take effective.
   - **Not execute record dispatch**: If selected, encoding device wouldn’t start recording. Other Schedule options
wouldn’t take effective.

- **Copy back**: If selected and uploading schedule exists, the camera video would upload to HYBRID SAN. For details of configuring uploading schedule, refer to chapter 7.5.2.3 Adding Upload.
- **Disable alarm pre-record**: Pre-record refers to the time you set to record before the scheduled time or event. If selected, pre-record is turned off.
- **Disable alarm arming**: If selected, when encoding device is error, HYBRID SAN wouldn’t alarm.
- **Lock**: If selected, you need to set locking time as a specified duration or keep locking. During locking time, videos wouldn’t be overlapped. Locking time must be longer than duration time.
- **Use sub stream to record**: If selected, encoding device records via sub-stream instead of main stream.

### 7.5.1.3 Advanced Record Plan

**Purpose:**
By setting advanced record plan, you can specify the start recording time and recording duration for designated.

**Steps:**
1. Click **Advanced Strategy**.
2. Enter in the encoding device name and click **OK** to select the encoding device. Repeat the step to add more. Or select encoding devices or groups in the list.

![Select Encoding Devices](image)

**Figure 7.16 Select Encoding Devices**

3. Select **Start time** by **Instant Recording** or **Preset Time**.
   - **Instant Recording**: Starts recording once schedule is added.
   - **Preset Time**: Starts recording at the set time.
4. Select **Duration** unit as **Week, Day, Hour, Minute, or Second** and enter number.
   - **Duration**: Keeps recording during the time.

![Start Time and Duration Time](image)

**Figure 7.17 Start Time and Duration Time**

5. Optionally, you can select one or more **Dispatch options**. For details, refer to step 5 of 7.5.1.2 Simple Record Plan.
6. Select **Use Strategy** and set the end time.

**NOTE**
If Schedule is set as hour, minute, or customized, locking in schedule options is not selectable.
7. Click **OK** to save the schedule. Then before the end time, the selected encoding devices would repeatedly start recording at set start time and stop recording till the duration time.

### 7.5.1.4 Exporting and Importing Advanced Record Plan

**Purpose:**
For the purpose of managing advanced schedules in batch, you can export them, modify their parameters, and import them back to HYBRID SAN sub-system.

**Step:**
For detailed steps, you can refer to **chapter 7.3.4 Exporting and Importing Encoding Device**.

### 7.5.2 Upload Strategy

**Purpose:**
When videos in HYBRID SAN lost, and the lost videos exist in encoding devices. You can upload the videos back to HYBRID SAN.

**Step:**
Click **Strategy and Alarm** in navigation bar and choose **Upload Strategy**.

![Figure 7.18 Upload Strategy](image)

#### 7.5.2.1 Basic Settings

**Steps:**
1. Click **Basic Configuration**.
2. Enter **Detection Start Time**, **Detection End Time**, **Max. Camera Number**, and **Max. Uploading Camera for One DVR**.
   - **Detection Window Start Time**: Start time of detecting uploading.
   - **Detection Window End Time**: End time of detecting uploading. Videos ranges from detection start time to end time would be uploaded.
   - **Upload Channel max limit**: The maximum cameras that could upload simultaneously.
   - **Single DVR Uploading Max Limit**: The maximum cameras in a DVR that could upload simultaneously.
7.5.2.2 Adding Uploading Tasks

**Purpose:**
When videos in HYBRID SAN are lost, and the lost videos exist in encoding devices. You can upload the videos back to HYBRID SAN by adding uploading tasks.

**Steps:**
1. Click **Add Upload Task**.
2. Enter the encoding device name and click **OK** to select the encoding device. Repeat the step to add more. Or select encoding devices or groups in the list.
3. Set the **Video Start time** and **Video End time** of video you want to upload.
4. Click **OK** to add the task. Then if encoding device contains the video, it starts uploading the video to HYBRID SAN.

7.5.2.3 Adding Upload Plan

**Purpose:**
Uploading schedule can judge whether video loss happens during record schedule. Configure the uploading schedule to upload the videos saved in encoding devices back to HYBRID SAN.

**Before you start:**

Ensure pulling back data from encoding device in schedule options is selected when configuring basic or advanced schedule. For detailed steps, refer to *chapter 7.5.1.2 Simple Record Plan* and *chapter 7.5.1.3 Advanced*.

**Steps:**

1. Click **Add Upload Plan**.
2. Enter the encoding device name and click **OK** to select the encoding device. Repeat the step to add more.
   
   Or select encoding devices or groups in the list.

   ![Select Encoding Devices](image)

   **Figure 7.22 Select Encoding Devices**

3. Select the date on which you want to set schedule.

4. In **Upload mode**, to schedule an all-day uploading, check the checkbox of **All-day Upload**.
   
   Or you can select the one or more time segments to set start time and end time.

   ![NOTE]

   **Up to 8 periods can be configured for each day. And the time periods can’t be overlapped with each other.**

5. Click **OK** to add the schedule. Then selected encoding devices only upload videos during the set date and time segments.

**7.5.3 Alarm**

**Purpose:**

You can set the recording time for alarm events.

**Before you start:**

Enable alarm events you want to pay attention in encoding devices first. For details, refer to user manual of encoding device.

**Steps:**

1. Click **Strategy and Alarm** in navigation bar and choose **Alarm**.
2. Click **Set Alarm Configuration**.
3. Enter the encoding device name and click **OK** to select the encoding device. Repeat the step to add more. Or select encoding devices or groups in the list.

4. Enter **Trigger Recording (Archive) Duration** for alarm types you want to pay attention. Valid Duration ranges from 5 to 9999. Then when an alarm occurs, HYBRID SAN starts recording for the set Duration. The supported alarm types include Signal Source, Motion Detection, Video Tampering, Border Cross, Wrong Direction, Unattended Baggage, and Object Loss.

5. Optionally, you can check the checkbox of **Archive** of alarm types. Then the alarm videos can be viewed in Archive Search interface.

6. Click **OK** to save the settings.
7.6 Playing and Downloading

**Purpose:**
You can search, archive, backup, lock, play, and download recorded videos.

**Step:**
Click **Download and Play** in navigation bar.

![Download and Play](image)

**Figure 7.26 Download and Play**

### 7.6.1 Searching Video

**Steps:**
1. Click **Search Video**.
2. Enter the encoding device name and click **OK** to select the encoding device. Repeat the step to add more.
   Or select encoding devices or groups in the list.
3. Specify the search conditions including **Start Time**, **End Time**, **Record Type**, **Search Type**, and **Display locktime** (whether it is a locked video).
4. Click **OK** to start search. And the videos meet the search conditions would be listed.

![Select Encoding Devices](image)

**Figure 7.27 Select Encoding Devices**

### 7.6.2 Locking Videos

**Purpose:**
The locked videos will not be overlapped by other videos.

**Before you start:**
Search videos first.

**Steps:**
1. Check the checkboxes of videos you want to lock. Not more than 100 videos can be selected.
2. Click **Lock Configuration**.
3. Select lock mode as **Unlock**, **Lock last**, or **Lock time**.
   - **Unlock**: If selected, the locked video would be unlocked.
   - **Always Locked**: If selected, the video is locked permanently.
   - **Lock Duration**: If selected, you need to set the locking time. Then the video would be locked from the video start time for the set time.

![Lock Configuration](image)

**Figure 7.28 Lock Mode**

### 7.6.3 Playing Videos

*Purpose:*
Play back videos to view the history image.

*Before you start:*
- Search videos first.
- Add IP address of HYBRID SAN to web browser trusted sites and enable all of ActiveX controls and plug-ins.

1. Enter Trusted Sites menu.
   - Tools > Internet Options > Security > Trusted Sites
2. Click button, enter https://IP address of HYBRID SAN , click Add, and click Close to go back to upper menu.

3. Click button, enable all of ActiveX controls and plug-ins, click OK to save and go back to upper menu.

4. Click OK to save the settings.

### 7.6.3.2 Whole Video Playback

**Purpose:**
Play the original video.

**Steps:**
1. Check the checkboxes of videos you want to play. Not more than 16 videos can be selected.
2. Click Video Playback. And another window pops up. You can view the playback image.
3. You can play all selected videos by clicking **Play All** in the upper-right corner.

### 7.6.4 Downloading Videos

**Purpose:**
Save the videos to the computer by downloading them.

**Before you start:**
Search videos first.

#### 7.6.4.1 One-Key Downloading

**Step:**
Click ![download_icon](download_icon.png) button and select the saving path to save a single video.

#### 7.6.4.2 Block Downloading

**Steps:**
Click ![download_block_icon](download_block_icon.png) button and click **Complete Download** to download.
7.6.4.3 Batch Downloading

Steps:
1. Check the checkboxes of videos you want to download.
2. Click the button to pop up batch downloading interface.
3. Click the button to select saving path.
4. Select downloading mode as By single-task or By multi-task.
   - By single-task: Download one video at a time.
   - By multi-task: Download several videos simultaneously. The maximum downloading video amount is Max. number of tasks whose valid range is from 1 to 5.
5. Click Start to start downloading. You can click Stop to stop downloading.
7.7 User

*Purpose:* You can switch system language and edit display rows in each page.

*Steps:*
1. Click User Management in navigation bar.
2. To modify Interface language, select language in the dropdown list.
3. To modify the display rows in each page, select number in the dropdown list of Number of table rows shown in each page.
4. Click Upload Configuration to save the changes.

![User Management -> Personal Set](image)

Figure 7.33 User

7.8 System Configuration

*Purpose:* You can configure system alarms and view HYBRID SAN version.

*Step:*
Click System Config in navigation bar.

7.8.1 System Alarm

*Purpose:* You can set linkage actions for alarm type, specify alarm type for alarm events, and turn on or turn off status alarm.

*Steps:*
1. Click System in navigation bar and choose System Alarm to enter System Alarm interface.
2. Alarm type includes Info (Information), Warning, Error, and Fatal. Specify 3 linkage actions for the 4 alarm types.
3. Specify alarm type for alarm events.

4. Turn on or turn off status alarm.

5. Click **Submit** to save the settings.

### 7.8.2 HYBRID SAN Version

**Purpose:**
You can view HYBRID SAN version, HYBRID SAN library version, and HYBRID SAN other version.

**Step:**
Click **System Config** in navigation bar and choose **Version**.
7.9 Log Management

Purpose:
Log helps you figure out HYBRID SAN history actions. You can search, export, and clear logs.

Step:
Click Log Management in navigation bar to enter Log Management interface.

Figure 7.38 Log Management

7.9.1 Searching Log

Steps:
1. Click Search log.
2. Specify the search condition including Log type, Start time, End time, and Including Characters.
3. Click OK to start search. The matched logs would be listed.
7.9.2 Exporting Log

**Purpose:**
You can export the listed logs to local HDD.

**Before you start:**
Search the logs you want to export.

**Step:**
Click Export All Logs and choose the saving path to save it.

![NOTE]

The exported logs are integrated in a .csv file.

7.9.3 Clearing Log

**Step:**
Click Clear All System Logs and click OK in popup confirmation dialog box to clear all logs saved in HYBRID SAN sub-system.
Chapter 8  System

**Purpose:**
You can configure network parameters, alarm triggered action, system time, modify system password, and so forth.

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network</td>
<td>You can:</td>
</tr>
<tr>
<td></td>
<td>● Modify the configuration of management network interface and data network interfaces.</td>
</tr>
<tr>
<td></td>
<td>● Bond data network interfaces.</td>
</tr>
<tr>
<td></td>
<td>● Remotely access the storage system via a specified gateway.</td>
</tr>
<tr>
<td></td>
<td>● Edit DNS server IP address, bond mode, and network work speed.</td>
</tr>
<tr>
<td>Alarm</td>
<td>You can:</td>
</tr>
<tr>
<td></td>
<td>● Send the storage system alarms to client via e-mail or SNMP manager.</td>
</tr>
<tr>
<td>Time</td>
<td>You can:</td>
</tr>
<tr>
<td></td>
<td>● Manually or automatically adjust system time.</td>
</tr>
<tr>
<td>Power Supply</td>
<td>You can:</td>
</tr>
<tr>
<td></td>
<td>● View UPS mode.</td>
</tr>
<tr>
<td></td>
<td>● Modify UPS power-off time.</td>
</tr>
<tr>
<td></td>
<td>● Modify supported UPS manufacturer.</td>
</tr>
<tr>
<td>Management Tool</td>
<td>You can:</td>
</tr>
<tr>
<td></td>
<td>● Modify user password.</td>
</tr>
<tr>
<td></td>
<td>● Configure SMTP parameters.</td>
</tr>
<tr>
<td></td>
<td>● Test network communication between the storage system and a specified IP address.</td>
</tr>
<tr>
<td></td>
<td>● Update the storage system.</td>
</tr>
<tr>
<td></td>
<td>● View service status.</td>
</tr>
</tbody>
</table>

**Keywords:**
Network, Alarm, Time, Power Supply, Tool
8.1 Network

Purpose:
The storage system provides one management network interface and two data network interfaces. The management network interface is designed for configuring the data network interface and device maintenance. The data network interfaces are used to transmit data.

Step:
Click System in navigation bar and choose Network.

![Figure 8.3 Network](image)

8.1.1 Modifying Data Network Interface

Steps:
1. Check the checkbox of data network interface.
2. Click ![Modify] in Basic Network Interface list.
3. Enter the new IP Address and Subnet Mask and select MTU in dropdown list.
   MTU (Maximum Transmission Unit): Select MTU as larger than 1500 byte for the purpose of improving transmission performance.
4. Click OK to save the settings.

8.1.2 Binding Network Interfaces

Purpose:
When transmitting data via a single data network interface, once the data network interface fails, data transmission stops. By bonding multiple data network interfaces into one, they can share one IP address, thus to balance network load and create redundant links. When transmitting data via a bound network interface, once a data network interface fails, other data network interfaces take over the transmission task.

- The management network interface does not support bond.
- The IP addresss of bound network interface is the same as the first data network interface.

Before you start:
Connect all data network interfaces to network via network cables.

### 8.1.2.1 Creating Bond

**Steps:**
1. Check the checkboxes of data network interfaces in Basic Network Interface list.
2. Click **Bind Network Interface** and click **OK** in confirmation dialog box.

![Figure 8. 4 Bound Network Interface Information](image)

### 8.1.2.2 Deleting Bond

**Steps:**
1. Check the bound network interface checkbox.
2. Click ![Delete](image) and click **OK** in confirmation dialog box. Then the bound network interface is recovered to several data network interfaces.

![Figure 8. 5 Confirmation Dialog Box](image)

### 8.1.2.3 Modifying Bonding Mode

For detailed information and steps, refer to section 8.1.5.2 **Binding Mode**.

### 8.1.3 Adding Route

**Purpose:**
By default, the route is empty, clients in different network segment access the storage system via the default gateway. If you want to access the storage system via a specified gateway, add route here.

**Steps:**
1. Click **Add Route Info** in Custom Route Information list.
2. Input **Route IP Address**, **Subnet Mask**, and **Default Gateway**. The client server within Route IP address can access the storage system via the Default Gateway.

3. Select **Bound data Network Interface** in the dropdown list.

4. Click **OK** to add the route. Thus the client server within 10.128.50.1 to 10.128.50.55 can access the storage system via the bound network interface 1 whose the gateway is 192.168.0.2.

### 8.1.4 MAC and IP Bonding

**Purpose:**
Only client with the specified MAC address and IP address is allowed to get access to iSCSI HDD.

**Steps:**
1. Click **MAC&IP Bonding**.

2. **Input target Client IP Address and MAC Address.**

   ![NOTE]

   Ensure the client IP is in the same network segment with the storage system.

3. Click **OK** and click **OK** in pop up confirmation box to create bond.

### 8.1.5 Advanced Parameters

**Purpose:**
You can configure DNS server, bond mode, and network work speed parameters.

### 8.1.5.1 DNS Server

**Purpose:**
You are required to add DNS server IP address if you need to access external network.

**Steps:**
1. Click **Modify** of **Preferred DNS Server**.
2. Enter IP address in text field.
3. Click **OK** and click **OK** in confirmation dialog box to save the settings.

![Figure 8. 8 DNS Server](image.png)

### 8.1.5.2 Binding Mode

**Purpose:**
The selection of bond mode is related to actual application and network situation. Up to seven types of bond modes are provided. For details, refer to Table 8.2 **Bonding Mode Description**.

**Steps:**
1. Click **Modify** of **NIC Binding Mode**.
2. Select bond mode in dropdown list. Up to 7 bond modes are selectable.
3. Click **OK** and click **OK** in confirmation dialog box to save the settings.

![Figure 8. 9 NIC Binding Mode](image.png)

**Table 8.2 Bonding Mode Description**

<table>
<thead>
<tr>
<th>Bond Mode</th>
<th>Description</th>
</tr>
</thead>
</table>
| Round-robin     | • Definition:  
|                 |   ➢ All data network interfaces sends and receives data in turn.  
|                 |   ➢ When using the mode, it is recommended to apply protocols except TCP/IP.  
|                 | • Advantage:  
|                 |   ➢ Load balance.  
|                 |   ➢ All data network interfaces are fully used.  
|                 |   ➢ There is no requirement about hardware like network switch.  
|                 | • Disadvantage:  
|                 |   ➢ The order of received data is uncertain.  
<p>|                 |   ➢ Low network throughput.  |
| Active-Backup   | • Definition: The default bond mode. Transmits data via a specified data network interface, other data network interfaces are standby. Only when the specified data network interface fails, another standby data network interface takes over |</p>
<table>
<thead>
<tr>
<th>Bond Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transmission</strong></td>
<td>Task.</td>
</tr>
</tbody>
</table>
| • **Advantage:** | - There is no requirement about hardware like network switch.  
- Redundant network links. |
| • **Disadvantage:** | - Load balance isn’t supported.  
- Uses only one data network interface at a time. Other data network interfaces aren’t fully used. |
| **XOR** | • Definition: The storage system can figure out the relationship between each data network interface and client MAC addresses. According to the relationship, the storage system transmits data to clients with corresponding data network interface. If the working data network interface fails, another data network interface takes over the task.  
- It is recommended to use this mode in a local area network. However, if data is transmitted via network gateway, don’t use the mode. |
| • **Advantage:** | - There is no requirement to hardware like network switch.  
- Balance the load in the local area network within a network switch. |
| • **Disadvantage:** | - Load balance isn’t supported in different local area network. |
| **Broadcast** | • Definition: All the data network interfaces transmit the same data. |
| • **Advantage:** | - There is no requirement about hardware like network switch.  
- Redundant network links.  
- Data network interfaces are fully used. |
| • **Disadvantage:** | - Load balance isn’t supported.  
- Low data network interface usage. |
| **802.3ad** | • Definition: The storage system figures out the relationship between each data network interface and clients’ MAC addresses according to Hash Algorithm. The storage system transmits data to client via corresponding data network interface. |
| • **Advantage:** | - Based on IEEE standard, devices in system can work efficiently if they are all 802.3ad mode.  
- Load balance.  
- Data network interfaces are fully used. |
| • **Disadvantage:** | - The storage system, network switch, and client server are all required to support 802.3ad mode. |
| **Tlb** | • Definition: The storage system allocates output traffic to each data network interfaces, according to current load. And transmits data to clients via different data network interfaces. If the working data network interface fails, another data network interface takes over the task. |
### Bond Mode

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
</table>
| **Advantage:**
| 1. Data network interfaces are fully used.
| 2. Load balance when sending data.
| **Disadvantage:** Load balance isn’t supported when receiving data.

### Virtualization

<table>
<thead>
<tr>
<th>Definition</th>
</tr>
</thead>
</table>
| **Definition:**
| 1. The storage system allocates input and output traffic to each data network interfaces, according to current load.
| 2. It is recommended to use the mode when sending and receiving data to multiple clients.
| **Advantage:**
| 1. Data network interfaces are fully used.
| 2. Load balance in both sending and receiving data.

### 8.1.5.3 Network Work Speed

**Purpose:**

It is the speed of all data network interfaces. The default network work speed is 100 Mb/s. It is recommended to set network work speed according to actual network situation.

**Steps:**

1. Click **Modify** of **Network Word Speed**.
2. Select **Network Work Speed** as **1000 Mb/s** or **100 Mb/s**.
3. Click **OK** and click **OK** in confirmation dialog box to save the settings.

### 8.2 Alarm

**Purpose:**

The storage system supports notifying you about the occurring alarms via e-mail and SMTP manager.

**Steps:**

Click **System** in navigation bar and choose **Alarm** to enter Network interface.

![Figure 8. 10 Alarm](image)

### 8.2.1 Alarm Type

**Purpose:**

The **Table 8. 3 Alarm Type Description** describes the supported alarm types and corresponding event level. E-mail
and SNMP manager support notifying you about the alarm types in Table 8. 3.

<table>
<thead>
<tr>
<th>Module</th>
<th>Alarm Type</th>
<th>Event Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>Controller power supply error</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Storage enclosure power supply error</td>
<td>Serious</td>
</tr>
<tr>
<td>Temperature</td>
<td>Temperature is too high</td>
<td>Warning</td>
</tr>
<tr>
<td></td>
<td>Temperature is high</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Temperature is too low</td>
<td>Serious</td>
</tr>
<tr>
<td>Fan</td>
<td>Fan speed is too low</td>
<td>Warning</td>
</tr>
<tr>
<td></td>
<td>Fan speed error</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Fan damaged or poor connection</td>
<td>Serious</td>
</tr>
<tr>
<td>Memory</td>
<td>Memory is used too much.</td>
<td>Warning</td>
</tr>
<tr>
<td>DOM card</td>
<td>Insufficient capacity</td>
<td>Serious</td>
</tr>
<tr>
<td>HDD</td>
<td>HDD loss</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>HDD warning</td>
<td>Warning</td>
</tr>
<tr>
<td></td>
<td>Bad HDD</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Risky HDD</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Drive kicked an HDD</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Array kicked an HDD</td>
<td>Serious</td>
</tr>
<tr>
<td>Array</td>
<td>Not available</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Degraded</td>
<td>Warning</td>
</tr>
<tr>
<td></td>
<td>Rebuilding</td>
<td>Warning</td>
</tr>
<tr>
<td>Storage system</td>
<td>Physical HDD loss</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Unknown physical HDD loss</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Storage pool unmounted</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>All storage pool lost</td>
<td>Serious</td>
</tr>
<tr>
<td>NAS</td>
<td>SAMBA error</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>NFS error</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>FTP error</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>AFP error</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>HTTP error</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>RSYNC error</td>
<td>Serious</td>
</tr>
<tr>
<td>iSCSI</td>
<td>iSCSI configurations mismatch</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>I/O error</td>
<td>Serious</td>
</tr>
<tr>
<td>Network</td>
<td>Data network interface %d unconnected</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Network speed of data network interface %d is 100M Ethernet.</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Single data network interface %d unconnected</td>
<td>Serious</td>
</tr>
<tr>
<td>Cluster</td>
<td>Cluster heartbeat communication error: network transmission failed</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Cluster resource network error: resource network</td>
<td>Serious</td>
</tr>
</tbody>
</table>

Table 8. 3 Alarm Type Description
8.2.2 Adding Email

Purpose:
Alarm messages are sent to receiving e-mails via sending e-mails.

Before you start:
Set DNS server first. Refer to section 8.1.5.1 DNS Server for detailed steps.

8.2.2.1 Sending Email

Steps:
1. Click **Configure SMTP** button.
2. Enter **User Name**, **Password**, **SMTP**, and **SMTP Port**.
   - **User Name**: sending e-mail account.
   - **Password**: sending e-mail password.
   - **SMTP**: sending e-mail server website.
   - **SMTP Port No.**: sending e-mail server port.
3. Click **OK** to add the sending e-mail.

![Configure Sending Email Address](image)

Figure 8. 11 Configure Sending Email

8.2.2.2 Receiving Email

Steps:
1. Click **Add Email User**.
2. Enter **Email** and **User Name**.
3. Choose **Event Level** as **Alarm Event** or **Serious Event**.
4. Click **OK** and click **OK** in confirmation dialog box to add the user. The added e-mail account is listed in List of email alarm users.
8.2.3 Testing Email

**Purpose:**
After sending and receiving e-mail are configured, you can test the communication between them.

**Steps:**
1. Check the checkbox of sending e-mail you want to test.
2. Click the **Test** button and click OK in confirmation dialog box to start test. The test result is listed in a message dialog box.

8.2.4 Adding SNMP Manager

**Purpose:**
SNMP manager can notify the SNMP-Trap software installed in your computer about the storage system alarm. When alarm occurs, alarm message pops up in SNMP-Trap software.

**Before you start:**
1. Install the SNMP-Trap software in your computer.
2. To receive alarm message in client, turn on Administration & Monitoring Tools in client.

**Steps:**
1. Click the **Add SNMP manager** button.
2. Enter **SNMP Manager** and **SNMP Port No.** in the text field.
3. **SNMP Version** is V2(V2C) by default and is not editable.
4. Choose **Event Level** as **System Log**, **Alarm Event**, **Error Event**, or **Serious Event**.
5. Click **OK** and click **OK** in conformation dialog box. The added SNMP manager is listed in SNMP manager list.

### 8.2.5 Testing SMTP Manager

**Purpose:**
You can test the network communication of SMTP manager.

**Steps:**
1. Check the checkbox of SMTP manager to test.
2. Click **Test** button and click **OK** to start test. Then test result pops up.

### 8.3 Time

**Purpose:**
System time is adjustable.

**Steps:**
Click **System** in navigation bar and choose **Time**.

![Figure 8. 14 Time Management](image)

**8.3.1 Adjusting System Time**

#### 8.3.1.1 Manual Adjust

**Steps:**
Do one or more of the following:
- Adjust **Time Zone**
1. Click Modify of Current System Time Zone.
2. Select time zone in the dropdown list.
3. Click OK and click OK in confirmation dialog box.
4. Click Modify of Current System Time.
5. Select date and time in text field.
6. Click OK and click OK in confirmation dialog box.

8.3.1.2 Auto Adjust

*Purpose*: The storage system automatically adjusts system time according to time server.

*Before you start*: Turn off the NTP server in client software.

*Steps*
1. Enter a correct **Time Server IP Address** in text field.
2. Click Enable of **NTP Server Status** to start auto time adjust.

![Figure 8. 15 Adjust Time Automatically]

8.3.2 Synchronizing Time

*Purpose*: You can configure time synchronization strategy.

*Before you start*: Turn off the NTP server in client software.

*Steps*
1. Click Enable of **Time Sync Strategy Status** (Synchronization Strategy Status).
2. Enter **Time Server IP Address** in text field.
3. Enter **Sync Cycle** (Synchronization Cycle) in text field.
4. Click **Configure** to start time synchronization.

![Figure 8. 16 Synchronize Time]
Chapter 9  Log

*Purpose:*

Table 9.1 Module Description

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Download</td>
<td>You can download logs by downloading mode.</td>
</tr>
<tr>
<td>Operation log</td>
<td>It records the content and time of each operation. Search, download, and clear logs are supported.</td>
</tr>
<tr>
<td>Performance log</td>
<td>The storage system records the performance logs at every ten minutes. Performance log includes messages of CPU usage, memory footprint, network traffic, and array read and writing speed.</td>
</tr>
<tr>
<td>Update log</td>
<td>It records the details information of every system update.</td>
</tr>
</tbody>
</table>

*Keywords:*

Log Download, Operation log, Performance log, Update log

![Log System]

Figure 9.2 System


9.1 Operation Log

**Purpose:**
Operation log records the content and time of each operation. Search, download, and clear logs are supported.

**Steps:**
Click Log in navigation bar and choose Operation Log to enter Operation Log interface. Do one or more of the following:

- **View Logs**
  - Click button to turn to previous/next page.
  - Click button to turn to the first/last page.
  - Or enter page number and click to go to the designated page.

- **Search Logs**
  1) To search by time, enter date and time you want to search in Search text field.
     To search by log type, select log type in dropdown list.
     
     **NOTE**
  2) Choose log type as All, Information, Warning, Error, or Serious in dropdown list.
  3) Click Search. Logs meet the search conditions would be listed in operation window.

- **Clear All Logs**
  - Click Clear Operation Log and click OK in popup dialog to confirm.

9.2 Performance Log

**Purpose:**
The storage system records the performance logs at every ten minutes. Performance log includes messages of CPU usage, memory footprint, network traffic, and array read and writing speed.

**Steps:**
1. Click Log in navigation bar and choose Operation Log to enter Operation Log interface.

2. For detailed steps of viewing and search performance logs, refer to section 9.1 Operation Log.

![Performance Log Image]

**9.3 Upgrade Log**

*Purpose:*

Update log records the details information of every system update.

*Steps:*

1. Click Log in navigation bar and choose Upgrade Log.
2. To view logs and search logs, refer to section 9.1 Operation Log for detailed steps.

![Upgrade Log Image]
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