Thecus VisoGuard

V2510/V4510/V4510U/V5510
V6810/V8810U/V16810U

User's Manual

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About This Manual

All information in this manual has been carefully verified to ensure its correctness. In case of an error, please provide us with your feedback. Thecus Technology Corporation reserves the right to modify the contents of this manual without notice.

Product name:
Thecus VisoGuard V2510/V4510/V6810/V4510U/V5510/V8810U/V16810U
Manual Version: 1.1
Release Date: March. 2013

Limited Warranty

Thecus Technology Corporation guarantees all components of Thecus NVR products are thoroughly tested before they leave the factory and should function normally under general usage. In case of any system malfunctions, Thecus Technology Corporation and its local representatives and dealers are responsible for repair without cost to the customer if the product fails within the warranty period and under normal usage. Thecus Technology Corporation is not responsible for any damage or loss of data deemed to be caused by its products. It is highly recommended that users conduct necessary back-up practices.

Check the functions that are available on your particular Thecus NVR model at:

http://www.Thecus.com

Safety Warnings

For your safety, please read and follow the following safety warnings:

- Read this manual thoroughly before attempting to set up your Thecus VisoGuard.
- Your Thecus VisoGuard is a complicated electronic device. DO NOT attempt to repair it under any circumstances. In the case of malfunction, turn off the power immediately and have it repaired at a qualified service center. Contact your vendor for details.
- DO NOT allow anything to rest on the power cord and DO NOT place the power cord in an area where it can be stepped on. Carefully place connecting cables to avoid stepping or tripping on them.
- Your Thecus VisoGuard can operate normally under temperatures between 5°C and 40°C, with relative humidity of 20% – 85%. Using Thecus VisoGuard under extreme environmental conditions could damage the unit.
- Ensure that the Thecus VisoGuard is provided with the correct supply voltage (AC 100V ~ 240V, 50/60 Hz). Plugging the Thecus VisoGuard to an incorrect power source could damage the unit.
- Do NOT expose Thecus VisoGuard to dampness, dust, or corrosive liquids.
- Do NOT place Thecus VisoGuard on any uneven surfaces.
- DO NOT place Thecus VisoGuard in direct sunlight or expose it to other heat sources.
- DO NOT use chemicals or aerosols to clean Thecus VisoGuard. Unplug the power cord and all connected cables before cleaning.
- DO NOT place any objects on the Thecus VisoGuard or obstruct its ventilation slots to avoid overheating the unit.
- Keep packaging out of the reach of children.
- If disposing of the device, please follow your local regulations for the safe disposal of electronic products to protect the environment.

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Chapter 1: Introduction

Overview

Thank you for choosing the Thecus VisoGuard Server. The Thecus VisoGuard is an easy-to-use NVR server that allows a dedicated approach to storing and distributing data on a network. Data reliability is ensured with RAID features that provide data security and recovery—over multiple Terabyte of storage are available using RAID 5 and RAID 6. Gigabit Ethernet ports enhance network efficiency, allowing Thecus VisoGuard to take over file management functions, increase application and data sharing and provide faster data response. The Thecus VisoGuard allows data consolidation and sharing between Windows (SMB/CIFS), and UNIX/Linux. The Thecus VisoGuard's user-friendly GUI supports multiple Languages.

Product Highlights

File Server

First and foremost, the Thecus VisoGuard allows you to store and share files over an IP network. With a Network Attached Storage (NVR) device, you can centralize your files and share them easily over your network. With the easy-to-use web-based interface, users on your network can access these files in a snap.

To learn about the Web User Interface, go to
Chapter 4: Using the Thecus VisoGuard > Web Administration Interface

FTP Server

With the built-in FTP Server, friends, clients, and customers can upload and download files to your Thecus VisoGuard over the Internet with their favorite FTP programs. You can create user accounts so that only authorized users have access.

To set up the FTP Server, refer to
Chapter 4: Network Service> FTP .

Superior Power Management

Thecus VisoGuard supports schedule power on/off. With this feature, administrator can set at what time to turn on or off the system. This feature is a big plus for people who want to conserve energy. Wake-On-LAN enables administrator to remotely turn on the system without even leaving their own seat.

To schedule system on and off, refer to
Chapter 4: System Management> Scheduled Power On/Off

Package Contents

V8810U/V16810U

The Thecus VisoGuard should contain the following common items:

- System Unit x1
- QIG (Quick Installation Guide) x1
- CD-Title
- Ethernet Cable x1
- Accessory bag x1
- HDD Compatibility list Card x1
- Multiple Languages Warranty Card x1
- Power cord x2

V2510/V4510/V4510U/V5510/V6810

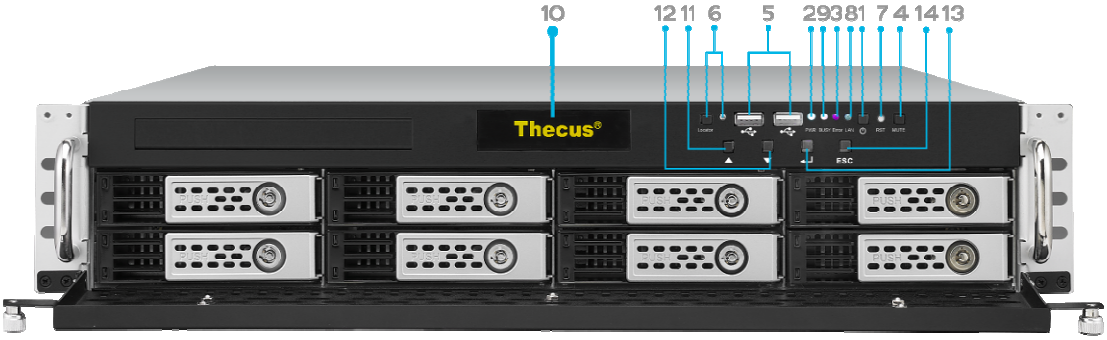
The Thecus VisoGuard should contain the following common items:

- System Unit x1
- QIG (Quick Installation Guide) x1
- CD-Title
- Ethernet Cable x1
- Accessory bag x1
- HDD Compatibility list Card x1
- Multiple Languages Warranty Card x1
- Power cord x1

Please check to see if your package is complete. If you find that some items are missing, contact your dealer.

Front Panel

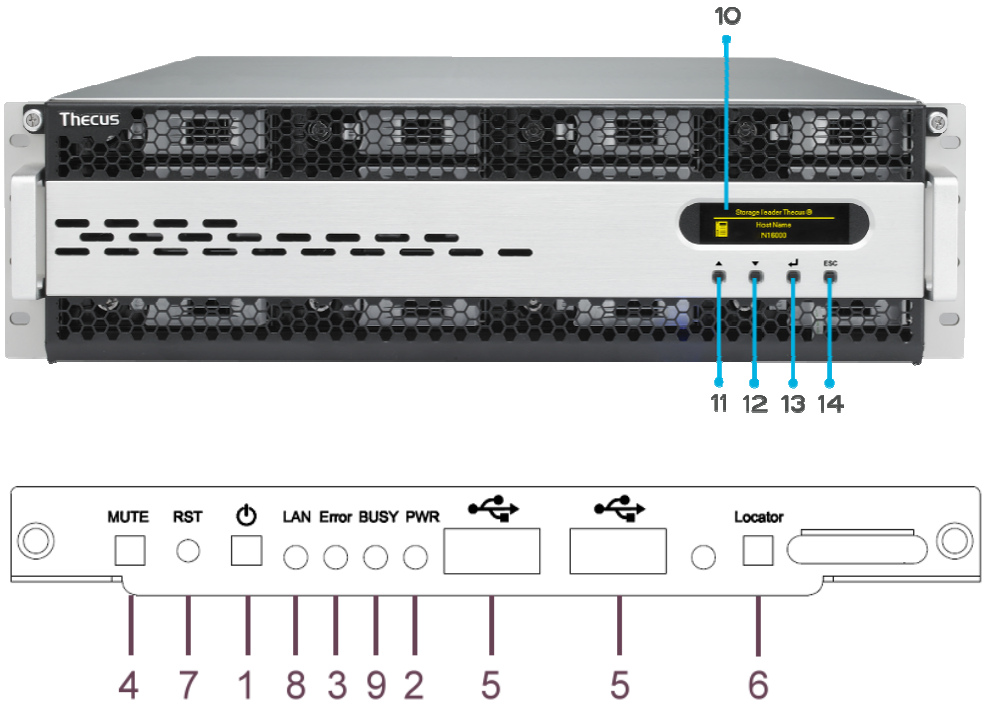
V8810U:



Front Panel	
Item	**Description**
1.Power Button	• Power on/off V8810U
2.Power LED	• **Solid green:** System is power on.
3.System error LED	• Solid RED: System error.
4.Mute button	• Mute the system fan alarm.
5.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks and USB printers
6. Locator button / LED	• Press the button, the back led will light up to identify the system position of the rack
7. RST	• Reboot system.
8. LAN	• Blinking green: network activity • Solid green: network link
9. BUSY	• Blinking orange: system startup or system maintenance; data currently inaccessible
10.OLED	• Displays current system status and messages • OLED screen saver will be enabled after screen is idle for more than 3 minutes • OLED screen will be turn off after idle for more than 6 minutes
11.Up Button ▲	• Push to scroll up when using the OLED display
12.Down Button ▼	• Push to enter USB copy operation screen
13.Enter Button ↵	• Push to enter OLED operate password for basic system setting
14.Escape Button **ESC**	• Push to leave the current OLED menu

V16810U:

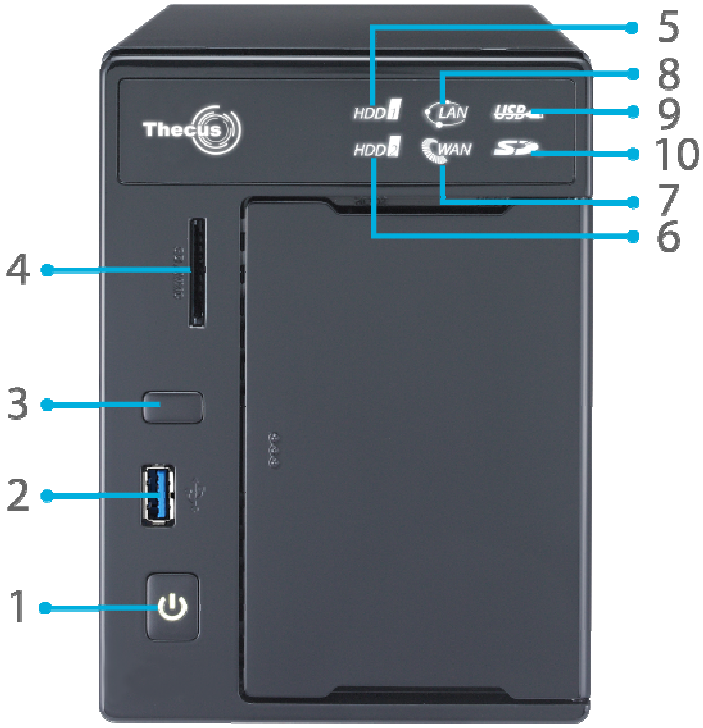
The Thecus V16810U front panel has the device's controls, indicators, and hard disk trays:



Front Panel	
Item	**Description**
1.Power Button	• Power on/off V16810U
2.Power LED	• **Solid green:** System is power on.
3.System error LED	• Solid RED: System error.
4.Mute button	• Mute the system fan alarm.
5.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks and USB printers
6. Locator button / LED	• Press the button, the back led will light up to identify the rack position of the system
7. RST	• Reboot system.
8. LAN	• Blinking green: network activity • Solid green: network link
9. BUSY	• Blinking orange: system startup or system maintenance; data currently inaccessible
10.OLED	• Displays current system status and messages • OLED screen saver will be enabled after screen is idle for more than 3 minutes • OLED screen will be turn off after idle for more than 6 minutes
11.Up Button ▲	• Push to scroll up when using the OLED display
12.Down Button ▼	• Push to enter USB copy operation screen
13.Enter Button ↵	• Push to enter OLED operate password for basic system setting
14.Escape Button **ESC**	• Push to leave the current OLED menu

V2510:

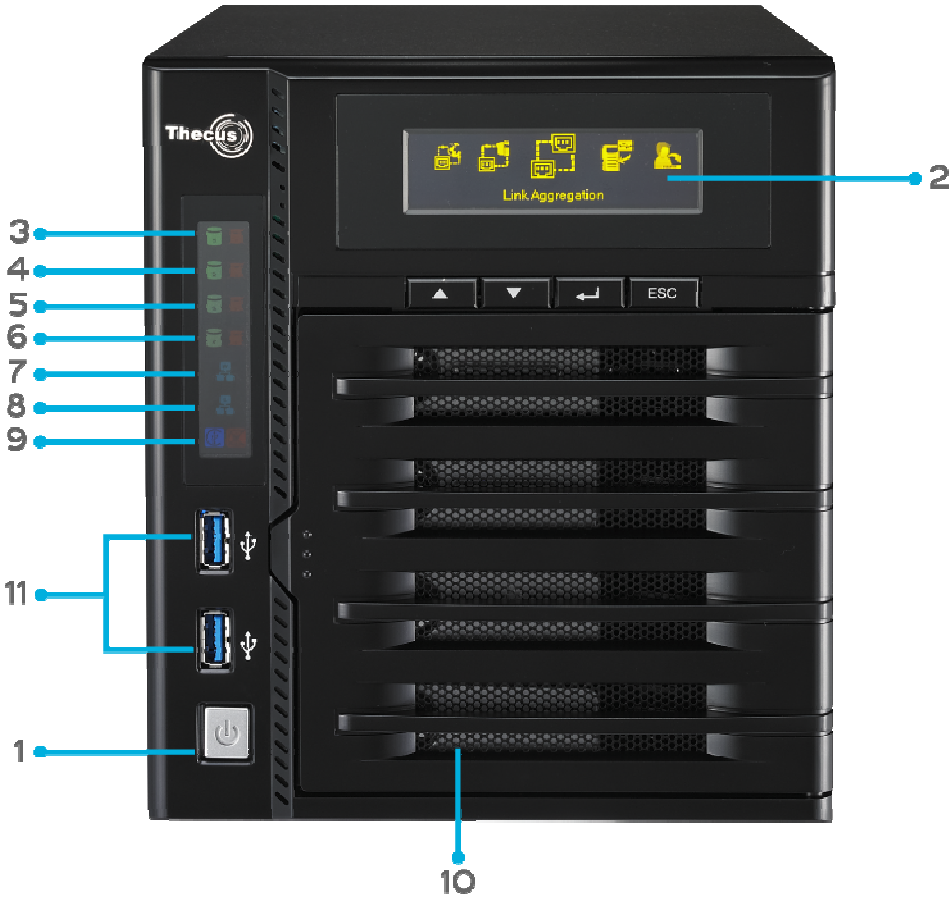
The Thecus V2510's front panel has the device's controls, indicators, and hard disk trays:



Front Panel	
Item	**Description**
1. Power Button	• Powers the V2510 on/off.
2. USB Port	• USB 3.0 port for compatible USB devices, such as digital cameras, USB disks, and USB printers.
3. USB Copy Button	• Copies USB storage contents to V2510.
4. Card reader	• Supports SD/SDHC/MMC cards via USB interface.
5. HDD1 led	• **Blinking white:** HDD activity
6. HDD2 led	• **Blinking white:** HDD activity
7. WAN led	• **Solid white:** WAN Cable link • **Blinking white:** Network activity
8. LAN led	• **Solid white:** LAN Cable link • **Blinking :** Network activity
9. USB Copy led	• **Blinking white:** USB copy activity
10. Card reader led	• **Blinking white:** Card reader copy activity

V4510:

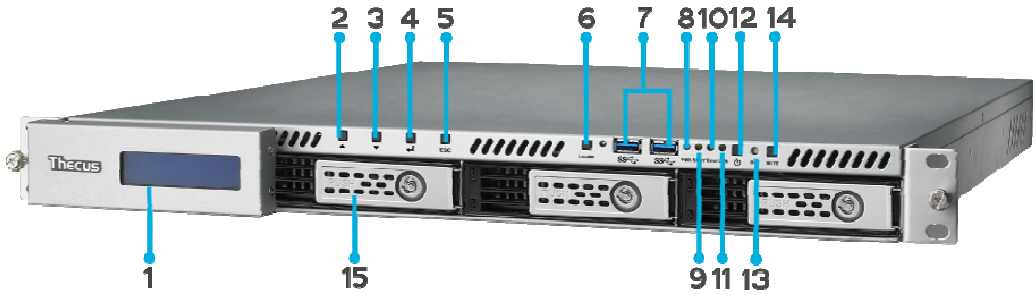
The Thecus V4510 front panel has the device's controls, indicators, and hard disk trays:



Front Panel		
Item	**Description**	
1.Power Button	• Power on/off V4510	
2.OLED	• Displays current system status and messages • OLED screen saver will be enabled after screen is left idle for more than 3 mins • OLED screen will be diabled after it is left idle for more than 6 mins	
OLED	3.HDD 1 LED	• **Yellow:** HDD activity • **Red:** HDD failure
	4.HDD 2 LED	• **Yellow:** HDD activity • **Red:** HDD failure
	5.HDD 3 LED	• **Yellow:** HDD activity • **Red:** HDD failure
	6.HDD 4 LED	• **Yellow:** HDD activity • **Red:** HDD failure
	7.WAN/LAN1 LED	• **Blinking green:** network activity
	8.LAN2 LED	• **Blinking green:** network activity
	9.USB Copy	• **Blue:** USB Copy activity • **Red:** USB Copy failure
10.HDD Tray	• Four HDD trays support 4x 3.5" or 4 x 2.5" HDDs	
11. USB Port	• USB 3.0 port for compatible USB devices, such as USB disks.	

V4510U:

The Thecus V4510U front panel has the device's controls, indicators, and hard disk trays:



Front Panel	
Item	**Description**
1. LCD Display	• Displays the current system status and warning messages. • Displays hostname, WAN/LAN1/LAN2 IP addresses, RAID status, and current time.
2. Up Button ▲	• Push to scroll up when using the LCD display.
3. Down Button ▼	• Push to scroll down when using the LCD display.
4.Enter Button ↵	• Push to confirm information entered into the LCD display.
5. Escape Button **ESC**	• Push to leave the current LCD menu.
6. Locator Button	• Turns on the LED backlight.
7. USB Port	• USB 3.0 port for compatible USB devices, such as digital cameras, USB disks, and USB printers.
8. PWR LED	• **Solid Blue:** System is powered on.
9. Busy LED	• **Blinking orange:** system startup or system maintenance; data currently inaccessible
10. Error LED	**Solid Red:** System alert: Redundant power or system fan failure
11. LAN LED	• **Solid green:** network link • **Blinking green:** network activity
12. Power Button	• Power the V4510U on/off.
13. Reset Button	• Resets the V4510U.
14. Mute Button	• Mutes the system fan alarm (Can also be managed through the UI)
15. HDD Trays	• Four 3.5" SATA HDD trays. • Locks are provided for added security.

V5510:

The Thecus V5510 front panel has the device's controls, indicators, and hard disk trays:

Front Panel	
Item	**Description**
1.System LED	• **Blinking orange:** System is being upgraded or ;is starting up; data currently inaccessible
2.WAN/LAN1 LED	• **Solid green:** Network link • **Blinking green:** Network activity
3.LAN2 LED	• **Solid green:** Network link • **Blinking green:** Network activity
4.USB Copy LED	• **Solid blue:** Files are being copied from a USB storage device
5.Syetem Warning LED	• **Solid RED:** System error
6.Reset Button	• Resets system configuration to default value.
7.USB Port	• USB 3.0 port for compatible USB devices, such as USB disks.
8.Power Button/ Power LED	• Power on/off V5510 and Power LED. • **Solid blue:** System is power on.
9.Up Button ▲	• Push to scroll up when using the LCD display.
10.Down Button ▼	• Push to enter the USB copy operation screen.
11.Enter Button ↵	• Push to enter LCD administrator password to access basic system setting.
12.Escape Button **ESC**	• Push to leave the current LCD menu.
13.LCD Display	• Displays current system status and warning messages.
14.HDD Trays	• Five 3.5" SATA HDD trays. • Locks are provided for added security.

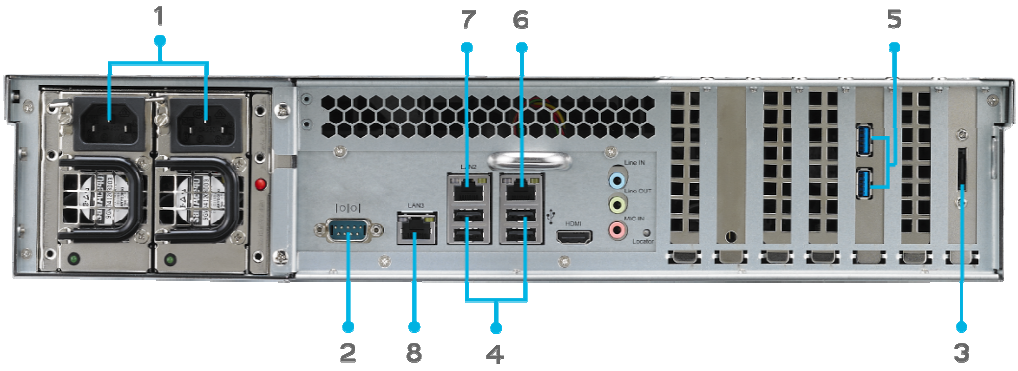
V6810:

The Thecus V6810's front panel has the device's controls, indicators, and hard disk trays:

Front Panel	
Item	**Description**
1. Power Button	• Power on/off V6810
2. USB Port	• USB 2.0 port for compatible USB devices, such as digital cameras, USB disks, and USB printers.
3. USB Port	• USB 3.0 port for compatible USB devices, such as digital cameras, USB disks, and USB printers.
4. LAN2 LED	• **Solid white:** LAN2 Cable link • **Blinking :** Network activity
5. LAN1 LED	• **Solid white:** LAN1 Cable link • **Blinking :** Network activity
6. USB LED	• **Solid white:** USB busy • **Solid Red:** USB error
7. System LED	• **Solid white:** System is power on.
8. OLED	• Displays system status and information
9. System Error LED	• **Blinking RED:** System error.
10. Down Button	• Push to enter USB copy operation screen
11. Up Button	• Push to scroll up when using the OLED display
12. Enter Button	• Push to enter OLED operate password for basic system setting
13. Escape Button	• Push to leave the current OLED menu

Rear Panel

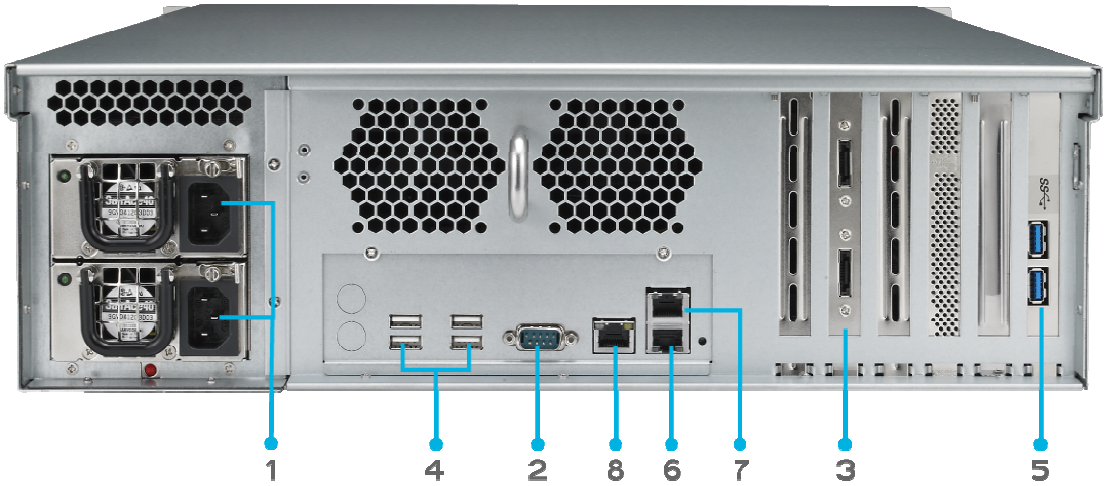
V8810U



Back Panel	
Item	**Description**
1.Power Connector	• Connect the included power cords to these connectors
2.Serial Port	• This port is for external UPS device
3.eSATA Port	• eSATA port for high-speed storage expansion
4.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers
5.USB Port	• USB 3.0 port for compatible USB devices.
6.WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
7.LAN2 Port	• LAN2 port for connecting to an Ethernet network through a switch or router
8.LAN3 Port	• LAN3 port for connecting to an Ethernet network through a switch or router.

V16810U:

The V16810U rear panel features ports and connectors.

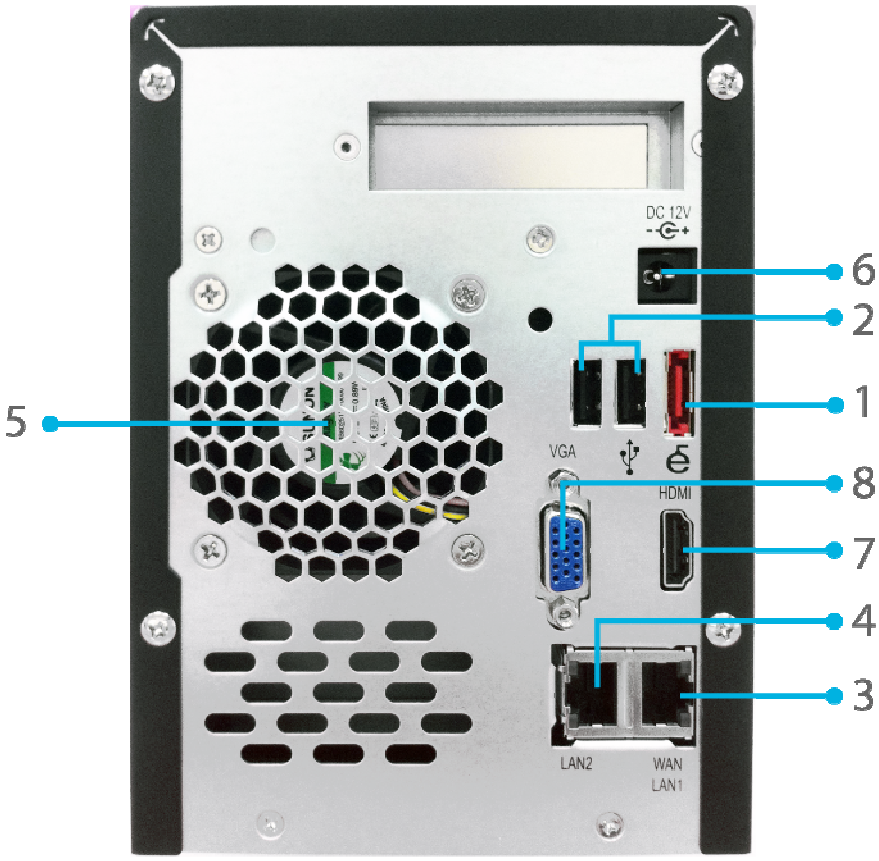


Back Panel	
Item	**Description**
1.Power Connector	• Connect the included power cords to these connectors

2.Serial Port	• This port is for external UPS device
3.eSATA Port	• eSATA port for high-speed storage expansion
4.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers
5.USB Port	• USB 3.0 port for compatible USB devices.
6.WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
7.LAN2 Port	• LAN2 port for connecting to an Ethernet network through a switch or router
8.LAN3 Port	• LAN3 port for connecting to an Ethernet network through a switch or router

V2510:

The V2510 rear panel features ports and connectors.



Back Panel	
Item	**Description**
1. eSATA Port	• eSATA port for high-speed external storage expansion.
2. USB Port	• USB 2.0 port for compatible USB devices, such as digital cameras, USB disks, and USB printers.
3. WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or a router.
4. LAN2 Port	• LAN2 port for connecting to a local Ethernet network through a switch or a router.
5. System Fan	• System fan that exhausts heat from the unit.
6. Power Connector	• Connect the included power cords to this connector.
7. HDMI	• For Video/Audio out
8. VGA	• For Video out

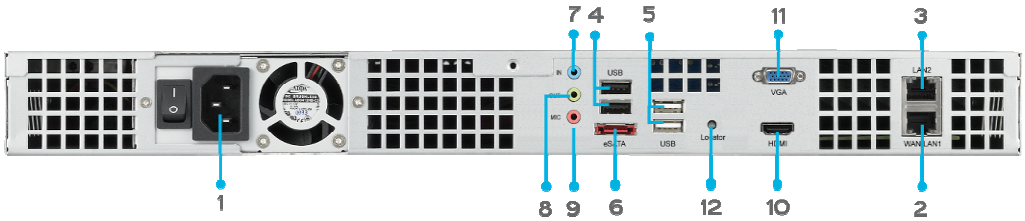
V4510:

The V4510 rear panel features ports and connectors.

Back Panel	
Item	**Description**
1. Power Connector	• For connect the power adaptor
2. WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
3. LAN2 Port	• LAN2 port for connecting to an Ethernet network through a switch or router
4. USB Ports	• USB 2.0 ports for storage expansion
5. eSATA Ports	• eSATA port for high-speed storage expansion
6. LINE Out	• For Audio out
7. VGA	• For Video out
8. HDMI	• For Video/Audio out

V4510U:

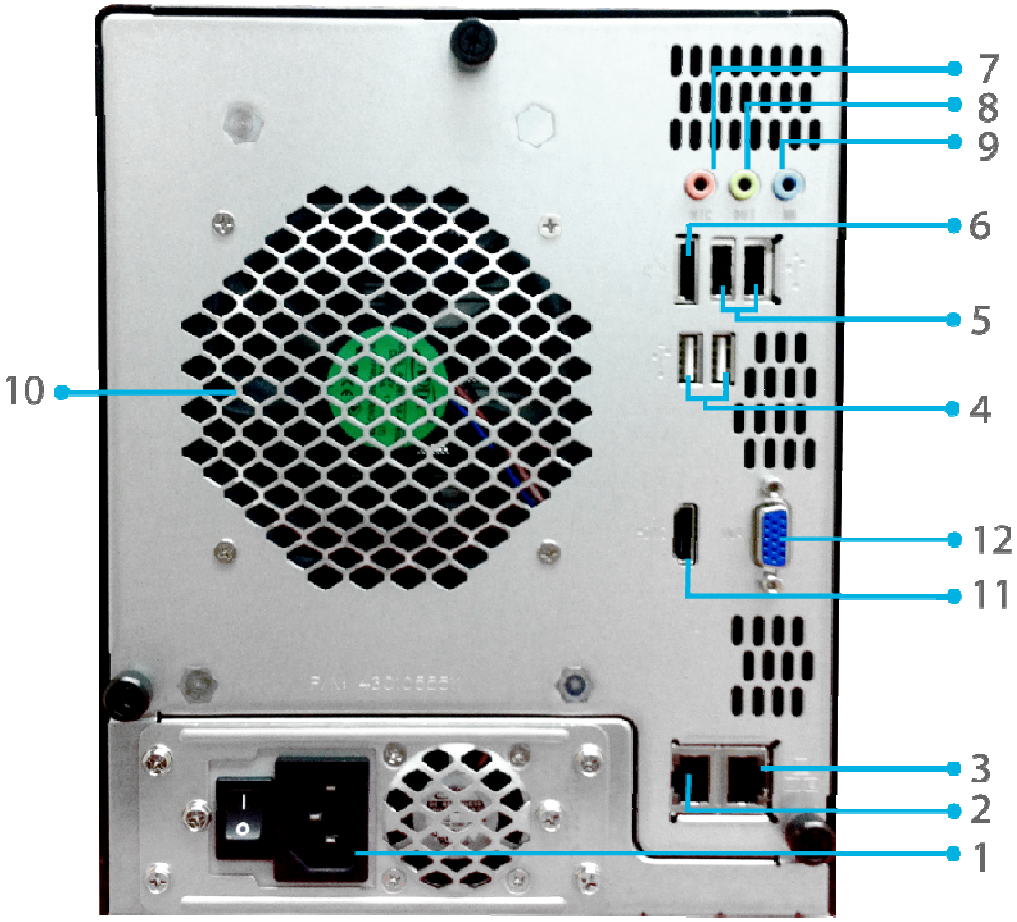
The rear panel of the V4510U with a single power connector:



Back Panel	
Item	**Description**
1.Power Connector	• Connect the included power cords to these connectors
2. WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
3. LAN2 Port	• LAN2 port for connecting to an Ethernet network through a switch or router
4.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers
5.USB Port	• USB 2.0 port for compatible USB devices.
6.eSATA Port	• eSATA port for high-speed storage expansion
7.Line in	• For Audio in
8. Line out	• For Audio out
9. Mic input	• Microphone input
10.HDMI Port	• For Video/Audio out
11.VGA Port	• For Video out
12. Locator LED	• Identifies each NAS within a rack mount configuration.

V5510:

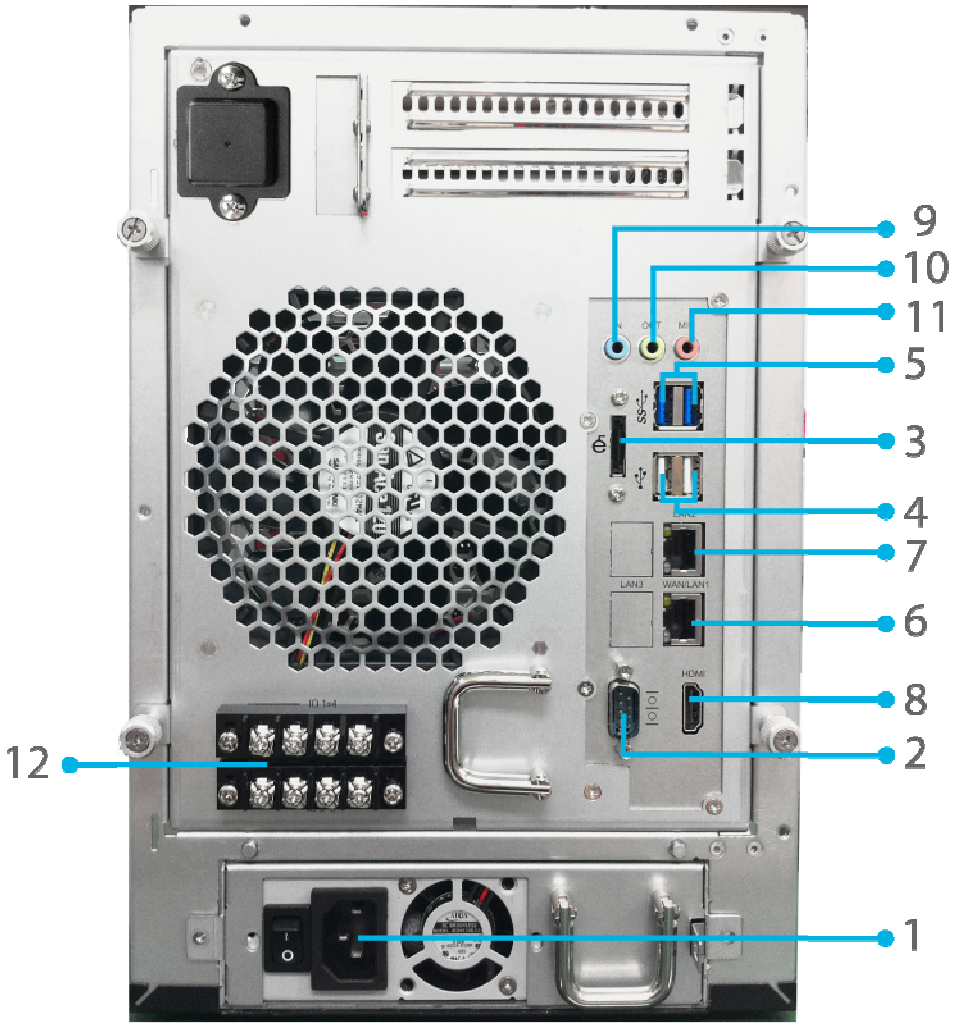
The V5510 rear panel features ports and connectors.



Back Panel	
Item	**Description**
1.Power Connector	• Connect the included power cords to these connectors
2. WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
3. LAN2 Port	• LAN2 port for connecting to an Ethernet network through a switch or router
4.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers
5.USB Port	• USB 2.0 port for compatible USB devices.
6.eSATA Port	• eSATA port for high-speed storage expansion
7.Line in	• For Audio in
8. Line out	• For Audio out
9. Mic input	• Microphone input
10.System Fan	• System fan that exhausts heat from the unit.
11.HDMI Port	• For Video/Audio out
12.VGA Port	• For Video out

V6810:

The V6810 rear panel features ports and connectors.



Back Panel	
Item	**Description**
1.Power Connector	• Connect the included power cords to these connectors
2.Serial Port	• This port is for external UPS device
3.eSATA Port	• eSATA port for high-speed storage expansion
4.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers
5.USB Port	• USB 3.0 port for compatible USB devices.
6.WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
7.LAN2 Port	• LAN2 port for connecting to an Ethernet network through a switch or router
8.HDMI Port	• For Video/Audio out
9.Line in	• For Audio in
10. Line out	• For Audio out
11. Mic input	• Microphone input
12. User GPIO	• Could define each GPIO (0~7) and implement its own functionality.

Chapter 2: Hardware Installation

Overview

Your Thecus VisoGuard is designed for easy installation. To help you get started, the following chapter will help you quickly get your Thecus VisoGuard up and running. Please read it carefully to prevent damaging your unit during installation.

Before You Begin

Before you begin, be sure to take the following precautions:

1. Read and understand the ***Safety Warnings*** outlined in the beginning of the manual.

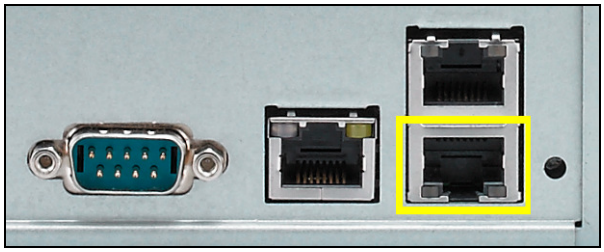
2. If possible, wear an anti-static wrist strap during installation to prevent static discharge from damaging the sensitive electronic components on the Thecus VisoGuard.

3. Be careful not to use magnetized screwdrivers around the Thecus VisoGuard's electronic components.

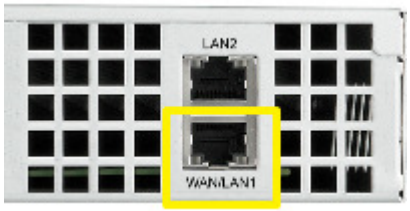
Cable Connections

To connect the Thecus VisoGuard product to your network, follow the steps below:

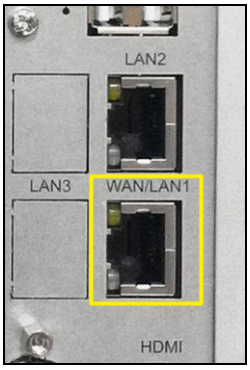
1. Connect an Ethernet cable from your network to the WAN/LAN1 port on the back panel of the Thecus VisoGuard.



▲ *V8810U/V16810U WAN/LAN1 port*

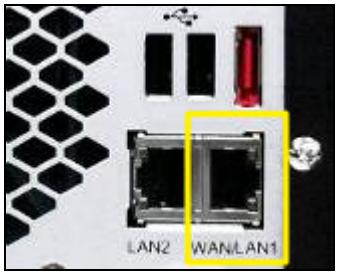


▲ *V4510U WAN/LAN1 port*



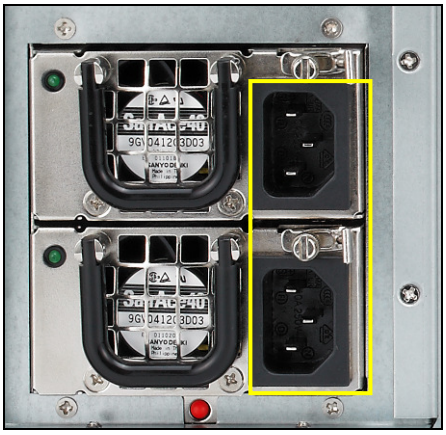
▲ *V6810 WAN/LAN1 port*

▲ V2510 WAN/LAN1 port

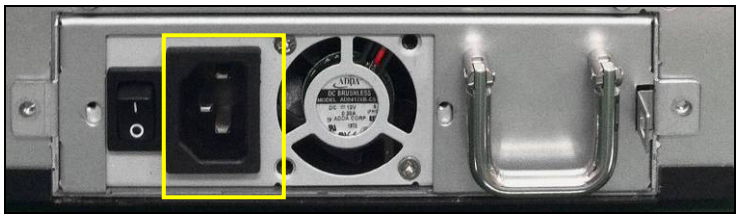


▲ *V4510 WAN/LAN1 port*

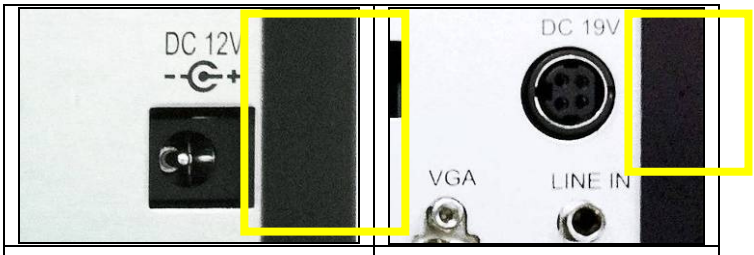
2. Connect the provided power cord into the universal power socket on the back panel. Plug the other end of the cord into a surge protector socket.



▲ *V8810U/V16810U power socket*

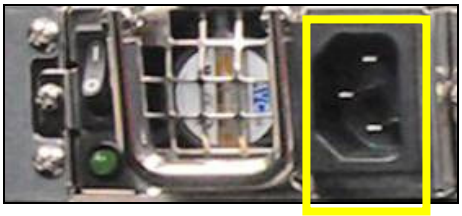


▲ *V6810 power socket*



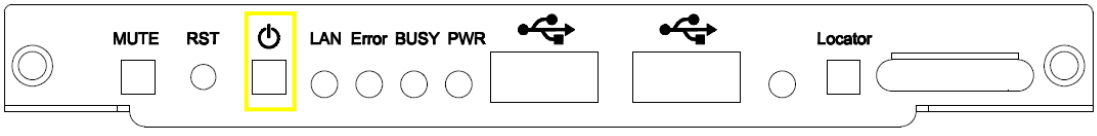
▲ *V2510 power socket*

▲ *V4510 power socket*



▲*V4510U power socket*

3. Press the power button on the Front Panel to boot up the Thecus VisoGuard.

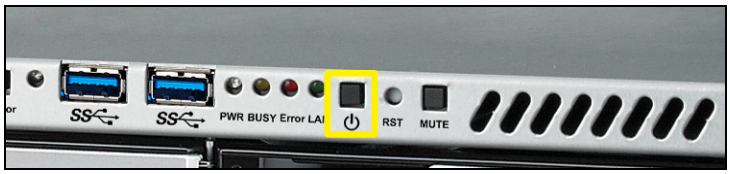


▲ *V8810U/V16810U button*

▲*V6810 power button*

▲ *V2510 power button*

▲ *V4510 power button*



▲ *V4510U power button*

Chapter 3: First Time Setup

Overview

Once the hardware is installed, physically connected to your network, and powered on, you can configure the Thecus VisoGuard so that it is accessible to your network users. There are two ways to set up your Thecus VisoGuard: using the **Thecus Setup Wizard** or the **LCD display**. Follow the steps below for initial software setup.

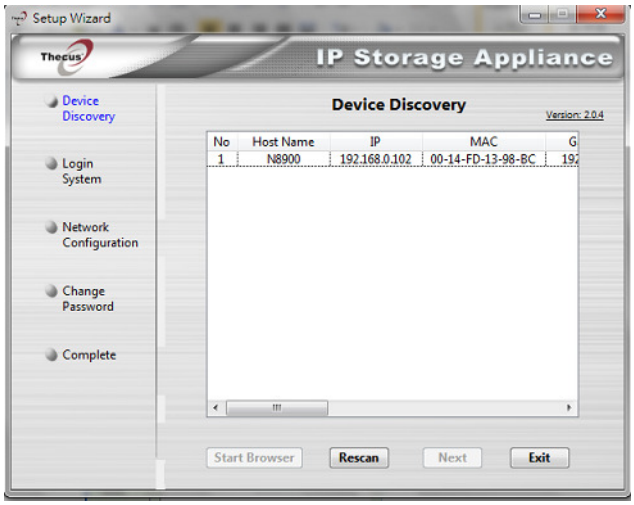
Thecus Setup Wizard

The handy Thecus Setup Wizard makes configuring Thecus VisoGuard a snap. To configure the Thecus VisoGuard using the Setup Wizard, perform the following steps:

1. Insert the installation CD into your CD-ROM drive (the host PC must be connected to the network).

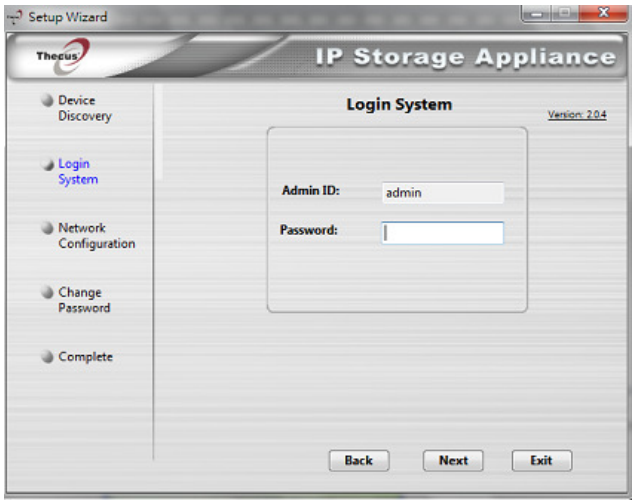
2. The Setup Wizard should launch automatically. If not, please browse your CD-ROM drive and double click on **Setup.exe.**

3. The Setup Wizard will start and automatically detect all Thecus storage devices on your network. If none are found, please check your connection and refer to **Chapter 7: Troubleshooting** for assistance.

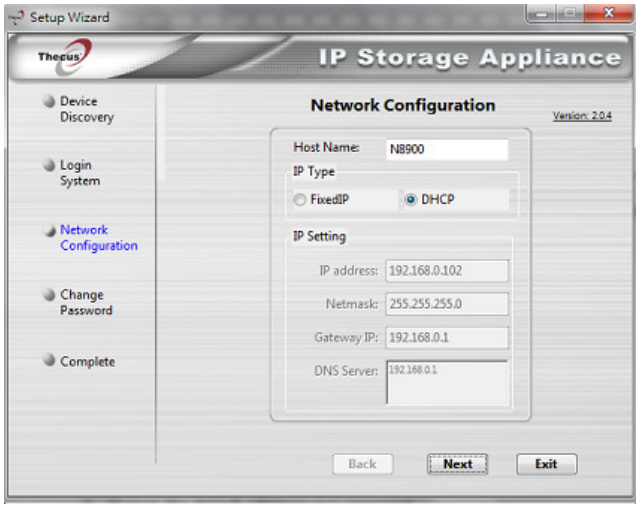


4. Select the Thecus VisoGuard that you like to configure.

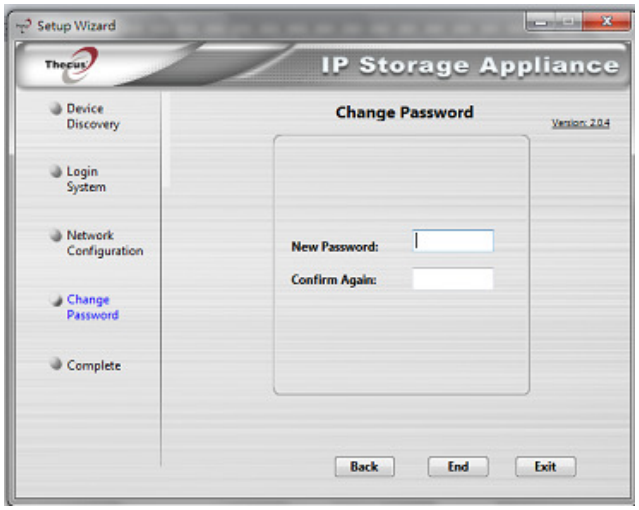
5. Login with the administrator account and password. The default account and password are both "`admin`".



6. Name your Thecus VisoGuard and configure the network IP address. If your switch or router is configured as a DHCP Server, configuring the Thecus VisoGuard to automatically obtain an IP address is recommended. You may also use a static IP address and enter the DNS Server address manually.

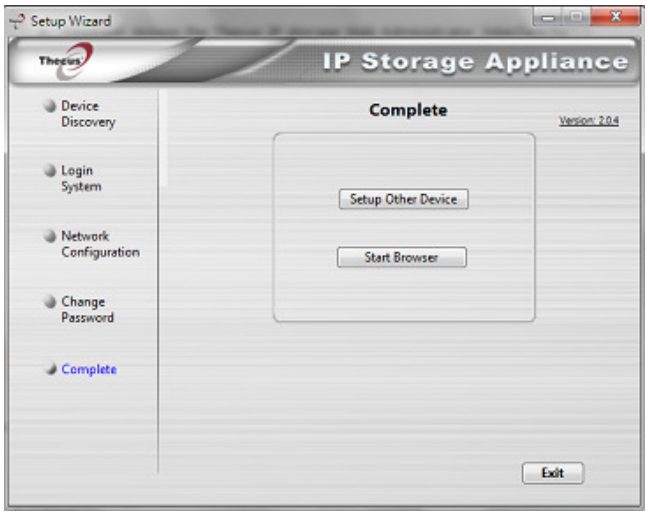


7. Change the default administrator password.



8. Finished! Access the Thecus VisoGuard Web Administrator Interface by pressing the ***Start Browser*** button. You can also configure another Thecus

VisoGuard at this point by clicking the ***Setup Other Device*** button. Press ***Exit*** to exit the wizard.



NOTE

The Thecus Setup Wizard is designed for installation on systems running Windows XP/2000/vista/7 or Mac OSX or later. Users with other operating systems will need to install the Thecus Setup Wizard on a host machine with one of these operating systems before using the unit.

LCD Operation (V4510U/V5510)

The mentioned models above are equipped with an LCD on the front for easy status display and setup. There are four buttons on the front panel to control the LCD functions.

LCD Controls

Use the **Up** (▲), **Down** (▼), **Enter** (↵) and **Escape** (**ESC**) keys to select various configuration settings and menu options for Thecus IP storage configuration.

The following table illustrates the keys on the front control panel:

LCD Controls		
Icon	**Function**	**Description**
▲	Up Button	Select the previous configuration settings option.
▼	Down Button	USB copy confirmation display.
↵	Enter	Enter the selected menu option, sub-menu, or parameter setting.
ESC	Escape	Escape and return to the previous menu.

There are two modes of operation for the LCD: **Display Mode** and **Management Mode**.

Display Mode

During normal operation, the LCD will be in **Display Mode**.

Display Mode	
Item	**Description**
Host Name	Current host name of the system.
WAN/LAN1	Current WAN/LAN1 IP setting.
LAN2	Current LAN2 IP setting.
Link Aggregation	Current Link Aggregation status
System Fan1	Current system fan1 status.
System Fan2	Current system fan2 status.
CPU Fan	Current CPU fan status
2009/05/22 12:00	Current system time.
Disk Info	Current status of disk slot has been installed
RAID	Current RAID status.

The Thecus VisoGuard will rotate these messages every one-two seconds on the LCD display.

USB Copy

The USB Copy function enables you to copy files stored on USB devices such as USB disks and digital cameras to the Thecus VisoGuard by press button. To use USB copy, follow the steps below:

1. Plug your USB device into an available USB port on the Front end.
2. In **Display Mode**, press the **Down Button** (▼).
3. The LCD will display "**USB Copy?**"
4. Press **Enter** (↵) and the Thecus VisoGuard will start copying USB disks connected to the front USB port.
5. All of data will be copied into system folder named "USB copy".

Management Mode

During setup and configuration, the LCD will be in **Management Mode**.

To enter into Management Mode, press **Enter (↵)** and an "*Enter Password*" prompt will show on the LCD.

At this time, the administrator has to enter the correct LCD password. System will check whether the correct LCD password has been entered. The default LCD password is " **0000** ". If correct password is entered, you will enter into the **Management Mode** menu.

Management Mode	
Item	**Description**
WAN/LAN1 Setting	IP address and netmask of your WAN/LAN1 ports.
LAN2 Setting	IP address and netmask of your LAN2 ports.
Link Agg. Setting	Select **Failover**.
Change Admin Passwd	Change administrator's password for LCD operation.
Reset to Default	Reset system to factory defaults.
Exit	Exit **Management Mode** and return to **Display Mode**.

NOTE

You can also change your LCD password using the Web Administration Interface by navigating to **System Management > Administrator Password**. For more on the Web Administration Interface, see **Chapter 4: System Management**.

OLED Operation(V4510/V6810/V8810U/V16810U)

OLED Operation

The Thecus VisoGuard is equipped with an OLED on the front for easy status display and setup. There are four buttons on the front panel to control the OLED functions.

OLED Controls

Use the **Up** (▲), **Down** (▼), **Enter** (↵) and **Escape** (**ESC**) keys to select various configuration settings and menu options for Thecus VisoGuard configuration.

The following table illustrates the keys on the front control panel:

OLED Controls		
Icon	**Function**	**Description**
▲	Up Button	Select the previous configuration settings option.
▼	Down Button	USB copy confirmation display.
↵	Enter	Enter the selected menu option, sub-menu, or parameter setting.
ESC	Escape	Escape and return to the previous menu.

There are two modes of operation for the OLED: **Display Mode** and **Management Mode**.

Display Mode

During normal operation, the OLED will be in **Display Mode**.

Display Mode	
Item	**Description**
Host Name	Current host name of the system.
WAN/LAN1	Current WAN/LAN1 IP setting.
LAN2	Current LAN2 IP setting.
Link Aggregation	Current Link Aggregation status
System Fan	Current system fan status.
CPU Fan	Current CPU fan status
2009/05/22 12:00	Current system time.
RAID	Current RAID status.

The Thecus VisoGuard will rotate these messages every one-two seconds on the OLED display.

USB Copy

The USB Copy function enables you to copy files stored on USB devices such as USB disks and digital cameras to the Thecus VisoGuard with a press of a button. To use USB copy, follow the steps below:

1. Plug your USB device into an available USB port on the Front Panel.

2. In **Display Mode**, press the **Enter** (↵).

3. The LCD will display "**USB Copy?**"

4. Press **Enter** (↵) and the Thecus VisoGuard will start copying USB disks connected to the front USB port. The LCD will display the USB copy progress and results.

Typical Setup Procedure

From the Web Administration Interface, you can begin to setup your Thecus VisoGuard for use on your network. Setting up the Thecus VisoGuard typically follows the five steps outlined below.

For more on how to use the Web Administration Interface, see
Chapter 4: Web Administration Interface.

Step 1: Network Setup

From the Web Administration Interface, you can configure the network settings of the Thecus VisoGuard for your network. You can access the **Network** menu from the menu bar.
For details on how to configure your network settings, refer to
Chapter 4: System Network .

Step 2: RAID Creation

Next, administrators can configure their preferred RAID setting and build their RAID volume. You can access RAID settings from the menu bar of the Web Administration Interface by navigating to **Storage Management > RAID Management.**

For more information on configuring RAID, see
Chapter 4: Storage > RAID Management.

Don't know which RAID level to use? Find out more about the different RAID levels from **Appendix B: RAID Basics**.

Step 3: Create Local Users or Setup Authentication

Once the RAID is ready, you can begin to create local users for Thecus VisoGuard. For more on managing users, go to **Chapter 4: User and Group Authentication**.

Step 4: Create Folders and Set Up ACLs

Once users are introduced into your network, you can begin to create various folders on the Thecus VisoGuard and control user access to each using Folder Access Control Lists.

More information on managing folders, see
Chapter 4: Storage Management > Share Folder .

To find out about configuring Folder Access Control Lists, see **Chapter 4: Storage Management > Share Folder> Folder Access Control List (ACL)**.

Step 5: Start Services

Finally, you can start to setup the different services of Thecus VisoGuard for the users on your network. You can find out more about each of these services by clicking below:

SMB/CIFS

File Transfer Protocol (FTP)

Chapter 4: System Administration

Overview

The Thecus VisoGuard provides an easily accessible **Web Administration Interface**. With it, you can configure and monitor the Thecus VisoGuard anywhere on the network.

Web Administration Interface

Make sure your network is connected to the Internet. To access Thecus VisoGuard **Web Administration Interface**:

1. Type the Thecus VisoGuard IP address into your browser. (Default IP address is `http://192.168.1.100`)

NOTE

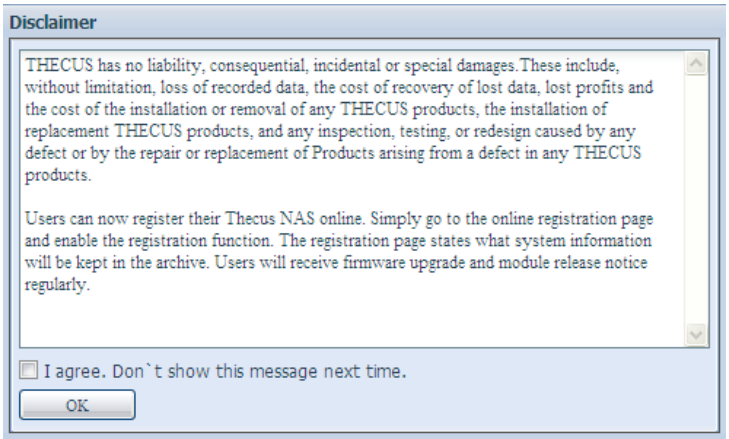
Your computer's network IP address must be on the same subnet as the Thecus IP storage. If the Thecus IP storage has default IP address of 192.168.1.100, your managing PC IP address must be 192.168.1.x, where x is a number between 1 and 254, but not *100*.

2. Login to the system using the administrator user name and password. The factory defaults are:

   User Name: `admin`
   Password: `admin`

※ If you changed your password in the setup wizard, use the new password.

Once you are logged in as an administrator disclaimer page will appear as below. Please click the check box if you do not want to have this page displayed during the next login.

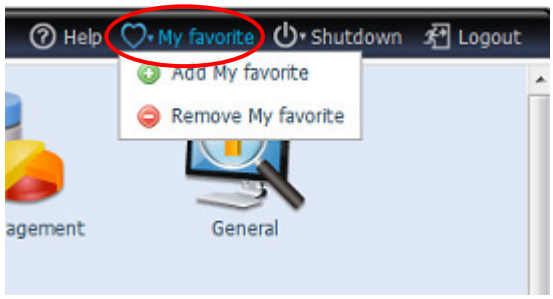


Following by disclaim page, you will see the **Web Administration Interface**. From here, you can configure and monitor virtually every aspect of the Thecus VisoGuard from anywhere on the network.

My Favorite

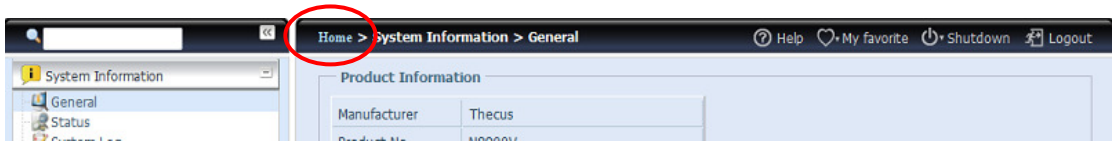
The user interface with "My Favorite" shortcut is allowed user to designate often used items and have them display on the main screen area. The figure below displays system favorite functions.

Administrators can add or remove favorite functions to My Favorites by right clicking the mouse on the menu tree.



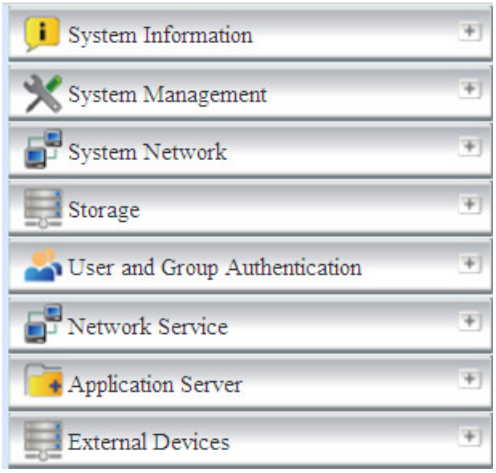
The other way administrators can add favorite functions is by clicking the "Add Favorite" icon in each function screen. Please refer figure below in red circuit icon.

To return to the favorite screen, simply click "Home" located at the left hand corner of the main screen.



Menu Bar

The **Menu Bar** is where you will find all of the information screens and system settings of Thecus VisoGuard. The various settings are placed in the following groups on the menu bar:



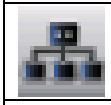
Menu Bar	
Item	**Description**
System Information	Current system status of the Thecus VisoGuard.
System Management	Various Thecus VisoGuard system settings and information.
System Network	Information and settings for network connections, as well as various services of the Thecus VisoGuard.
Storage	Information and settings for storage devices installed into the Thecus VisoGuard.
User and Group Authentication	Allows configuration of users and groups.
Network Service	Samba/CIFS ,FTP,SSH,DDNS,UPnP Port Management
Application Server	System and user Module to install of the Thecus VisoGuard.
External Devices	Uninterrupted Power Source

Moving your cursor over any of these items will display the dropdown menu selections for each group.

In the following sections, you will find detailed explanations of each function, and how to configure your Thecus VisoGuard.

Message Bar

You can get information about system status quickly by moving mouse over.

Message Bar		
Item	**Status**	**Description**
	RAID Information.	Display the status of created RAID volume. Click to go to RAID information page as short cut.
	Disks Information.	Display the status of disks installed in the system. Click to go to Disk information page as short cut.
	FAN.	Display system FAN Status. Click to go to System Status page as short cut.
	Network.	Green: Connection to network is normal. Red: abnormal connection to the network
	Temperature	Display system temperature, click to go to System Status page as shot cut.

Logout

Click to logout Web Administration Interface.

Language Selection

The Thecus VisoGuard supports multiple Languages, including:

- English
- Japanese
- Traditional Chinese
- Simplified Chinese
- French
- German
- Italian
- Korean
- Spanish
- Russia
- Polish
- Portugal

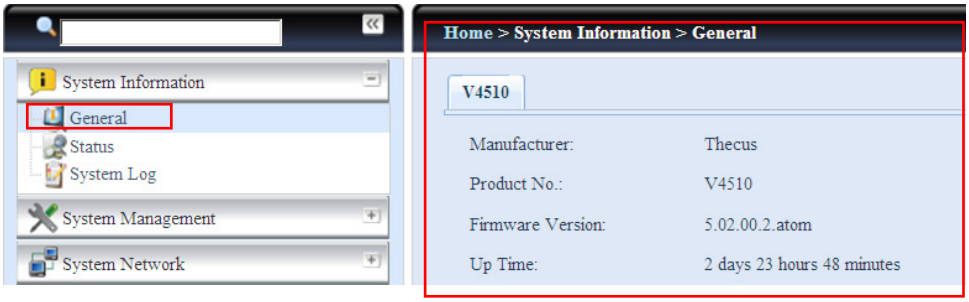
On the menu bar, click **Language** and the **selection** list appears. This user interface will switch to selected Language for Thecus VisoGuard.

System Information

Information provides viewing on current Product info, System Status, Service Status and Logs.
The menu bar allows you to see various aspects of the Thecus VisoGuard. From here, you can discover the status of the Thecus VisoGuard, and also other details.

System Information

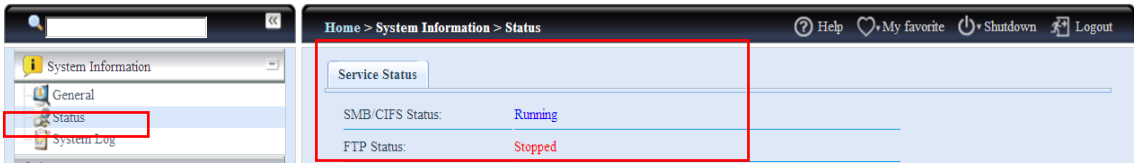
Once you login, you will first see the basic **system Information** screen providing **Manufacturer**, **Product No.**, **Firmware Version**, and **System Up Time** information.



System Information	
Item	**Description**
Manufacturer	Displays the name of the system manufacturer.
Product No.	Shows the model number of the system.
Firmware version	Shows the current firmware version.
Up time	Displays the total run time of the system.

System/Service Status

From the **System Information** menu, choose the ***Status*** item, **Service Status** screens appear. These screens provide basic system and service status information.

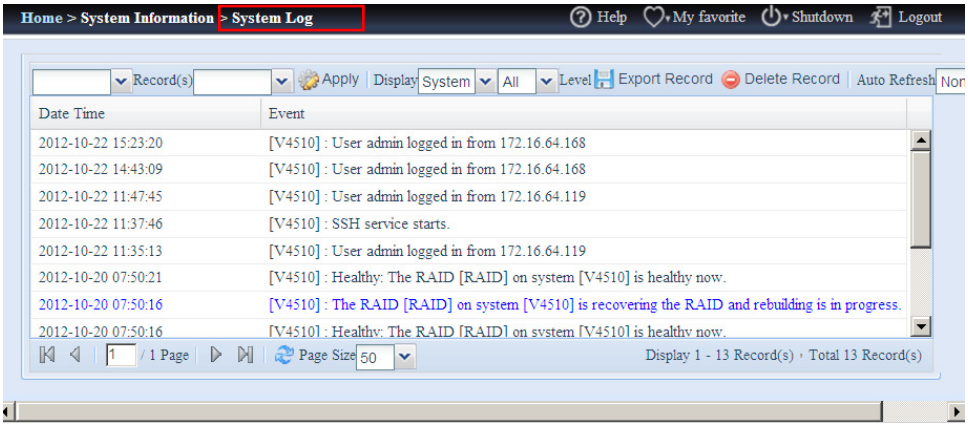


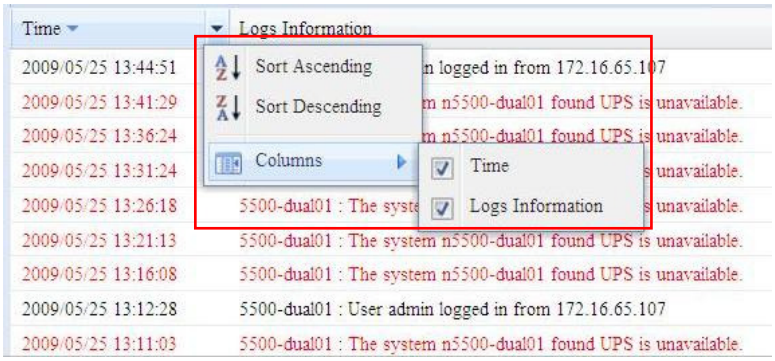
Service Status	
Item	**Description**
SMB/CIFS Status	The status of the SMB/CIFS server.
FTP Status	The status of the FTP server.

Logs

From the **System Information** menu, choose the **System Logs** item and the **System Logs** screen appears. This screen shows a history of system usage and

important events such as disk status, network information, and system booting. See the following table for a detailed description of each item:





See the following table for a detailed description of each item:

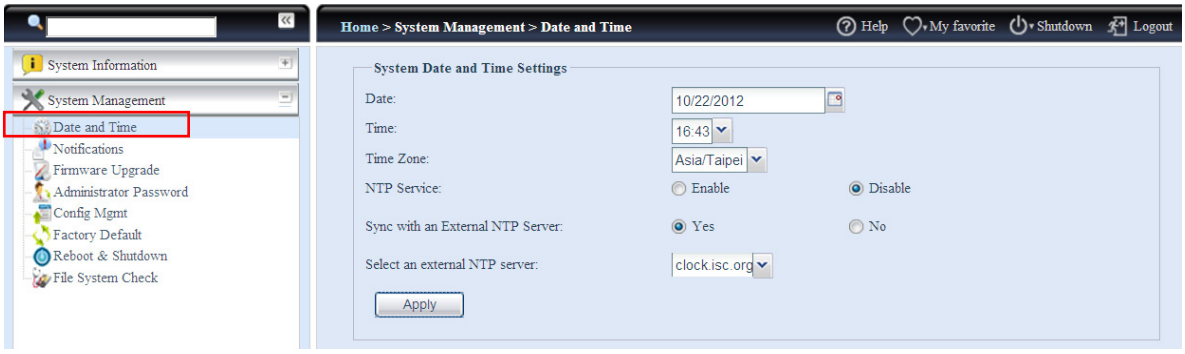
System Logs	
Item	**Description**
All	Provides all log information including system messages, warning messages and error messages.
INFO	Records information about system messages.
WARN	Shows only warning messages.
ERROR	Shows only error messages.
Download All Log File	Export all logs to an external file.
Truncate All Log File	Clear all log files.
The number of lines per page	Specify desired number of lines to display per page.
Sort Ascending	Shows logs by date in ascending order.
Sort Descending	Shows logs by date in descending order.
|<< < > >>|	Use the forward (**>** **>>|**) and backward (**|<<** **<**) buttons to browse the log pages.
	Re-loading logs.

System Management

The **System Management** menu gives you a wealth of settings that you can use to configure your Thecus VisoGuard system administration functions. You can set up system time, system notifications, and even upgrade firmware from this menu.

Time: Setting system time

From the **time** menu, choose the **Time** item and the **Time** screen appears. Set the desired **Date**, **Time**, and **Time Zone**. You can also elect to synchronize the system time on Thecus VisoGuard with an **NTP (Network Time Protocol) Server**.



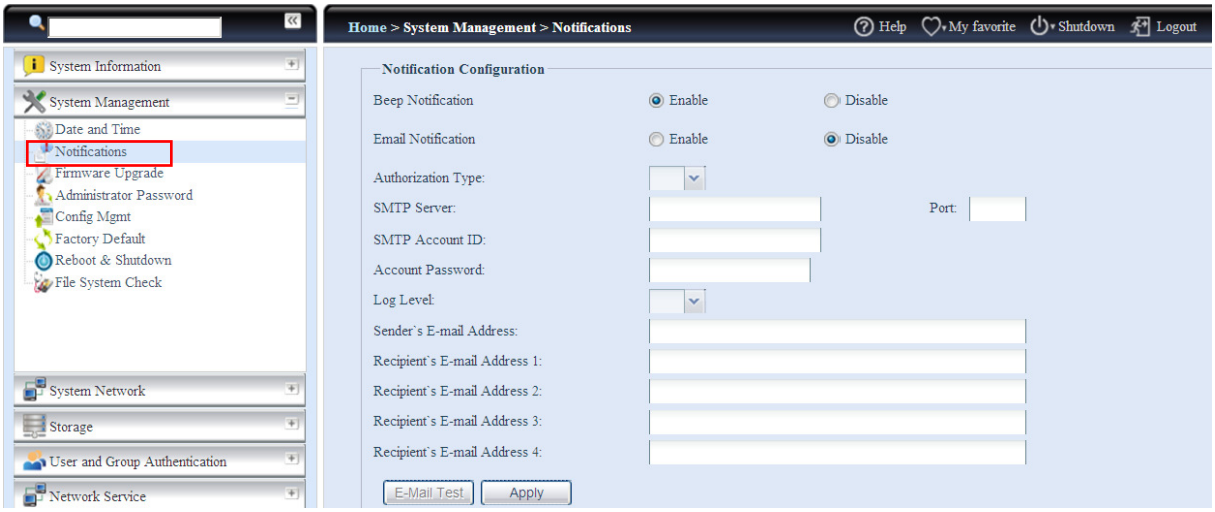
See the following table for a detailed description of each item:

Time	
Item	**Description**
Date	Sets the system date.
Time	Sets the system time.
Time Zone	Sets the system time zone.
NTP Service	Select ***Enable*** to synchronize with the NTP server. Select Disable to close the NTP server synchronization.
Sync with external NTP Server	Select **YES** to allow Thecus VisoGuard to synchronize with an NTP server of your choice. Press **Apply** to change.

WARNING If an NTP server is selected, please make sure your Thecus IP storage has been setup to access the NTP server.

Notification configuration

From the menu, choose the ***Notification*** item, and the **Notification Configuration** screen appears. This screen lets you have Thecus VisoGuard notify you in case of any system malfunction. Press ***Apply*** to confirm all settings. See following table for a detailed description of each item.



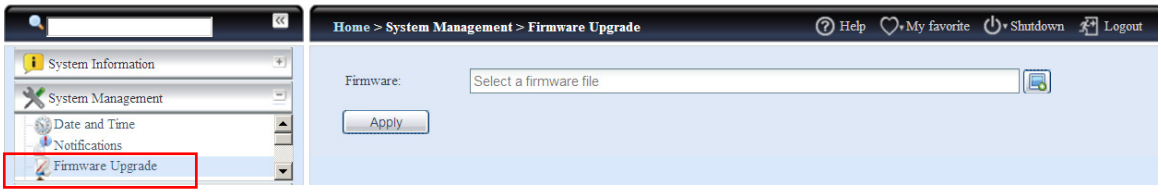
Notification Configuration	
Item	**Description**
Beep Notification	Enable or disable the system beeper that beeps when a problem occurs.
Email Notification	Enable or disable email notifications of system problems.
Authentication Type	Select the SMTP Server account authentication type.
SMTP Server	Specifies the hostname/IP address of the SMTP server.
Port	Specifies the port to send outgoing notification emails.
SMTP Account ID	Set the SMTP Server Email account ID.
Account Password	Enter a new password.
Log Level	Select the log level to send the e-mail out.
Sender's E-mail Address	Set email address to send email.
Receiver's E-mail Address (1,2,3,4)	Add one or more recipient's email addresses to receive email notifications.

NOTE

Consult with your mail server administrator for email server information.

Firmware Upgrade

From the menu, choose the ***Firmware Upgrade*** item and the **Firmware Upgrade** screen appears.



Follow the steps below to upgrade your firmware:

1. Use the ***Browse*** button  to find the firmware file.
2. Press ***Apply***.
3. The beeper beeps and the Busy LED blinks until the upgrade is complete.

NOTE

- The beeper only beeps if it is enabled in the System Notification menu.
- Check Thecus website for the latest firmware release and release notes.
- Downgrading firmware is not permitted.

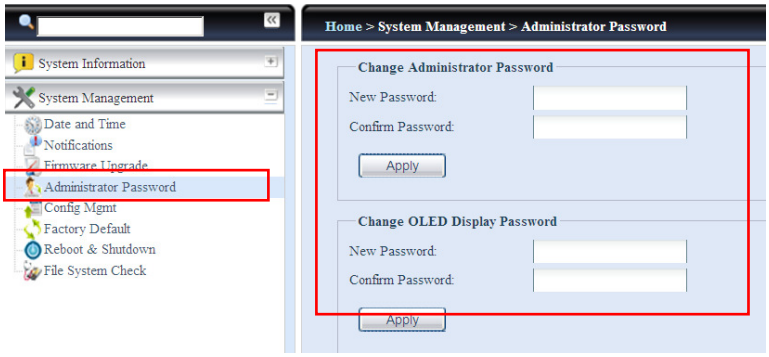
WARNING

Do not turns off the system during the firmware upgrade process.
This will lead to a catastrophic result that may render the system inoperable.

Administrator Password

From the menu, choose the **Administrator Password** item and the **Change Administrator Password** screen appears. Enter a new password in the **New Password** box and confirm your new password in the **Confirm Password** box. Press ***Apply*** to confirm password changes.

There is also **password** for enter **OLED** setting you could setup here. Enter a new password in the **New Password** box and confirm your new password in the **Confirm Password** box. Press ***Apply*** to confirm password changes.

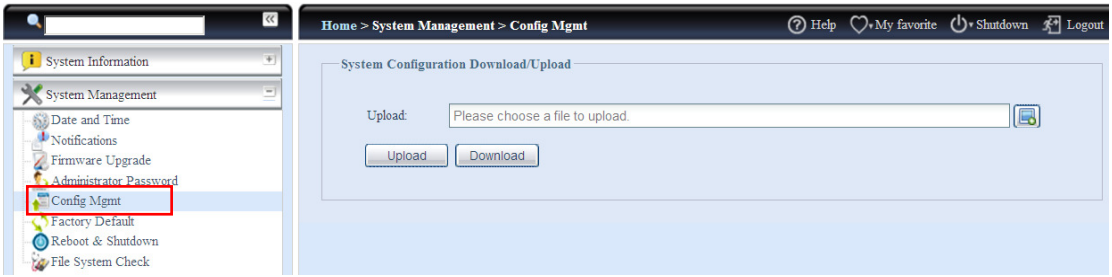


See the following table for a detailed description of each item.

Change Administrator and LCD Entry Password	
Item	**Description**
New Password	Type in a new administrator password.
Confirm Password	Type the new password again to confirm.
Apply	Press this to save your changes.

Config Mgmt

From the menu, choose the ***Config Mgmt*** item and the **System Configuration Download/Upload** screen appears. From here, you can download or upload stored system configurations.



See the following table for a detailed description of each item.

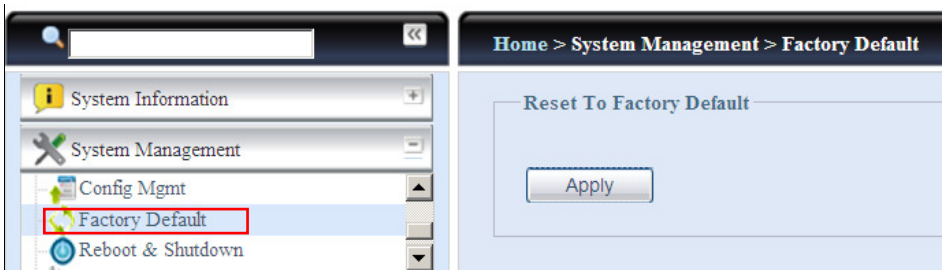
System Configuration Download/Upload	
Item	**Description**
Download	Save and export the current system configuration.
Upload	Import a saved configuration file to overwrite current system configuration.

NOTE

Backing up your system configuration is a great way to ensure that you can revert to a working configuration when you are experimenting with new system settings. The system configuration you have backup can be only restore in same firmware version. And the backup details have excluded user/group accounts.

Factory Default

From the menu, choose the ***Factory Default*** item and the **Reset to Factory Default** screen appears. Press ***Apply*** to reset Thecus VisoGuard to factory default settings.



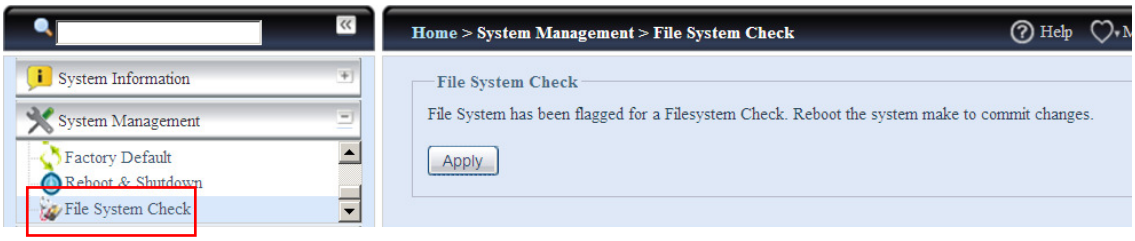
WARNING Resetting to factory defaults will not erase the data stored in the hard disks, but WILL revert all the settings to the factory default values.

Reboot & Shutdown

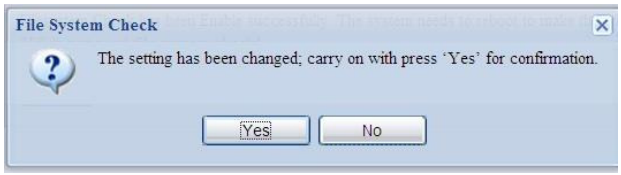
From the menu, choose **Reboot & Shutdown** item, and the **Shutdown/Reboot System** screen appears. Press ***Reboot*** to restart the system or ***Shutdown*** to turn the system off.

File System Check

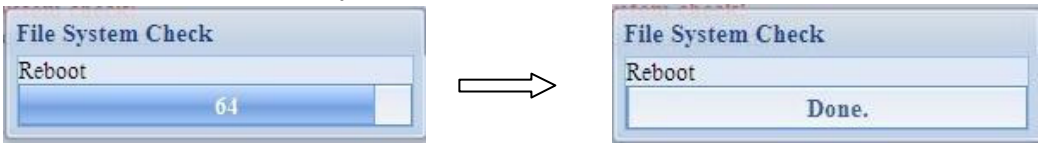
The File System Check allows you to perform a check on the integrity of your disks' file system. Under the menu, click ***File system Check*** and the **File System Check** prompt appears.



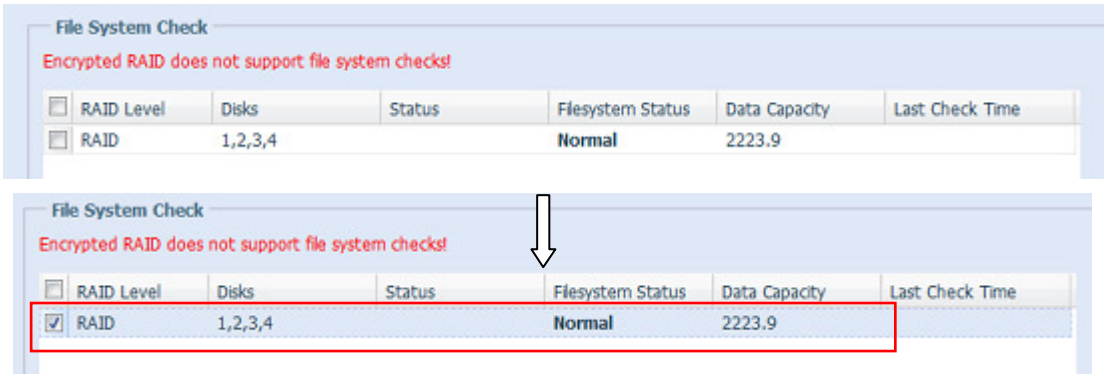
To perform a file system check, click ***Apply***.
Once clicked, the following prompt will appear:



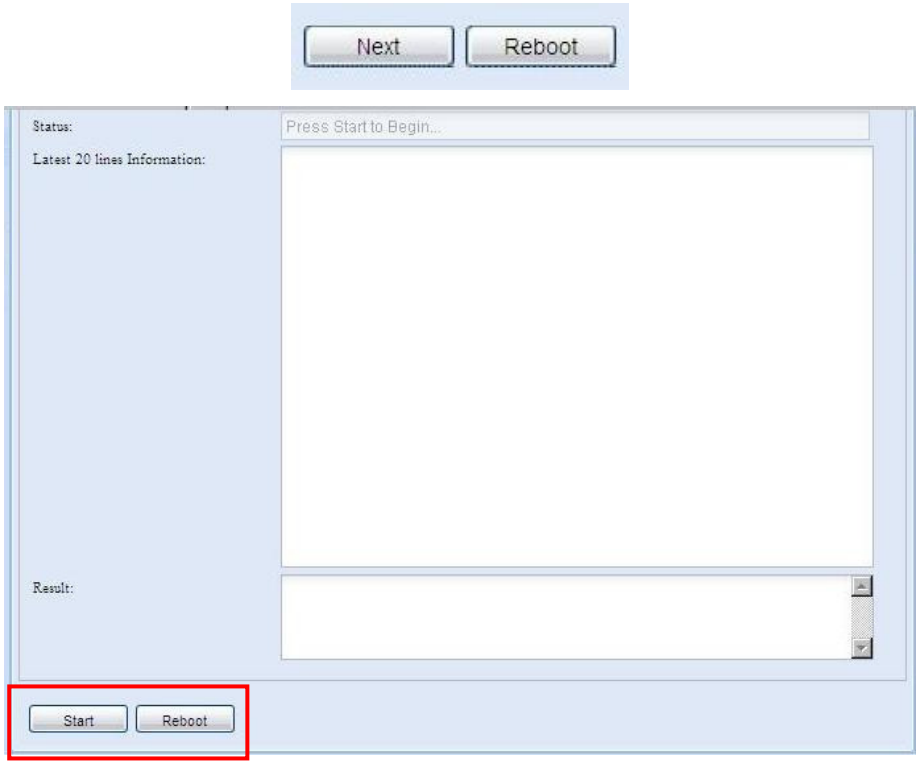
Click ***Yes*** to reboot the system.



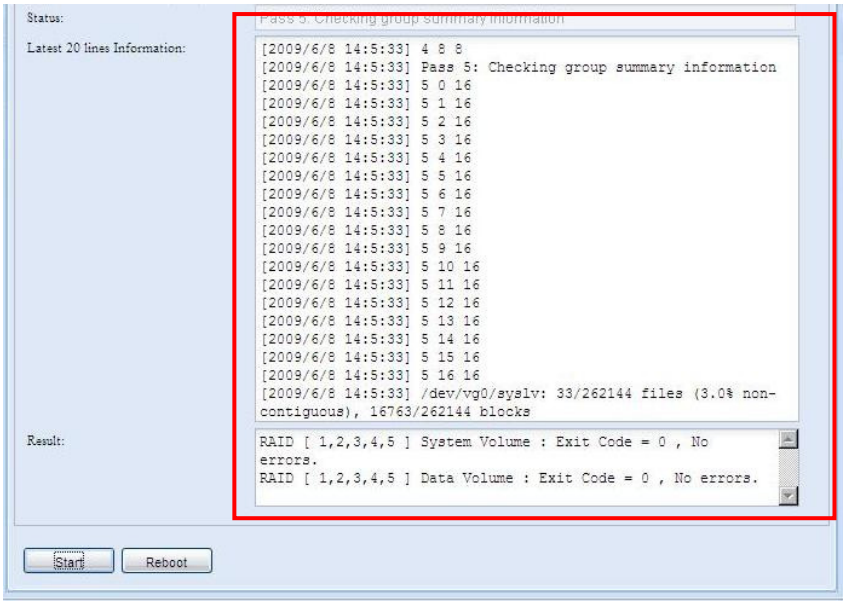
Once the system has rebooted, you will be returned to the **File System Check** prompt. There you will see the available RAID volumes to run the file system check. Check the desired RAID volumes and click ***Next*** to proceed with the file system check. Click ***Reboot*** to reboot without running the check.



Once you click ***Next***, you will see the following screen:



Click ***Start*** to begin the file system check. Click ***Reboot*** to reboot the system. When the file system check is run, the system will show 20 lines of information until it is complete. Once complete, the results will be shown at the bottom.



NOTE

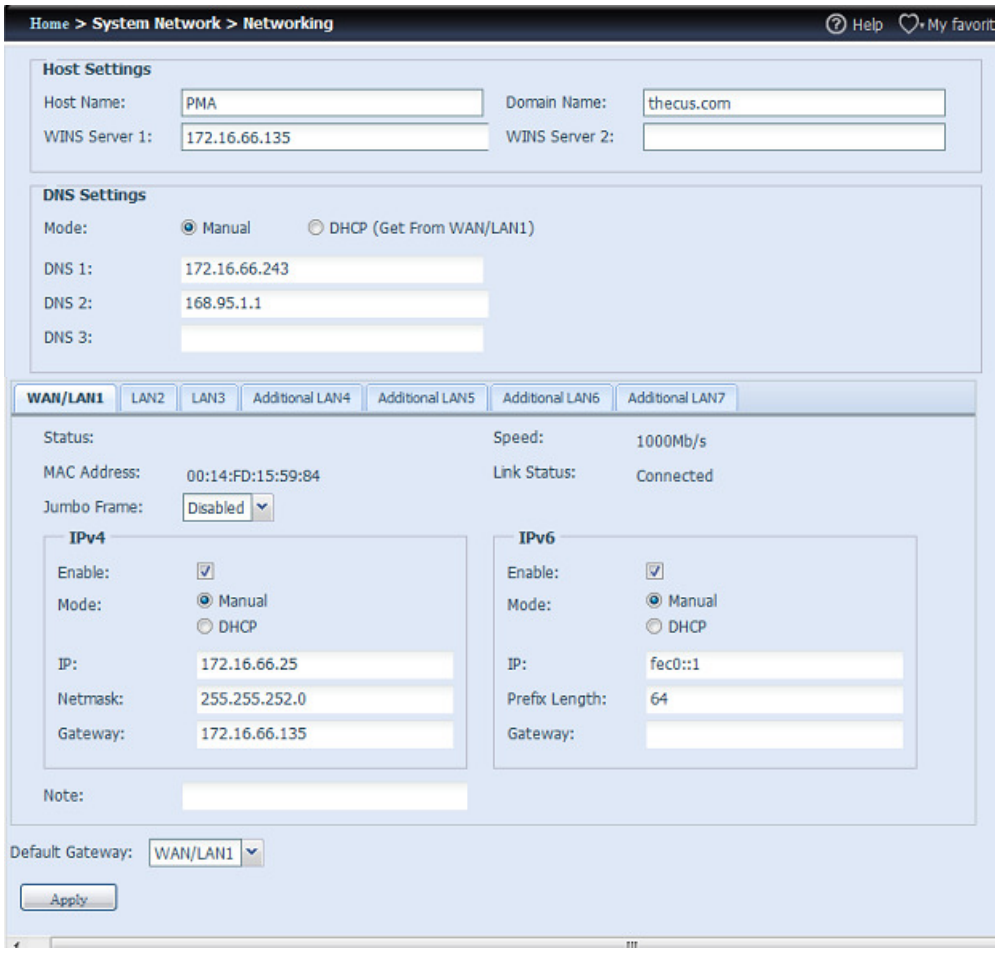
The system must be rebooted before Thecus IP storage can function normally after file system check complete.

System Network

Use the **System Network** menu to make network configuration settings for on board network ports or additional NIC as well as DHCP and link aggregation.

Networking

From the **System Network** menu, choose ***Networking***, and the **Networking Configuration** screen appears. This screen displays the network parameters of the global setting and available network connection. You may change any of these items and press ***Apply*** to confirm your settings. See a description of each item in the following table:



The available system network ports are coming from embedded of system and additionally added from reserved PCI-e slot with associated compatible list. Therefore, the screen shows above is example from Thecus N16000 with 3 GbE NIC on board and installed additional Intel PRO/1000 PT quad port NIC, it makes total 7 NIC ports for the system.

Network Configuration (Global parameter)	
Item	**Description**
Host name	Host name that identifies the Thecus VisoGuard on the network.
Domain name	Specifies the domain name of Thecus VisoGuard.
WINS Server	To set a server name for NetBIOS computer.
DNS Mode	Select the DNS server is coming from DHCP server or manual input. It has totally 3 DNS servers can be input. If choose DNS server is granted from DHCP server then it will refer to WAN/LAN1 port.
DNS Server 1,2,3	Domain Name Service (DNS) server IP address.

Network Configuration (NIC port)	
Link speed	Display associated NIC port link speed.
Link status	Display associated NIC port link status.
MAC address	MAC address of the network interface.
Jumbo Frame Support	Enable or disable Jumbo Frame Support of associate interface on your Thecus VisoGuard.
IPv4/IPv6	Click to enable IPv4/IPv6 for TCP/IP. The default is IPv4 enabled.
Mode	It can choose a static IP or Dynamic IP.
IP	IP address of associate NIC interface.
Netmask/Prefix Length	Input netmask for IPv4 and Prefix length for IPv6.
Gateway	Gateway for associate NIC.
Default gateway	It can be choose from drop down list of default gateway been used for the Thecus VisoGuard.

NOTE

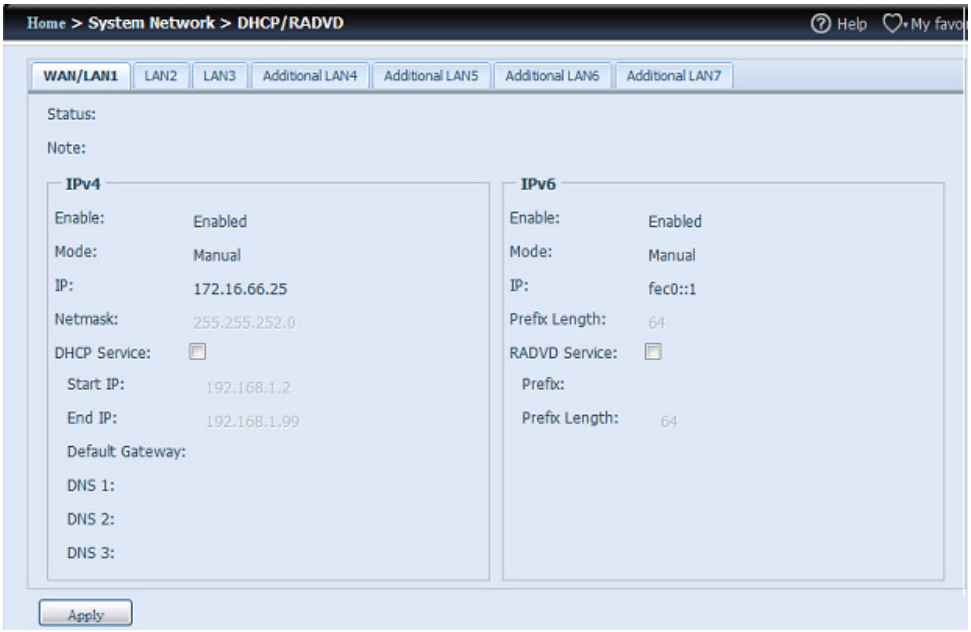
- Only use Jumbo Frame settings when operating in a Gigabit environment where all other clients have Jumbo Frame Setting enabled.
- A correct DNS setting is vital to networks services, such as SMTP and NTP.

WARNING

Most Fast Ethernet (10/100) Switches/Routers do not support Jumbo Frame and you will not be able to connect to your Thecus NAS after Jumbo Frame is turned on.

DHCP/RADVD

From the **System Network** menu, choose ***DHCP/RADVD***, and the **DHCP/RADVD Configuration** screen appears. This screen displays available NIC status. And for each NIC it can be configured to act as DHCP/RADVD server if it is static IP been setup.



DHCP/RADVD Server Configuration

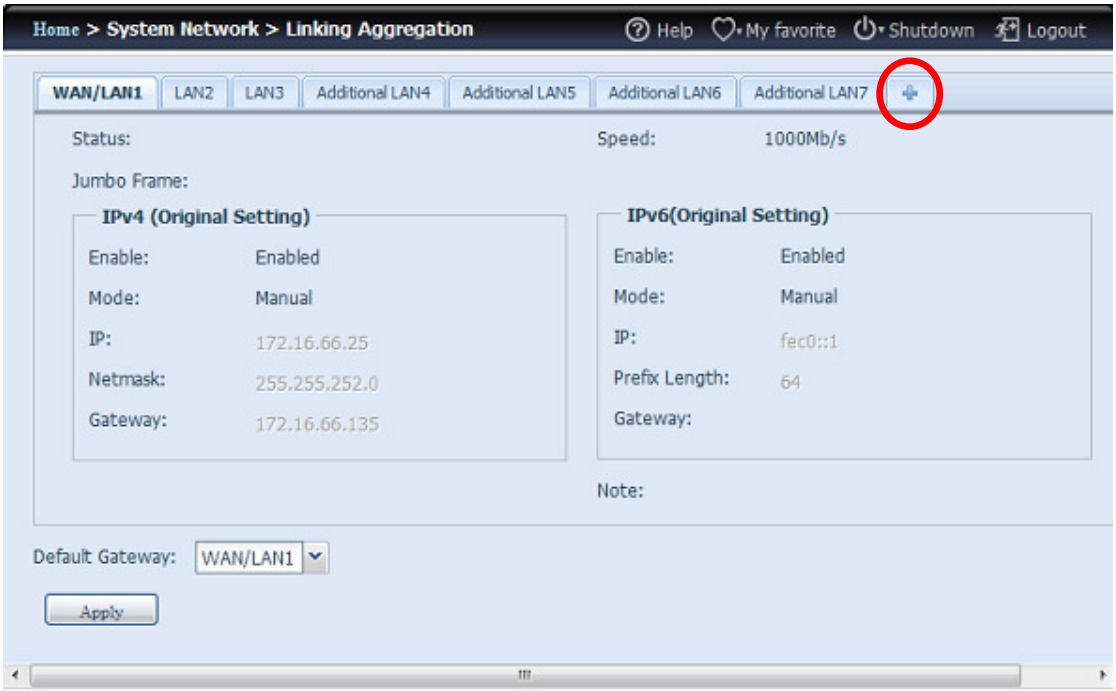
A DHCP/RADVD server can be configured to assign IP addresses (IPv4) or Prefix (IPv6) to devices connected to the associated NIC port.

DHCP Configuration	
Item	**Description**
DHCP/RADVD Server	Enable or disable the DHCP/RADVD server to automatically assign IP address to PCs connected to associate NIC interface.
Start IP (IPv4)	Specifies the lower IP address of the DHCP range.
End IP in (IPv4)	Specifies the highest IP address of the DHCP range.
Default Gateway (IPv4)	Specifies gateway for the DHCP server service.
DNS Server 1,2,3 (IPv4)	Displayed the DNS server IP address.
Prefix (IPv6)	Specifies prefix
Prefix Length (IPv6)	Specifies prefix length

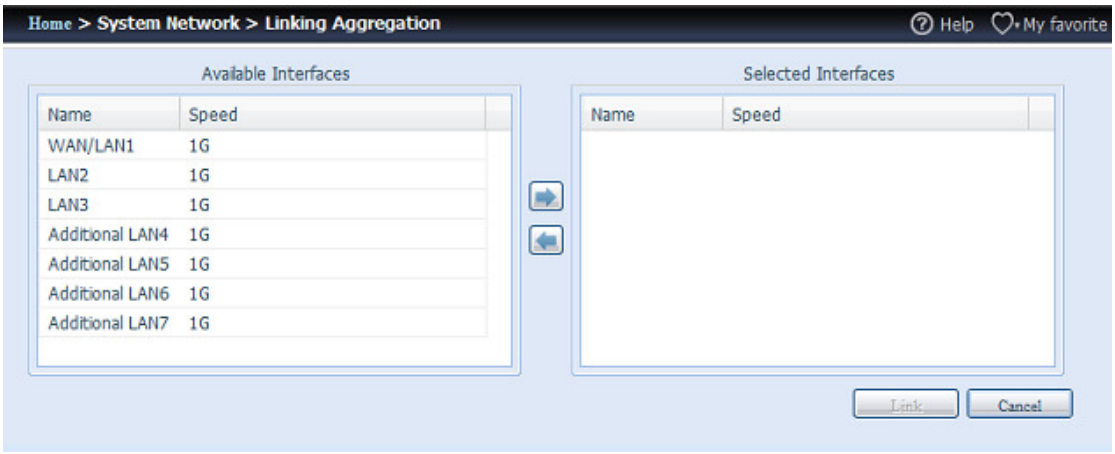
WARNING The IP address of associate NIC should not be in the range of the Start IP address and End IP address (IPv4).

Linking Aggregation

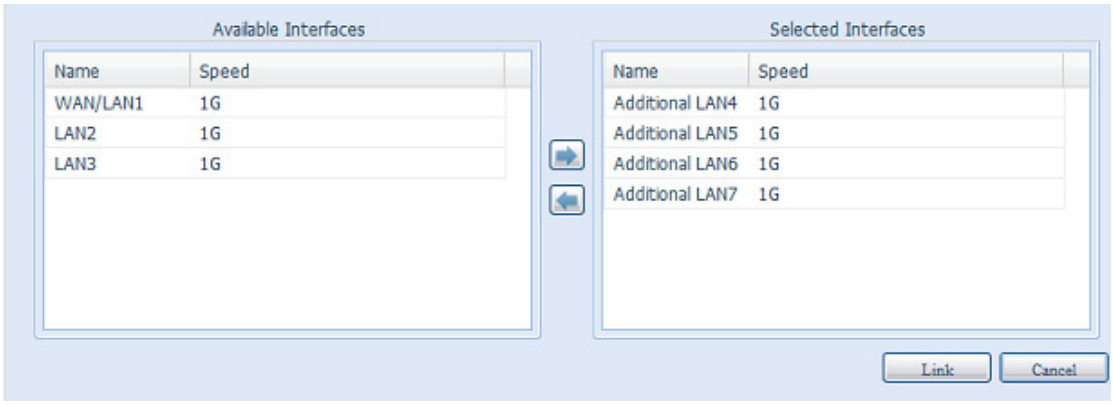
The Thecus VisoGuard supports link aggregation from either on board network port or additional NIC. Simple click on "+" as screen shot indicate below.



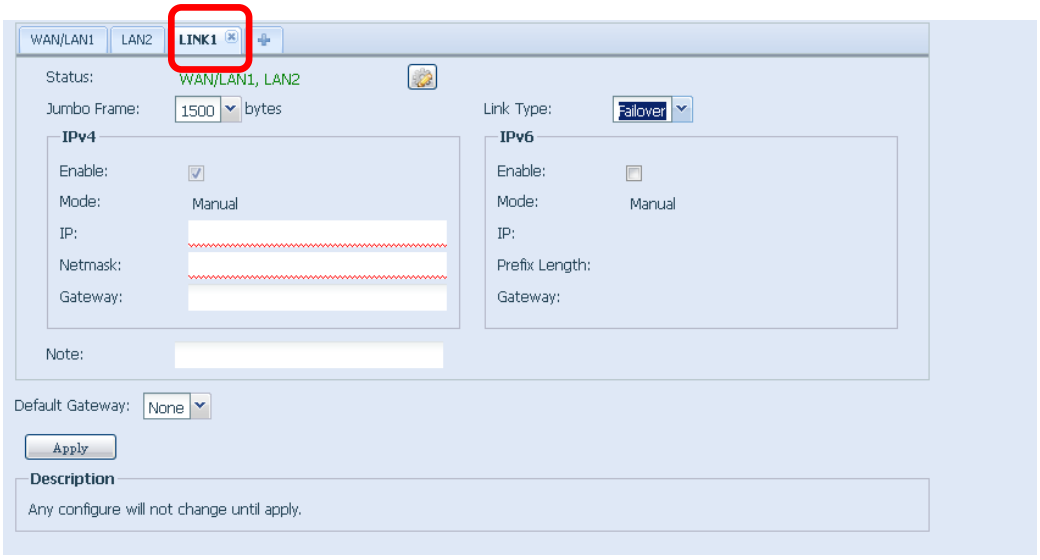
The associated screen shot will appear after "+" clicked.



Select from available network port then move over to selected box.



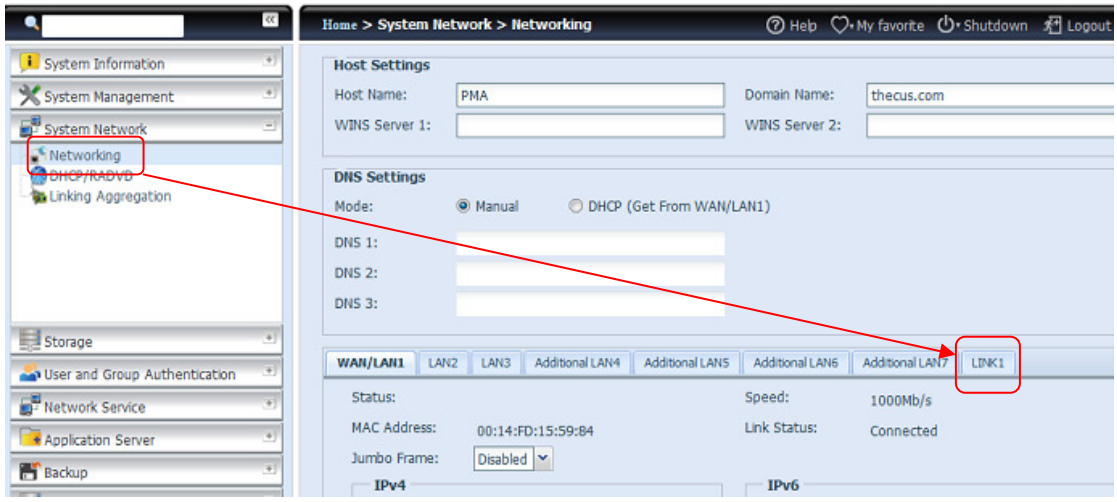
Click "Link" to confirm the selection. Then related screen will appear for more setting required to complete link aggregation configuration.



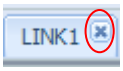
Link1 Configuration	
Status	Specific the network ports been used with associate link aggregation. Click on  to modify selected network ports.

Jumbo Frame Support	Enable or disable Jumbo Frame Support of associate interface on your Thecus VisoGuard.
Link Type	Select from drop down list for desired mode.
IPv4/IPv6	Click to enable IPv4/IPv6 for TCP/IP. The default is IPv4 enabled.
Mode	It has to be static IP with link aggregation been used.
IP	IP address of link aggregation. .
Netmask/Prefix Length	Input netmask for IPv4 and Prefix length for IPv6.
Gateway	Gateway for associate link aggregation
Default gateway	It can be choose from drop down list of default gateway been used for the Thecus VisoGuard.

Now under the networking, it will have "Link1" appear from network title bar.



To modify or delete LINK1, go to Link Aggregation setting page. Click on 

to modify setting or click on 

to delete this link aggregation. It can certainly create 2nd link aggregation by click  if there are still available network ports.

Storage Management

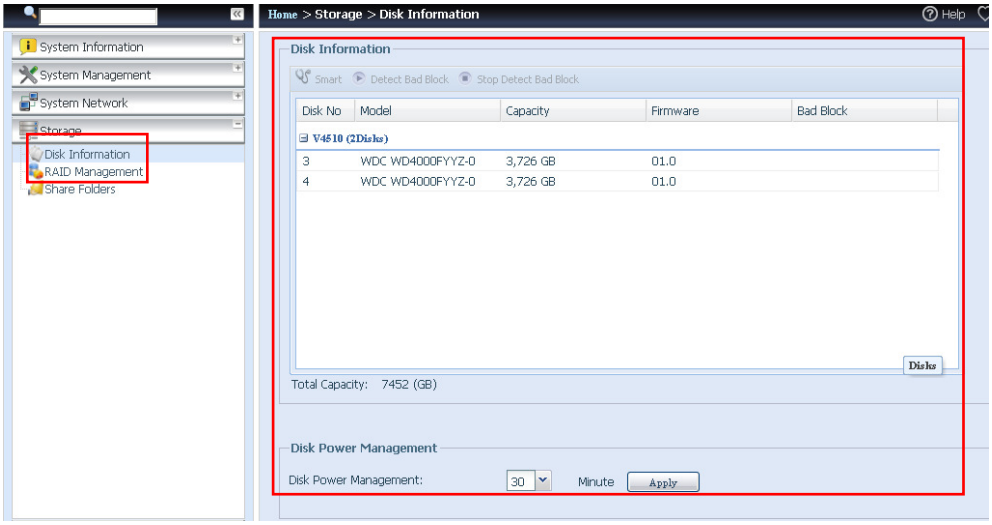
The **Storage** menu displays the status of storage devices installed in the Thecus VisoGuard, and includes storage configuration options such as RAID and disk settings, folder configuration.

Disks Information

From the **Storage** menu, choose the ***Disks*** item and the **Disks Information** screen appears. From here, you can see various items about installed SATA/SAS hard disks. Blank lines indicate that hard disk is not currently installed in that particular disk slot.

NOTE

- The screen shot below just example from Thecus NVR. The disk slots can from 2,4,8,12 to 16 depend on the model of Thecus NVR.

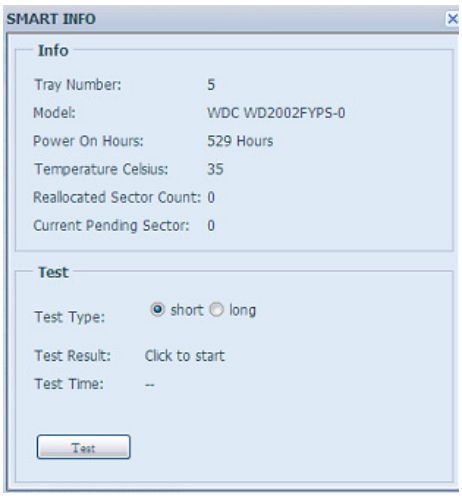


Disks Information	
Item	**Description**
Disk No.	Indicates disk location.
Capacity	Shows the SATA hard disk capacity.
Model	Displays the SATA hard disk model name.
Firmware	Shows the SATA hard disk firmware version.
Bad Block scan	Yes to start scan Bad Block.

S.M.A.R.T. Information

On the **Disks Information** screen, the status of each disk will be displayed in the **Status** column. Clicking on an ***OK*** or ***Warning*** link will display the **S.M.A.R.T Information** window for that particular disk.

You may also perform disk SMART test (not apply for SAS HDD), simply to click "Test" to start with. The result is only for reference and system will not take any action from its result.



S.M.A.R.T. Information

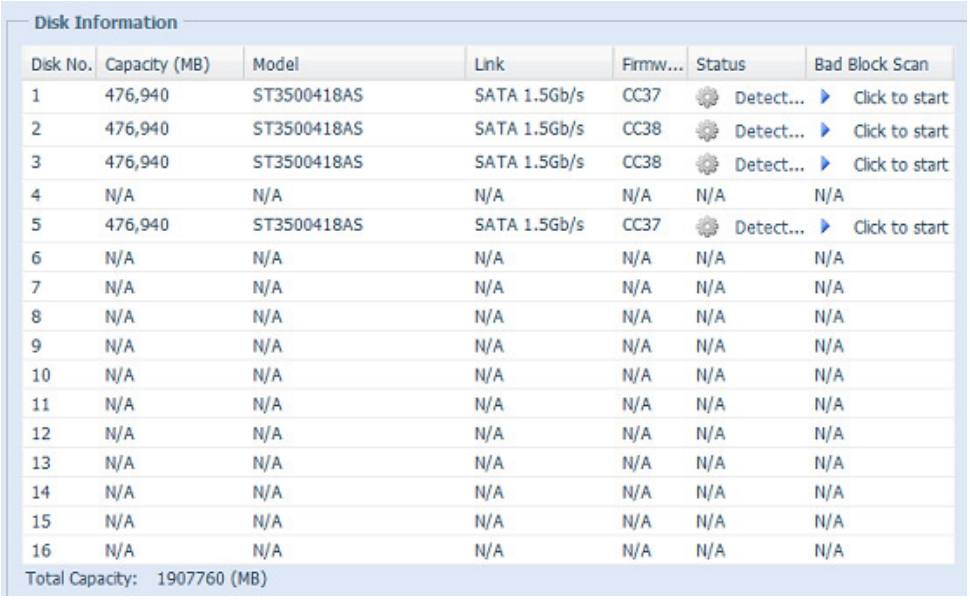
Item	Description
Tray Number	Tray the hard disk is installed in.
Model	Model name of the installed hard disk.
Power ON Hours	Count of hours in power-on state. The raw value of this attribute shows total count of hours (or minutes, or seconds, depending on manufacturer) in power-on state.
Temperature Celsius	The current temperature of the hard disk in degrees Celsius
Reallocated Sector Count	Count of reallocated sectors. When the hard drive finds a read/write/verification error, it marks this sector as "reallocated" and transfers data to a special reserved area (spare area). This process is also known as remapping and "reallocated" sectors are called remaps. This is why, on a modern hard disks, you can not see "bad blocks" while testing the surface - all bad blocks are hidden in reallocated sectors. However, the more sectors that are reallocated, the more a decrease (up to 10% or more) can be noticed in disk read/write speeds.
Current Pending Sector	Current count of unstable sectors (waiting for remapping). The raw value of this attribute indicates the total number of sectors waiting for remapping. Later, when some of these sectors are read successfully, the value is decreased. If errors still occur when reading sectors, the hard drive will try to restore the data, transfer it to the reserved disk area (spare area), and mark this sector as remapped. If this attribute value remains at zero, it indicates that the quality of the corresponding surface area is low.
Test Type	Set short or long time to test.
Test Result	Result of the test.
Test Time	Total time of the test.

NOTE

If the Reallocated Sector Count > 32 or Current Pending Sector of a hard disk drive > 0 , the status of the disk will show "Warning". This warning is only used to alert the system administrator that there are bad sectors on the disk, and they should replace those disks as soon as possible.

Bad Block Scan

On the **Disks Information** screen, you may also perform disk bad block scan, simply to click "Click to start" to start with. The result is only for reference and system will not take any action from its result.

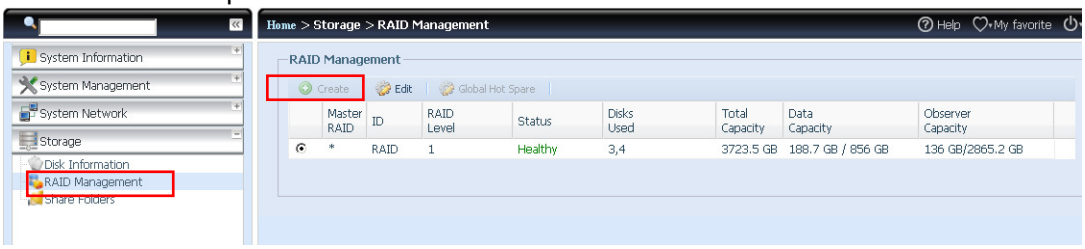


The testing result will be stay till system reboot with "Yet to start" displayed as default.

RAID Information

From the **Storage** menu, choose the ***RAID*** item and the **RAID Information** screen appears.

This screen lists the RAID volumes currently residing on the Thecus VisoGuard. From this screen, you can get information about the status of your RAID volumes, as well as the capacities allocated for data.



RAID Information	
Item	**Description**
Master RAID	The RAID volume currently designated as the Master RAID volume.
ID	ID of the current RAID volume. **NOTE: All RAID IDs must be unique.**
RAID Level	Shows the current RAID configuration.
Status	Indicates status of the RAID. Can read either ***Healthy***, ***Degraded***, or ***Damaged***.
Disks Used	Hard disks used to form the current RAID volume.
Total Capacity	Total capacity of the current RAID.
Data Capacity	Indicates the used capacity and total capacity used by user data.

Create a RAID

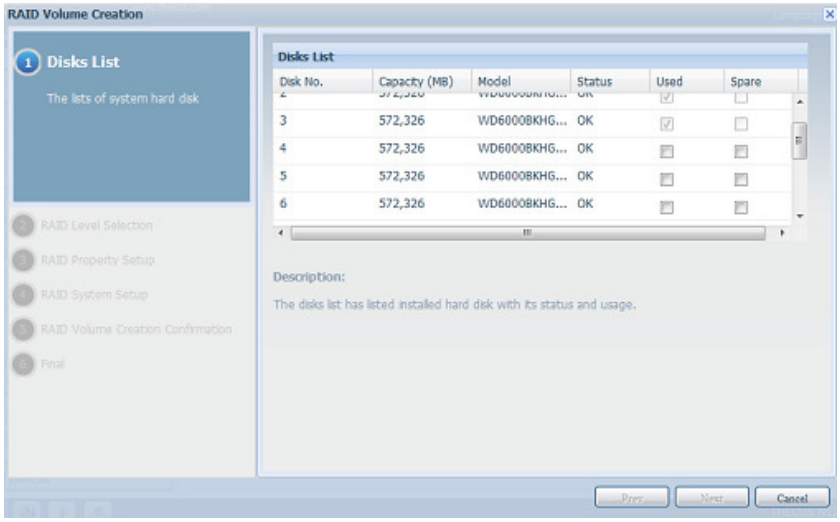
On the **RAID Information** screen, press the ***create*** button to go to the **CREATE RAID** screen. In addition to RAID disk information and status, this screen lets you make RAID configuration settings.

Using **Create RAID**, you can select stripe size, choose which disks are RAID disks or the Spare Disk. .

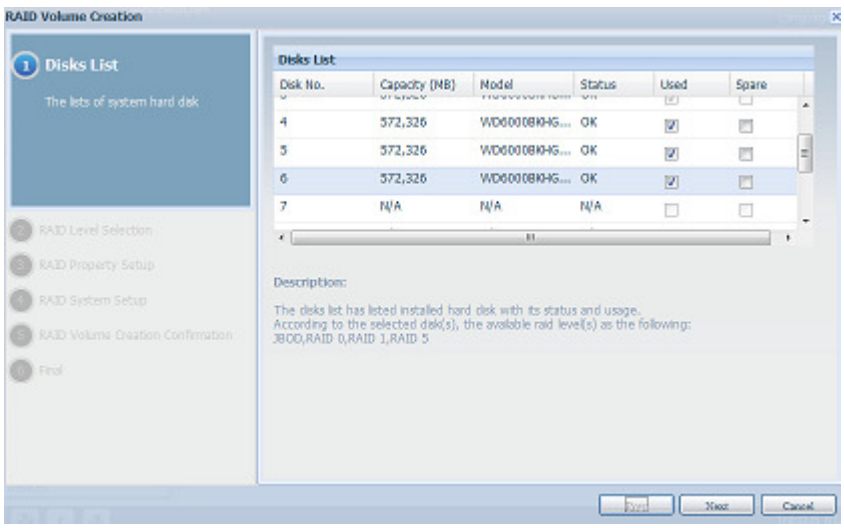
RAID Configurations	
Item	**Description**
Disk No.	Number assigned to the installed hard disks.
Capacity (MB)	Capacity of the installed hard disks.
Model	Model number of the installed hard disks.
Status	Status of the installed hard disks.
Used	If this is checked, current hard disk is a part of a RAID volume.
Spare	If this is checked, current hard disk is designated as a spare for a RAID volume.
Master RAID	Check a box to designate this as the Master RAID volume. See the **NOTE** below for more information.
Stripe Size	This sets the stripe size to maximize performance of sequential files in a storage volume. Keep the 64K setting unless you require a special file storage layout in the storage volume. A larger stripe size is better for large files.
Data Percentage	The percentage of the RAID volume that will be used to store data.
Create	Press this button to configure a file system and create the RAID storage volume.

To create a RAID volume, follow the steps below:

1. On the **RAID Information** screen, clicks create.

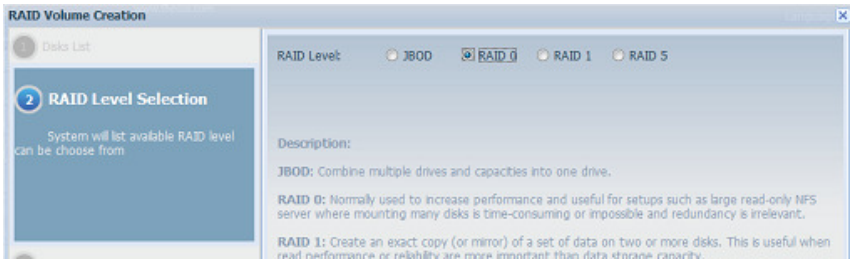


2. On the **RAID Configuration** screen, set the RAID storage space as **JBOD**, **RAID 0**, **RAID 1**, **RAID 5**, **RAID 6, RAID 10, RAID 50** or **RAID 60** (depend on model)— see **Appendix B: RAID Basics** for a detailed description of each.



NOTE Thecus VisoGuard Series only supports single RAID sysetm.

3. Specify a RAID ID.



4. Quick RAID — Enabled the quick RAID setting is going to enhance RAID creation time.

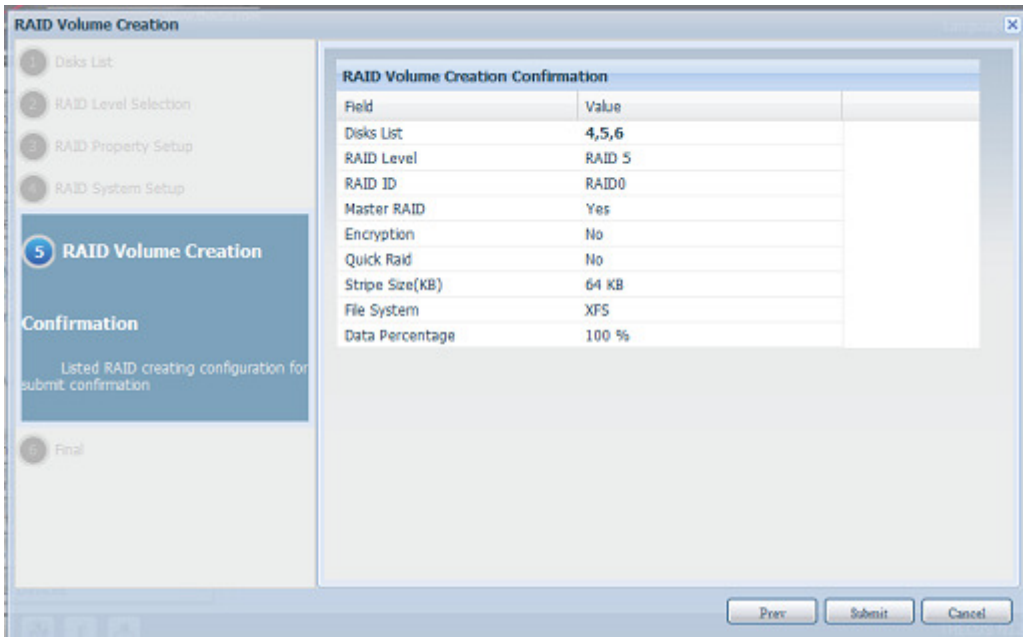
NOTE We recommend is "Quick RAID" setting is going to be used, only if hard disk is brand new or it has no existed partitions contained.

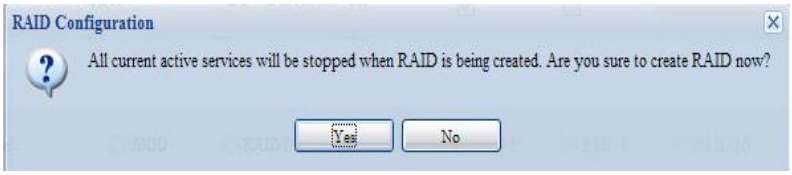
5. Specify a stripe size — 64K is the default setting.

6. Selected the file system you like to have for this RAID volume. The selection is available from XFS .

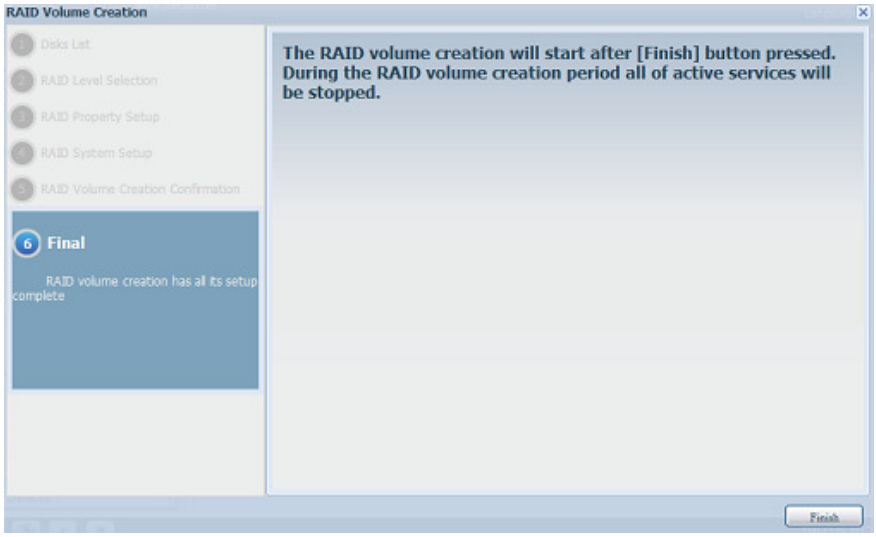
NOTE Single volume size supported:XFS → 48TB

7. Press ***Submit*** to build the RAID storage volume.





8. Press "Yes" for RAID volume creation preparation. Then click "Finish" to start up with RAID volume building.



NOTE

Building a RAID volume may take time, depending on the size of hard drives and RAID mode. In general, while the RAID volume building process is up to "RAID Building" then the data volume is capable to be accessed.

WARNING

Creating RAID destroys all data in the current RAID volume. The data is unrecoverable.

RAID Level

You can set the storage volume as **JBOD**, **RAID 0**, **RAID 1**, **RAID 5, RAID 6, RAID 10, RAID 50 or RAID 60 (depend on model)**.

Level / Model	JBOD	RAID 0	RAID 1	RAID 5	RAID 6	RAID 10	RAID 50	RAID 60
V16810U	•	•	•	•	•	•	•	•
V8810U	•	•	•	•	•	•	•	•
V6810U	•	•	•	•	•	•	•	
V4510U	•	•	•	•	•	•		
V4510	•	•	•	•	•	•		
V2510	•	•	•					

RAID configuration is usually required only when you first set up the device. A brief description of each RAID setting follows:

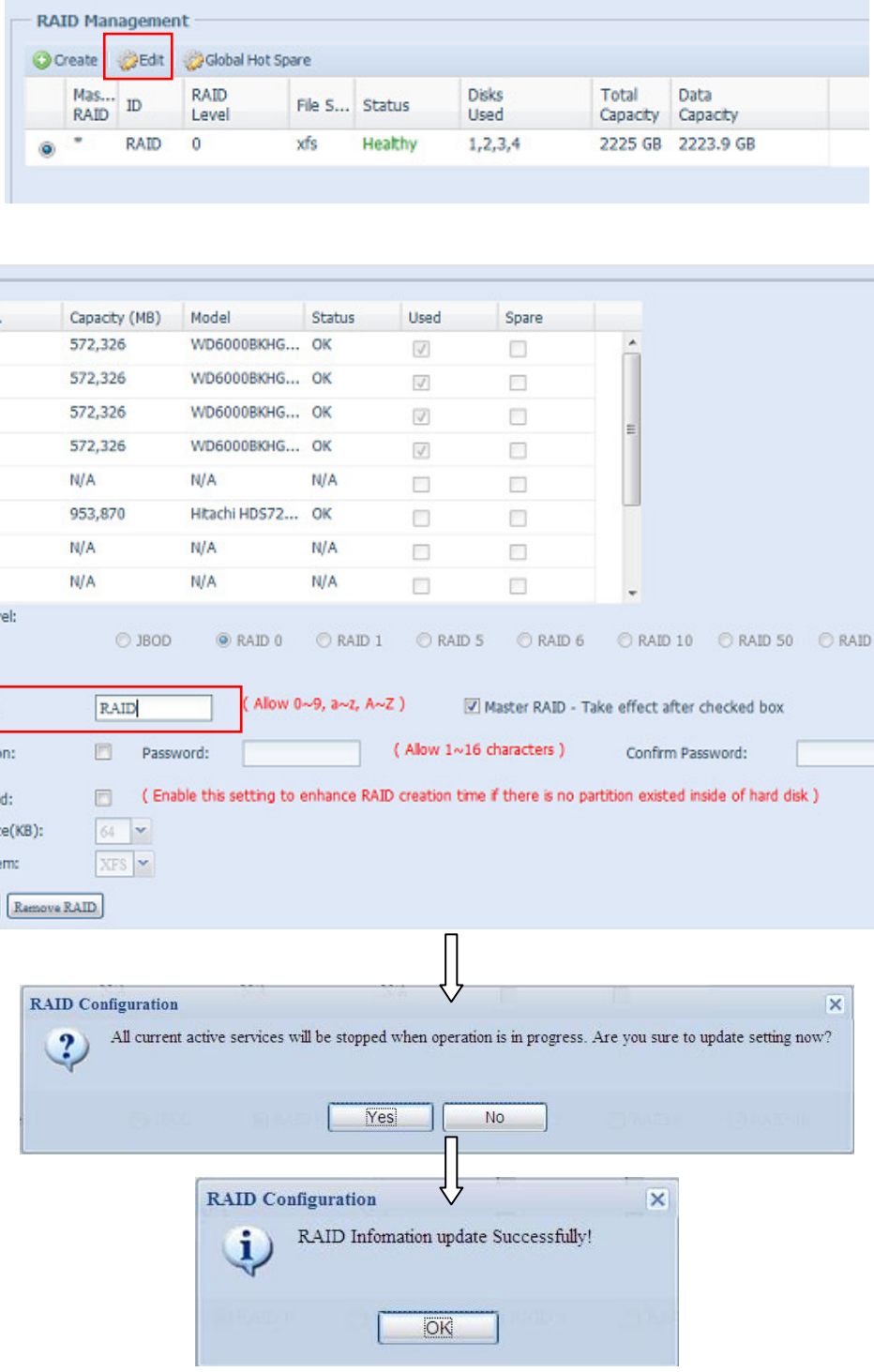
RAID Levels	
Level	**Description**
JBOD	The storage volume is a single HDD with no RAID support. JBOD requires a minimum of 1 disk.
RAID 0	Provides data striping but no redundancy. Improves performance but not data safety. RAID 0 requires a minimum of 2 disks.
RAID 1	Offers disk mirroring. Provides twice the read rate of single disks, but same write rate. RAID 1 requires a minimum of 2 disks.
RAID 5	Data striping and stripe error correction information provided. RAID 5 requires a minimum of 3 disks. RAID 5 can sustain one failed disk.
RAID 6	Two independent parity computations must be used in order to provide protection against double disk failure. Two different algorithms are employed to achieve this purpose. RAID 6 requires a minimum of 4 disks. RAID 6 can sustain two failed disks.
RAID 10	RAID 10 has high reliability and high performance. RAID 10 is implemented as a striped array whose segments are RAID 1 arrays. It has the fault tolerance of RAID 1 and the performance of RAID 0. RAID 10 requires 4 disks. RAID 10 can sustain two failed disks.
RAID 50	RAID 50 combines the straight block-level striping of RAID 0 with the distributed parity of RAID 5. This is a RAID 0 array striped across RAID 5 elements. It requires at least 6 drives.
RAID 60	RAID 60 combines the straight block-level striping of RAID 0 with the distributed double parity of RAID 6. That is, a RAID 0 array striped across RAID 6 elements. It requires at least 8 disks.

WARNING If the administrator improperly removes a hard disk that should not be removed when RAID status is degraded, all data will be lost.

Edit RAID

On the **RAID Information** screen, press the ***Edit*** button to go to the **RAID Information** screen.

Using **Edit RAID**, you can select RAID ID and the Spare Disk. .



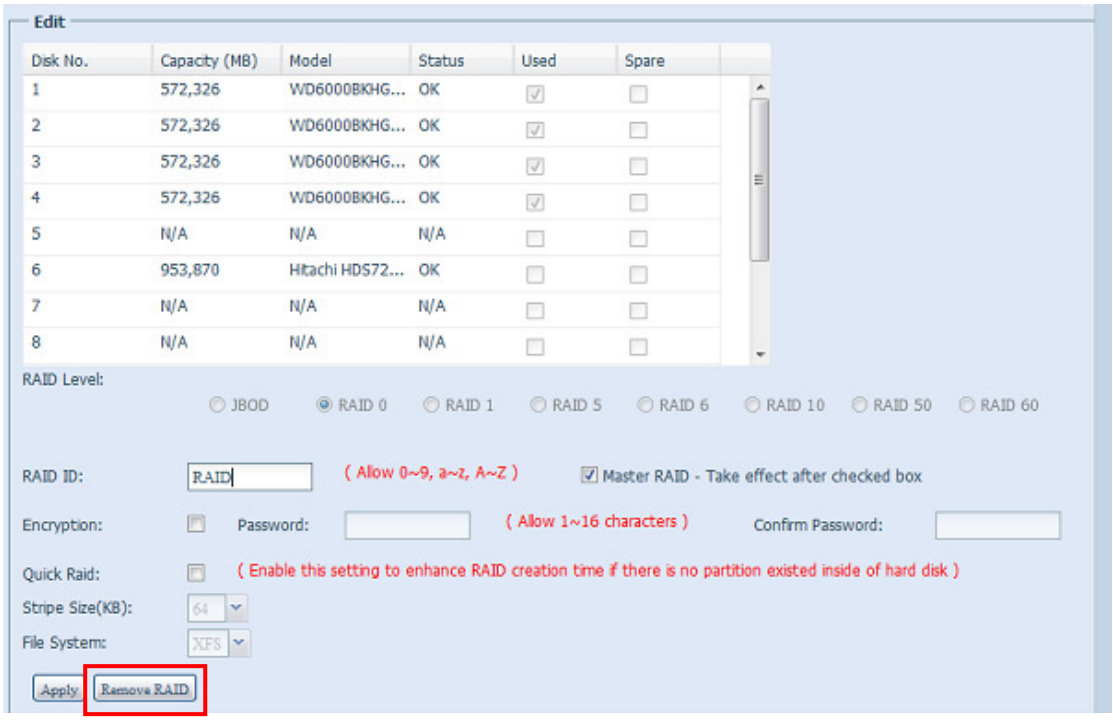
Remove RAID

Click to remove the RAID volume. All user data has been created in selected RAID volume will be removed.
To remove a RAID volume, follow the steps below:

1. On the RAID List screen, select the RAID volume by clicking on its radio button, and click ***RAID Information*** to open the **RAID Configuration** screen.

2. On the **RAID Configuration** screen, click ***Remove RAID***.

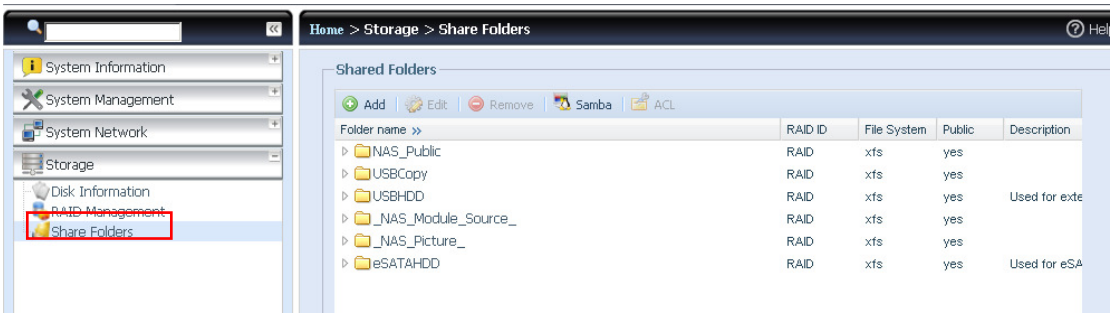
3. The confirmation screen appear, you will have to input "Yes" with exactly wording case to complete "**Remove RAID**" operation



WARNING Remove RAID destroys all data in the current RAID volume. The data is unrecoverable.

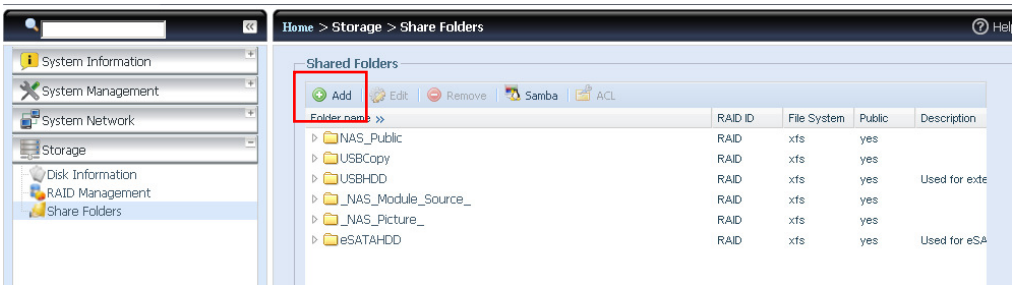
Share Folder

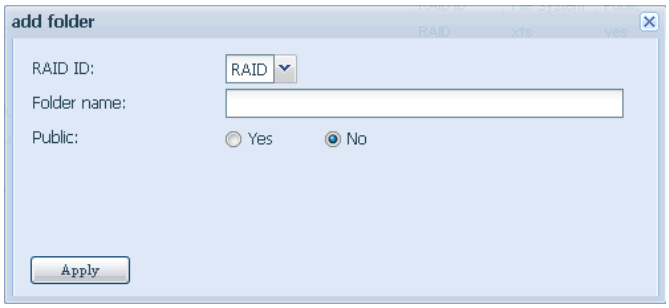
From the **Storage** menu, choose **Share *Folder***, and the **Folder** screen appears. This screen allows you to create and configure folders on the Thecus VisoGuard volume.



Adding Folders

On the **Folder** screen, press the ***Add*** button and the **Add Folder** screen appears. This screen allows you to add a folder. After entering the information, press ***Apply*** to create new folder.





Add Folder	
Item	**Description**
RAID ID	RAID volume where the new folder will reside.
Folder Name	Enter the name of the folder.
Public	Admit or deny public access to this folder. If **Yes** is selected, then users do not need to have access permission to write to this folder. When accessing a public folder via FTP, the behavior is similar to anonymous FTP. Anonymous users can upload/download a file to the folder, but they cannot delete a file from the folder.
Apply	Press ***Apply*** to create the folder.

NOTE Folder names are limited to 60 characters. Systems running Windows 98 or earlier may not support file names longer than 15 characters.

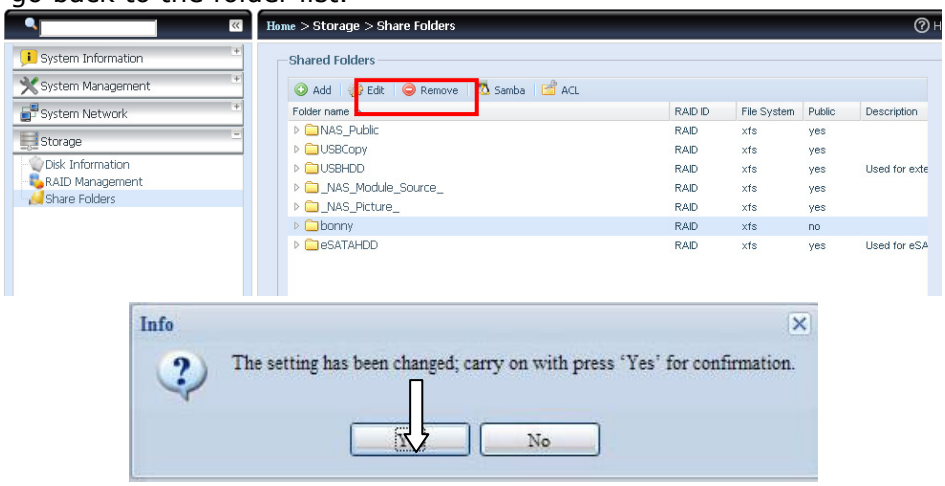
Modify Folders

On the **Folder** screen, press the ***Edit*** button and the **Modify Folder** screen appears. This screen allows you to change folder information. After entering the information, press **Apply** to save your changes.

Modify Folder	
Item	**Description**
RAID ID	RAID volume where the folder will reside.
Folder Name	Enter the name of the folder.
Public	Admit or deny public access to this folder.

Remove Folders

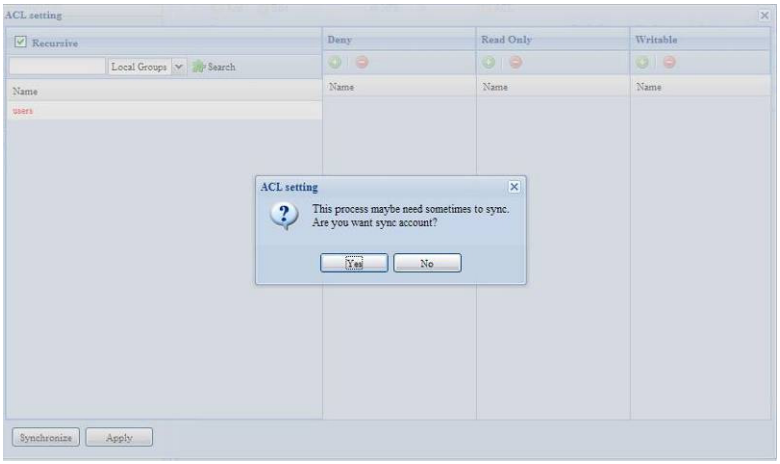
To remove a folder, press the ***Remove*** button from the specified folder row. The system will confirm folder deletion. Press ***Yes*** to delete the folder permanently or ***No*** to go back to the folder list.

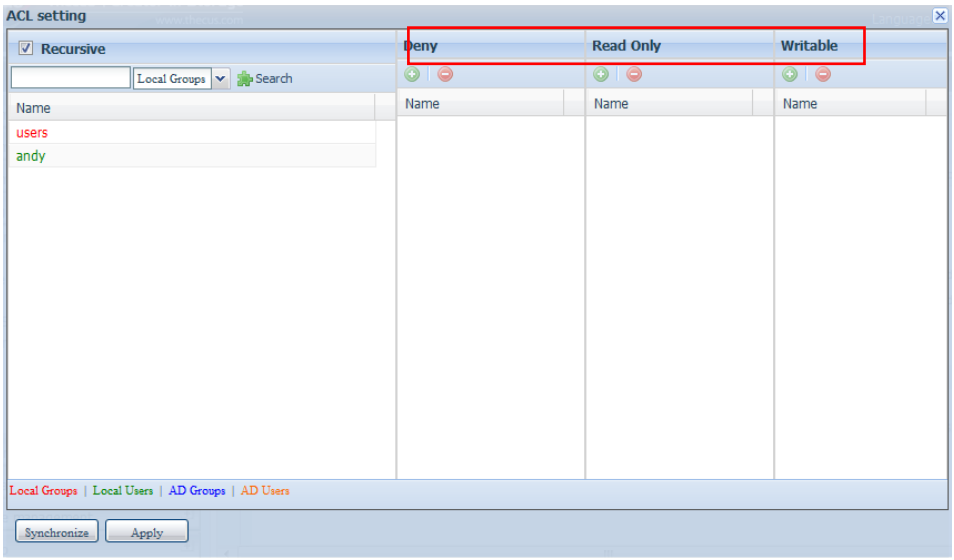


WARNING All the data stored in the folder will be deleted once the folder is deleted. The data will not be recoverable.

Folder and sub-folders Access Control List (ACL)

On the Folder screen, press the ***ACL*** button, and the **ACL setting** screen appears. This screen allows you to configure access to the specific folder and sub-folders for users and groups. Select a user or a group from the left hand column and then choose ***Deny***, ***Read Only***, or ***Writable*** to configure their access level. Press the ***Apply*** button to confirm your settings.





ACL setting	
Item	**Description**
Deny	Denies access to users or groups who are displayed in this column.
Read Only	Provides Read Only access to users or groups who are displayed in this column.
Writable	Provides Write access to users or groups who are displayed in this column.
Recursive	Enable to inherit the access right for all its sub-folders.

To configure folder access, follow the steps below:

1. On the **ACL** screen, all network groups and users are listed in the left hand column. Select a group or user from this list.

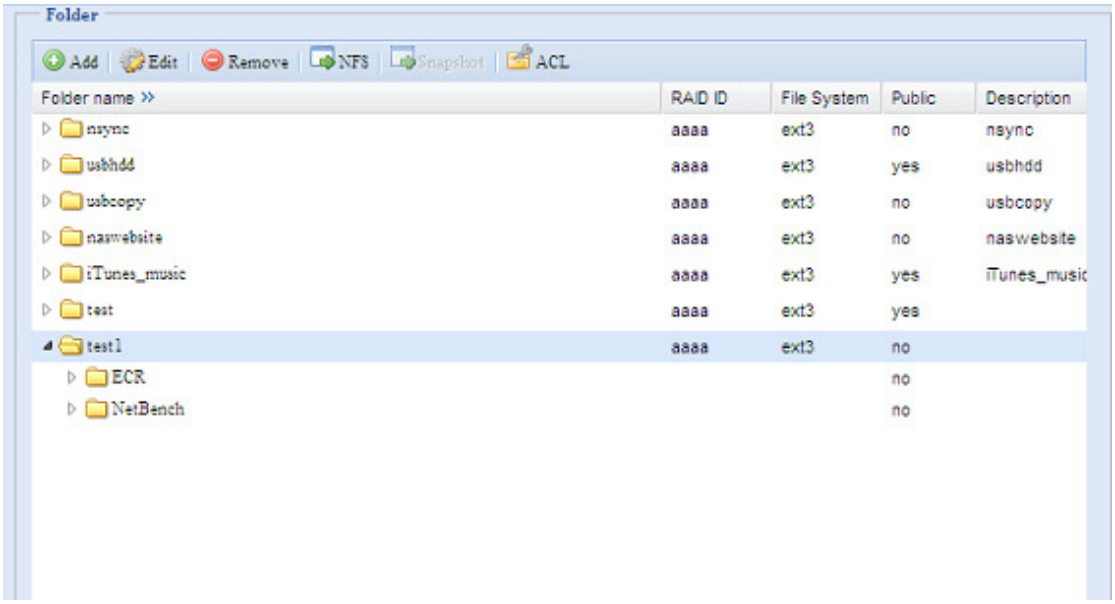
2. With the group or user selected, press one of the buttons from the three access level columns at the top. The group or user then appears in that column and has that level of access to the folder.

3. Continue selecting groups and users and assigning them access levels using the column buttons.
4. To remove a group or user from an access level column, press the ***Remove***  button in that column.

5. When you are finished, press ***Apply*** to confirm your ACL settings.

NOTE If one user has belonged to more than one group but different privilege than the priority Deny > Read Only > Writable

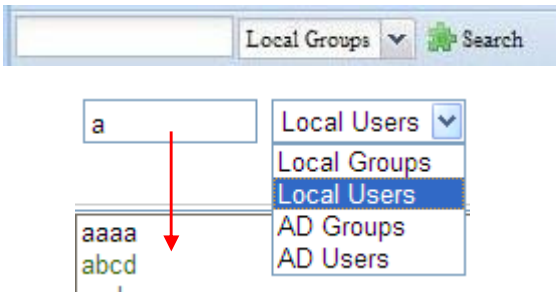
To setup sub-folders ACL, click on " ▷ " symbol to extract sub folders list as screen shot shows below. You may carry on with same steps as share level ACL setting.



NOTE The ACL can be set for share and sub-folders level, not for files.

The ACL screen also allows you to search for a particular user. To do this, follow the steps below:

1. In the blank, enter the name of the user you would like to find.
2. From the drop down select the group you would like to search for the user in.
3. Click ***Search***.



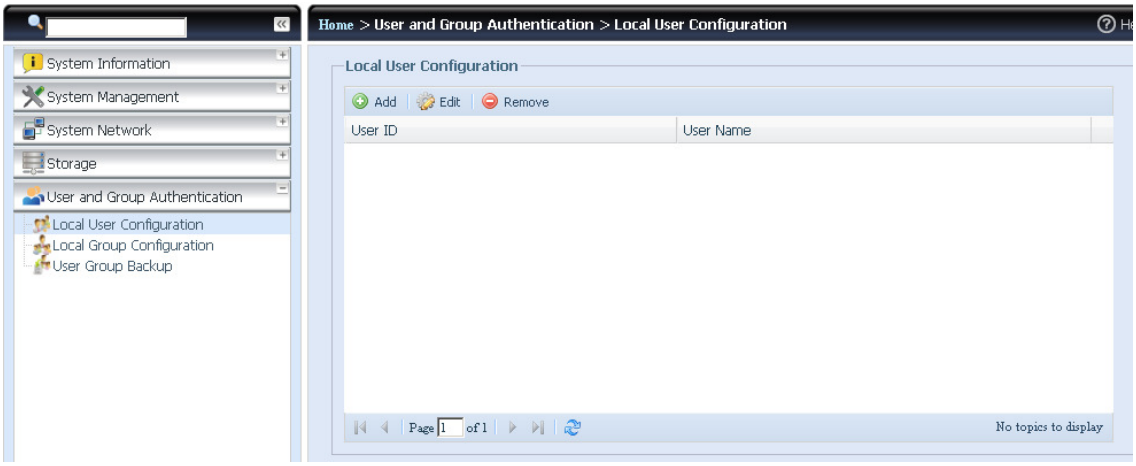
NOTE The system will list up to 1,000 users from the chosen category. To narrow your search, enter a search term in the blank provided.

User and Group Authentication

The Thecus VisoGuard has built-in user database that allows administrators to manage user access using different group policies. From the **User and Group Authentication** menu, you can create, modify, and delete users, and assign them to groups that you designate.

Local User Configuration

From the **Accounts** menu, choose the **User** item, and the **Local User Configuration** screen appears. This screen allows you to **Add**, **Edit**, and **Remove** local users.



Local User Configuration	
Item	**Description**
Add	Press the ***Add*** button to add a user to the list of local users.
Edit	Press the ***Edit*** button to modify a local user.
Remove	Press the ***Remove*** button to delete a selected user from the system.

Add Users

1. Click on the ***Add*** button on **Local User Configuration** screen, and **Local User Setting** screen appears.

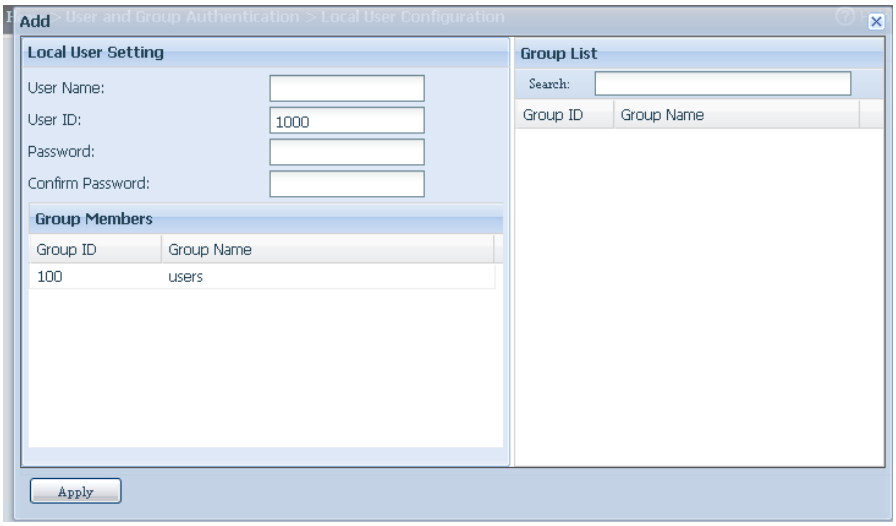
2. On the **Local User Setting** screen, enter a name in the **User Name** box.

3. Enter a **User ID** number or left to use system default value.

4. Enter a password in the **Password** box and re-enter the password in the **Confirm** box.

5. Select which group the user will belong to. **Group Members** is a list of groups this user belongs to. **Group List** is a list of groups this user does not belong to. Use the **<<** or **>>** buttons to have this user join or leave a group.

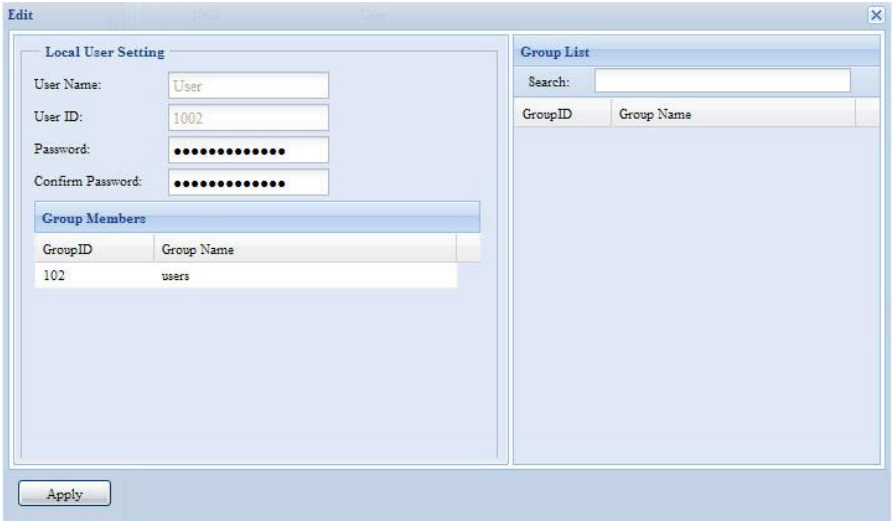
6. Press the ***Apply*** button and the user is created.



NOTE All users are automatically assigned to the 'users' group.

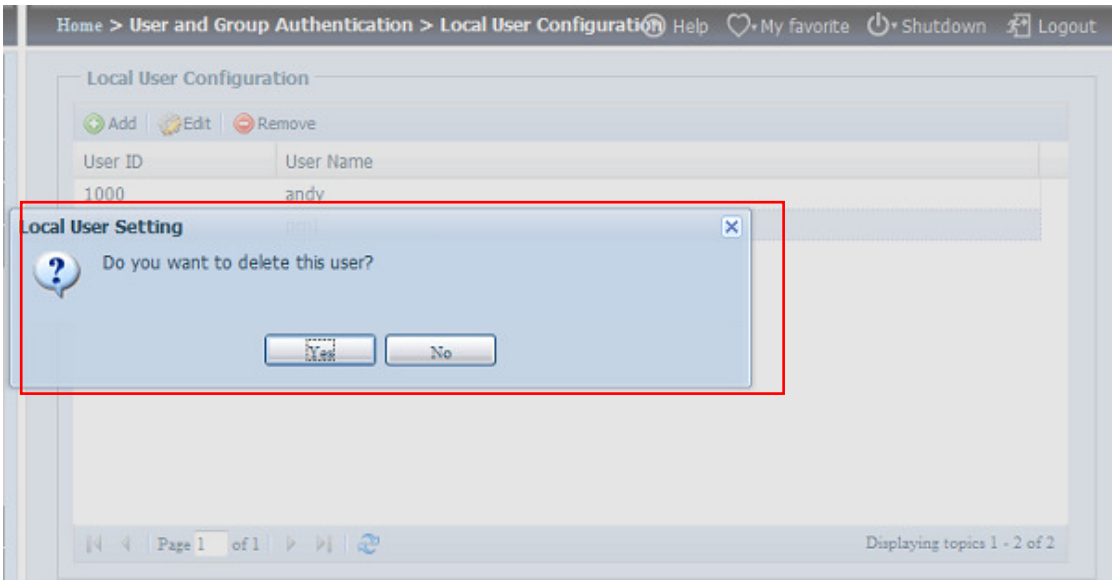
Edit Users

1. Select an existing user from the **Local User Configuration** screen.
2. Click on the ***Edit*** button, and **Local User Setting** screen appears.
3. From here, you can enter a new password and re-enter to confirm, or use the **<<** or **>>** buttons to have this user join or leave a group. Click the ***Apply*** button to save your changes.



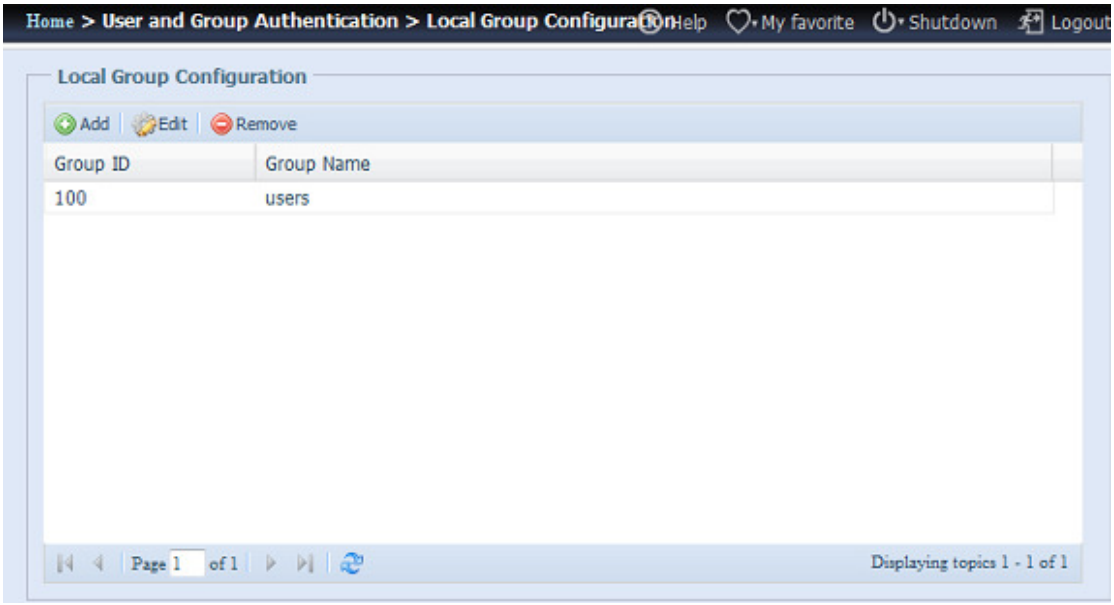
Remove Users

1. Select an existing user from the **Local User Configuration** screen.
2. Click on ***Remove*** button and the user is deleted from the system.



Local Group Configuration

From the **Accounts** menu, choose the ***Group*** item, and the **Local Group Configuration** screen appears. This screen allows you to **Add**, **Edit**, and **Remove** local groups.

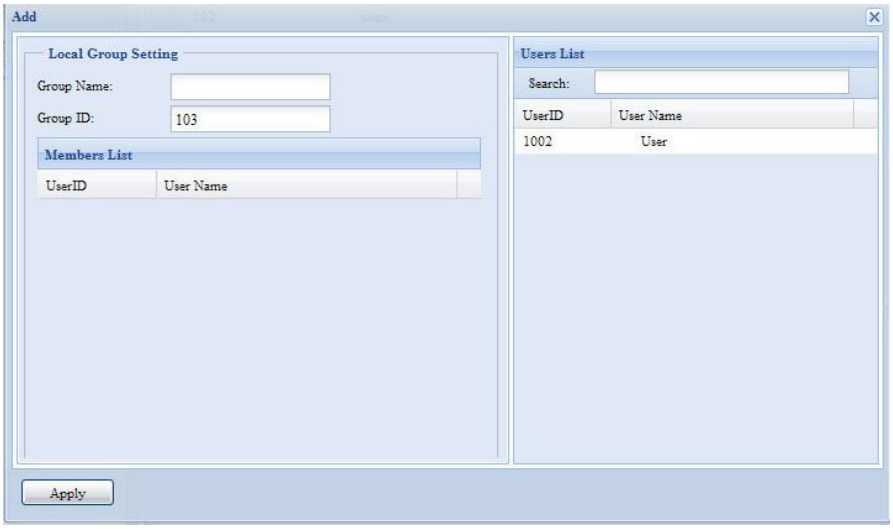


Local Group Configuration	
Item	**Description**
Add	Press the ***Add*** button to add a user to the list of local groups.
Edit	Press the ***Edit*** button to modify a selected group from the system.
Remove	Press the **Remove** button to delete a selected group from the system.

Add Groups

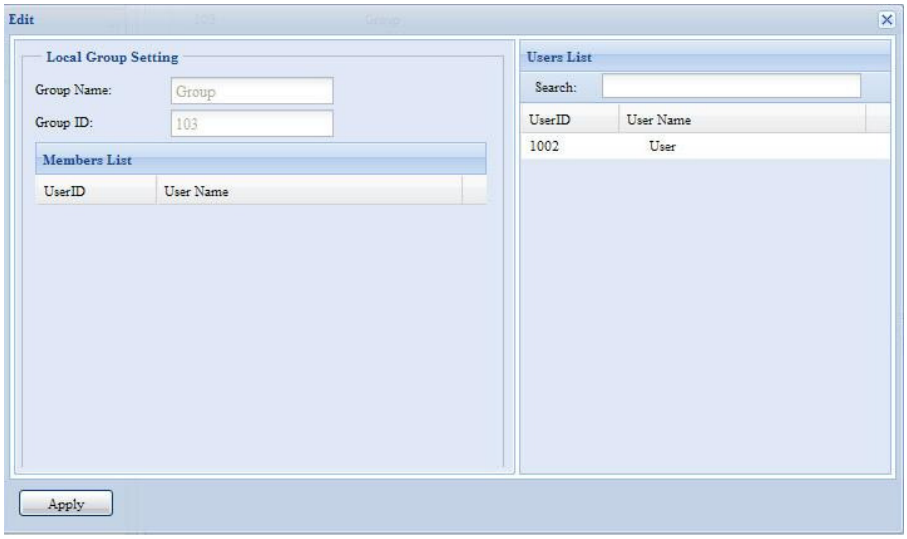
1. On the **Local Group Configuration** screen, click on the ***Add*** button.
2. The **Local Group Setting** screen appears.
3. Enter a **Group Name**.
4. Enter a **Group ID** number. If left blank, the system will automatically assign one.

5. Select users to be in this group from the **Users List** by adding them to the **Members List** using the **<<** button.
6. Click the ***Apply*** button to save your changes.



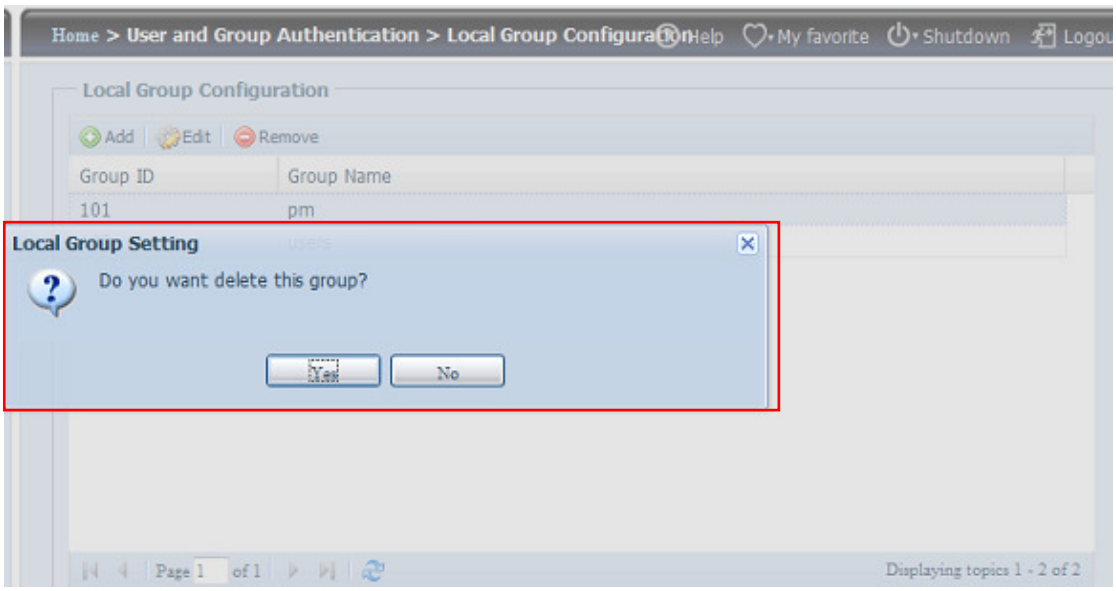
Edit Groups

1. On the **Local Group Configuration** screen, select a group name from the list.
2. Press the ***Edit*** button to modify the members in a group.
3. To add a user into a group, select the user from the **Users List**, and press the **<<** button to move the user into the **Members List**.
4. To remove a user from a group, select the user from **Members List**, and press the **>>** button.
5. Click the ***Apply*** button to save your changes.



Remove Groups

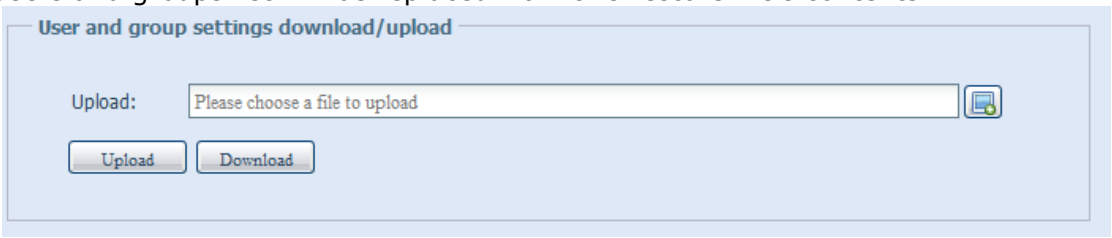
1. On the **Local Group Configuration** screen, select a group name from the list.
2. Press ***Remove*** to delete the group from the system.



User and Group Backup

The user and group backup feature is allowed system users and groups been backup to other location and restore it while needed.

Please be noticed when restore previous backup users and groups, the current users and groups list will be replaced from this restore file's contents.

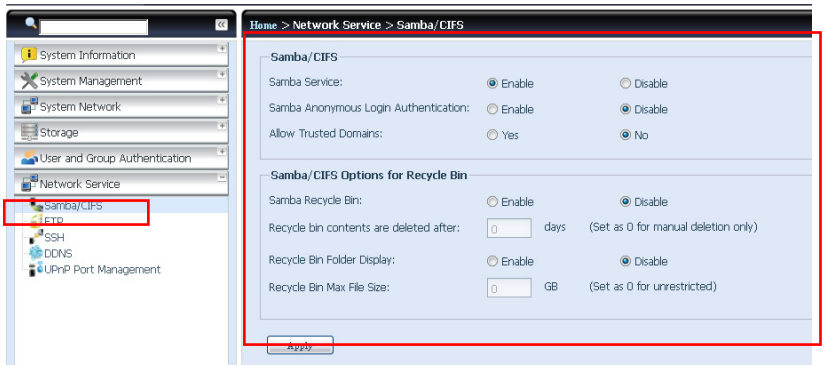


Network Service

Use the **Network** Service menu to make network service support settings.

Samba / CIFS

There are options is currently allow Admin to Enable/Disable to operate Thecus VisoGuard associated with Samba / CIFS protocol. With the option changed, it will need to reboot system to activate.



Samba Service

Used for letting the operating system of UNIX series and SMB/CIFS of Microsoft Windows operating system (Server Message Block / Common Internet File System).Do the link in network protocol. Enable or Disable SMB/CIFS protocol for Windows, Apple, Unix drive mapping.

NOTE

- In some environments, due to security concerns, you may wish to disable SMB/CIFS as a precaution against computer viruses.

Samba Recycle Bin

The Thecus VisoGuard is supported recycle bin via SMB/CIFS protocol. Simply enable it then all of deleted files/folders will reside in the ".recycle" folder with hidden attribution in each share.

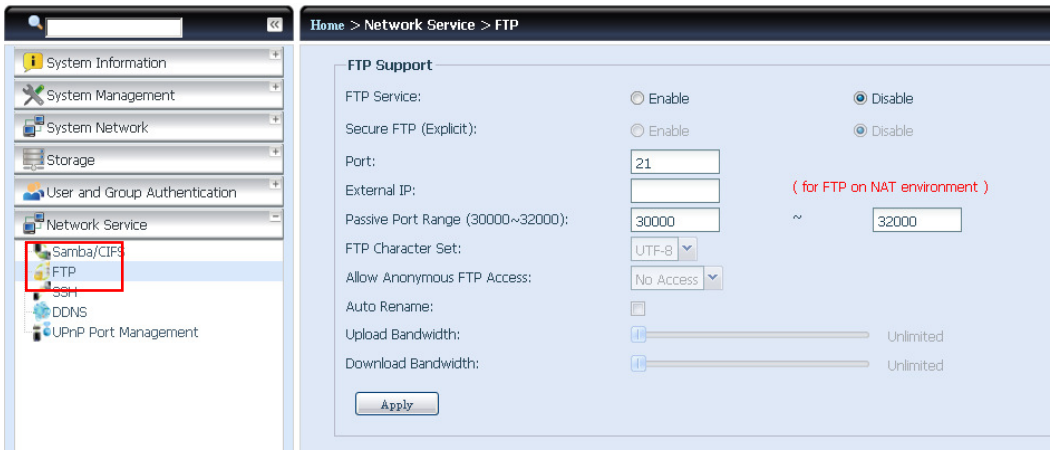
In general, Windows has default to invisible all of hidden folders/files. So please enable this option to view ".recycle" folder.

Samba Anonymous Login Authentication

To enable this option, no matter there is share folder has been created in public access. The user account and password is needed from system to access under SMB/CIFS protocol. On the other hand, no more anonymous login is allowed.

FTP

Thecus VisoGuard can act as a FTP server, enabling users to download and upload files with their favorite FTP programs. From the **System Network** menu, choose the ***FTP*** item, and the **FTP** screen appears. You can change any of these items and press ***Apply*** to confirm your settings.



A description of each item follows:

FTP	
Item	**Description**
FTP	Enable FTP Service on Thecus VisoGuard.
Security FTP	Enable or disable Security FTP, be sure the client FTP software has also security FTP setting enabled.
Port	Specifies the port number of an incoming connection on a non-standard port.

External IP	Input the public IP address of router while Thecus secure FTP server has been enabled. It could help to response ftp client with correct communicate information.
Passive Port Range (30000-32000)	limited port range for the FTP server to use.
FTP ENCODE	If your FTP client or operating system does not support Unicode (e.g. Windows® 95/98/ME or MAC OS9/8), select the same encoding as your OS here in order to properly view the files and directories on the server. Available options are BIG5, HZ, GB2312, GB18030, ISO, EUC-JP, SHIFT-JIS and UTF-8.
Allow Anonymous FTP Access	**Upload/Download:** Allow anonymous FTP users to upload or download files to/from public folders. **Download:** Allow anonymous FTP users to download files from public folders. **No access:** Block anonymous FTP user access.
Auto Rename	If checked, the system will automatically rename files that are uploaded with a duplicate file name. The renaming scheme is `[filename].#`, where # represents an integer.
Upload Bandwidth	You may set the maximum bandwidth allocated to file uploads. Selections include **Unlimited, 1 ~ 32 MB/s.**
Download Bandwidth	You may set the maximum bandwidth allocated to file downloads. Selections include **Unlimited, 1 ~ 32 MB/s.**

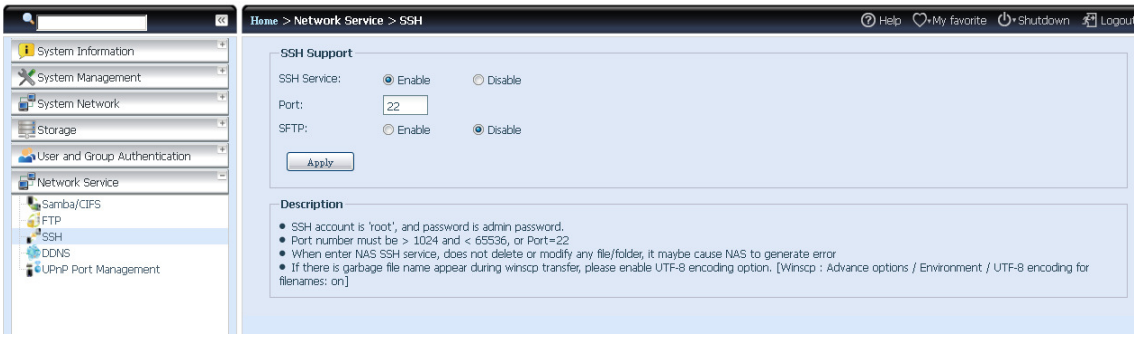
To access the share folder on Thecus VisoGuard, use the appropriate user login and password set up on the **Users** page. Access control to each share folder is set up on the **ACL** page (***Storage Management*** > **Shore *Folder*** > ***ACL***).

SSH

The device is now SSH protocol supported. It is allowed user to use SSH and having console to manipulate per needed. The SSH default login user name is "root" with full privilege and password is admin's password. The default admin password is "admin" so once the admin password has changed then SSH login needed to change the password too.

A description for each item as following:

SSH	
Item	**Description**
SSH Service	Enable or disable SSH service.
Port	The port number is default 22.
SFTP	Enable or disable SFTP protocol under SSH service.
Apply	Click "Apply" to confirm the changes.



DDNS

To set up a server on the Internet and enable the users to connect to it easily, a fixed and easy-to remember host name is often required. However, if the ISP provides only dynamic IP address, the IP address of the server will change from time to time and is difficult to recall. You can enable the DDNS service to solve the problem.
After enabling the DDNS service of the NVR, whenever the NVR restarts or the IP address is changed, the NVR will notify the DDNS provider immediately to record the new IP address. When the user tries to connect to the NVR by the host name, the DDNS will transfer the recorded IP address to the user.
The NVR supports the DDNS providers:
DyDNS.org(Dynamic DNS),DyDNS.org(Custom DNS),DyDNS.org(Static DNS), www.zoneedit.com,www.no-ip.com.

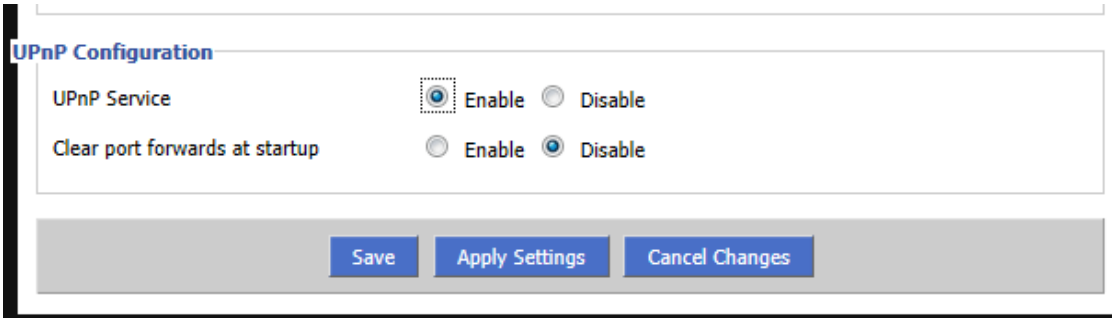
A description for each item as following:

DDNS	
Item	**Description**
DDNS Service	Enable or disable DDNS service.
Register	Choose the service provider from drop down list
User name	Input user name with DDNS registry.
Password	Input password with DDNS registry.
Domain name	Input domain name with DDNS registry.
Apply	Click "Apply" to confirm the changes.

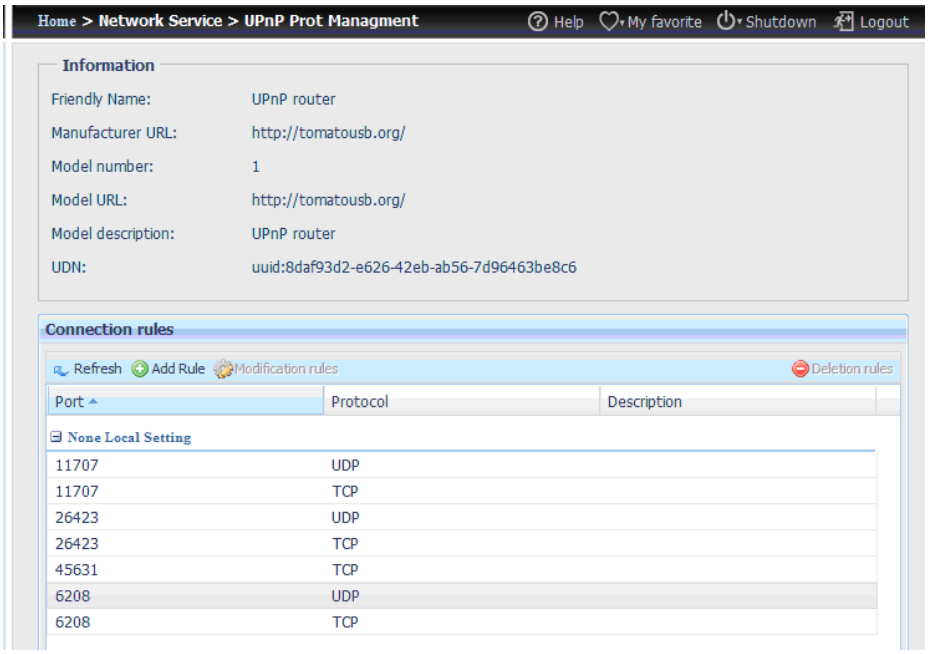
UPnP Port Management

One of most convenience way to allow user to access required services such as FTP, SSH etc. from Internet environment is setting UPnP port management.

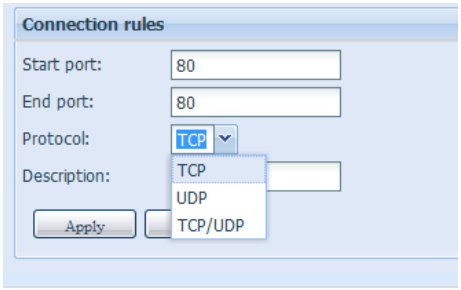
To set up this UPnP port forwarding feature, please be sure that the router has "UPnP Service" Enabled. The following is example from one of router manufacture with UPnP Configuration page.



After the router has enabled "UPnP Service" then you will have information come from associated router to UPnP port management screen as below.



And click "Add Rule" to add more port mapping from Internet to access desired services or press "Refresh" to get most updated list.



A description for each item as following:

UPnP Port Management	
Item	**Description**
Start port	Specific port number starts with.
End port	Specific port number ended
Protocol	Choose the protocol for port forwarding needed.
Description	Specific the port services if applicable.
Apply	Click "Apply" to confirm the changes.
Cancel	Click "Cancel" to abort the changes

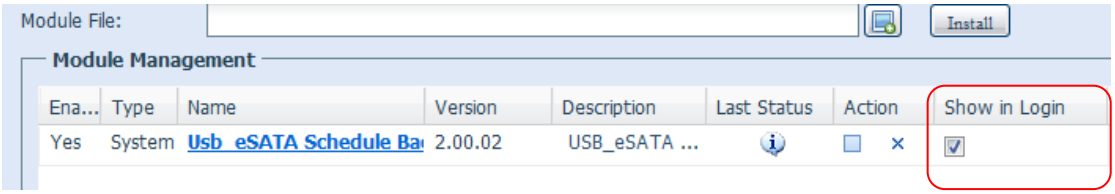
WARNING **Some of router is not allowed to input port number below 1024. So it may have resulted "setting fails".**

Application Server

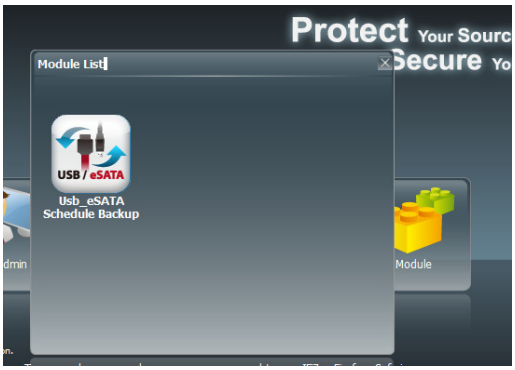
The Thecus VisoGuard supports build-in application such as iTunes server. The Thecus VisoGuard provides activating the iTunes Server on the device. You will be able to play music files on this device with your iTunes client software directly. The following section shows you how.

Module Installation

From the login page, other than admin, web disk and Piczza (Photo server) the module has newly added from this FW release. So after module has been installed there is new option can be chosen "Show in Login".



If this option has enabled then while login to the system, the modules will have associated icon to allow all of valid users to login through.

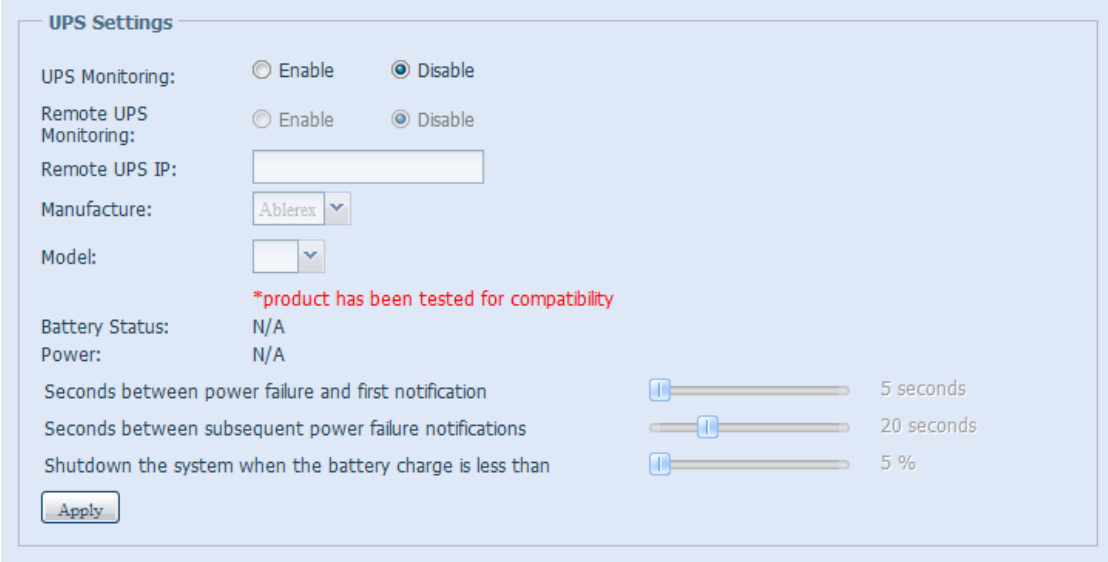


External Devices

For the UPS, Thecus VisoGuard support via USB, Series and Network interface. The following section shows you how.

Uninterrupted Power Source

From the **External Devices** menu, choose the ***Uninterrupted Power Source*** item and the **UPS Setting** screen appears. Make any changes you wish, and press ***Apply*** to confirm changes.



See the following table for a detailed description of each item.

UPS Setting	
Item	**Description**
UPS Monitoring	Enable or disable UPS monitoring.
Remote UPS Monitoring	Enable or disable Remote UPS monitoring.
Remote UPS IP	Input the IP address of the NVR that the UPS device is connected to via USB or RS232.Input the IP address of your network UPS.
Manufacturer	Choose the UPS manufacturer from the dropdowns.
Model	Choose the UPS model number from the dropdowns.
Battery Status	Current status of the UPS battery
Power	Current status of the power being supplied to the UPS
Seconds between power failure and first notification	Delay between power failure and first notification in seconds.
Seconds between subsequent power failure notifications	Delay between subsequent notifications in seconds.
Shutdown the system when the battery charge is less than	Amount of UPS battery remaining before system should auto-shutdown.
Apply	Press ***Apply*** to save your changes.

Chapter 5: Tips and Tricks

USB and eSATA Storage Expansion

The Thecus VisoGuard supports external USB hard disks through its USB ports. Once a USB hard disk has successfully mounted, the entire volume will be linked automatically to the default USB HDD folder. The Thecus VisoGuard supports USB external storage devices. All file names on the USB disk volume are case sensitive.

The Thecus VisoGuard also supports eSATA hard disks with its eSATA port.

Before attaching an eSATA or USB disk drive to Thecus VisoGuard, you have to partition and format it on a desktop computer or a notebook first. The attached device will be located at `\\192.168.1.100\usbhdd\sd(x)1` where `192.168.1.100` means the IP address of Thecus VisoGuard and `sd(x)1` stands for the first partition on the eSATA or USB disk drive.

Remote Administration

You can set up your Thecus VisoGuard for remote administration. With remote administration, you can access your Thecus VisoGuard over the Internet, even if your Thecus VisoGuard is behind a router. This is especially useful if you are traveling and suddenly need a file from your Thecus VisoGuard.

Setting up remote administration is a three-part process, and will require the following equipment:

- Thecus VisoGuard device
- Cable / DSL Router with Dynamic DNS support
- Home PC
- Internet Connection

NOTE

Router setup will differ slightly depending on router used. For this example, we will use the Asus WL500g because it has support for Dynamic DNS. Contact your router hardware vendor for setup help.

Part I - Setup a DynDNS Account

1. Go to `http://www.dyndns.org` from your home PC.
2. Click on the ***Sign Up Now*** link.
3. Check the Check boxes, select a user name (i.e.: N12000), enter your email address (i.e.: xxx@example.com), check ***Enable Wildcard***, and create a password (i.e.: xxxx).
4. Wait for an email from www.dyndns.org.
5. Open the email and click on the link to activate your account

Part II - Enable DDNS on the Router

1. Go to the router setup screen and select ***IP Config*** > ***Miscellaneous DDNS Setting*** from your Home PC.
2. Click on ***Yes*** for **Enable the DDNS Client?**
3. Select **`www.dyndns.org`**.
4. Go to router setup screen, and enter the following information:
    a. User Name or E-mail Address: **xxx@example.com**
    b. Password or DDNS Key: **xxxx**
    c. Host Name: **`www.N12000.dyndns.org`**
    d. Enable wildcard? Select ***Yes***
    e. Update Manually: Click ***Update***

Part III - Setting up Virtual Servers (HTTPS)

1. Navigate to ***NAT Setting*** > ***Virtual Server***.
2. For **Enable Virtual Server?**, select ***Yes***
3. Setup the HTTPS Server
    a. **Well-Known Applications**: Select **User Defined**
    b. **Local IP**: Enter **`192.168.1.100`**

c. **Port Range**: **443** (the default HTTPS port setting on the Thecus VisoGuard)
d. **Protocol**: select **TCP**
e. Click ***Add***.
f. Click ***Apply***.

4. Test the HTTPS connection from another computer on the Internet
   a. From a remote computer, open your browser and enter **https://www.N12000.dyndns.org**
   b. You should see the login page of Thecus VisoGuard.

Firewall Software Configuration

If you are using a software firewall (i.e. Norton Internet Security) and are having trouble connecting to Thecus VisoGuard, you can try the following steps:

1. Double click the **NIS** icon on system tray, and then configure the **Personal Firewall**.

2. On the **Programs** page, find the **SetupWizard.exe** and change its permission to "Permit All". If it's not in the program list, use the **Add** or **Program Scan** buttons to find it.

3. On the **Networking** page, manually add Thecus VisoGuard IP address (i.e. 192.168.1.100) to the **Trusted** list.

Replacing Damaged Hard Drives

If you are using RAID 1, RAID 5, RAID 6, RAID 50 or RAID 60 you can easily replace a damaged hard drive in the Thecus VisoGuard while keeping your data secure with the system's automatic data recovery.

Hard Drive Damage

When a hard drive is damaged and data in the RAID volume, the system OLED will display warning message also the system beeps.

Replacing a Hard Drive

To replace a hard disk drive in Thecus VisoGuard:

1. Remove the tray with the damaged hard disk.
2. Unscrew the damaged hard disk and remove it from the tray.

3. Slide a new hard disk into the tray and fasten the screws.

4. Insert the hard disk tray back into Thecus VisoGuard until it snaps into place. You can also lock it with a key if desired.

5. The LED blinks green when the HDD is accessed.

RAID Auto-Rebuild

When using RAID 1, 5, 6,10, 50 or 60 on Thecus VisoGuard, you can use the auto-rebuild function when an error is detected.

1. When a hard disk fails the system beeps and/or an email notification is sent to specified receivers.

2. Check the OLED to see which disk has failed.

3. Follow the steps mentioned above to replace the failed hard disk.

4. The system automatically recognizes the new hard disk and starts the auto-rebuild sequence to resume its status before the hard disk crash.

Chapter 6: Troubleshooting

Forgot My Network IP Address

If you forget your network IP address and have no physical access to the system, you can find out the IP address by either looking directly onto Thecus VisoGuard OLED panel, or by using the setup wizard to retrieve the IP of your Thecus VisoGuard.

1. Start the Setup Wizard, and it will automatically detect all Thecus VisoGuard products on your network.

2. You should be able to find the IP address of Thecus VisoGuard which you have forgotten in the **Device Discovery** screen.

Can't Map a Network Drive in Windows XP

You may have problems mapping a network drive under the following conditions:

1. The network folder is currently mapped using a different user name and password. To connect using a different user name and password, first disconnect any existing mappings to this network share.

2. The mapped network drive could not be created because the following error has occurred: **Multiple connections to a server or shared resource by the same user, using more than one user name, are not allowed.** Disconnect all previous connections to the server or shared resource and try again.

To check out existing network connections, type `net use` under the DOS prompt. You may refer the URL below for more network mapping information.

http://esupport.thecus.com/support/index.php?_m=downloads&_a=viewdownload&downloaditemid=57&nav=0

Restoring Factory Defaults

From the **System** menu, choose the ***Factory Default*** item and **the Reset to Factory Default** screen appears. Press ***Apply*** to reset Thecus VisoGuard factory default settings.

WARNING Resetting to factory defaults will not erase the data stored in the hard

Problems with Time and Date Settings

The administrator is able to select an NTP Server to keep Thecus VisoGuard time synchronized. However, if Thecus VisoGuard can not access the Internet, you may encounter a problem when setting the Time and Time Zone. If this happens:

1. Login to the Web Administration Interface.
2. Navigate to **System Management>*Time***.
3. Under **NTP Server**, select ***No***.
4. Set the **Date**, **Time**, and **Time Zone**.
5. Click ***Apply***.

In addition, if Thecus VisoGuard is able to access the Internet and you want to keep the NTP Server clock.isc.org by default, please make sure the DNS Server is correctly entered, thereby allowing the NTP Server name to correctly resolve. (See **System *Network*** > ***WAN/LAN1*** > ***DNS Server***)

Appendix A: Customer Support

If your Thecus VisoGuard is not working properly, we encourage you to check out **Chapter 6: Troubleshooting**, located in this manual. You can also try to ensure that you are using the latest firmware version for your Thecus VisoGuard. Thecus is committed to providing free firmware upgrades to our customers. Our newest firmware is available on our Download Center:

http://www.thecus.com/download.php

If you are still experiencing problems with your Thecus VisoGuard, or require a Return Merchandise Authorization (RMA), feel free to contact technical support via our Technical Support Website:

http://www.thecus.com/support_tech.php

Customers in the US should send all technical support enquiries to the US contact window included in the following web page:

http://www.thecus.com/support_tech.php

For Sales Information you can e-mail us at:

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Thank you for choosing Thecus!

Appendix B: RAID Basics

Overview

A Redundant Array of Independent Disks (RAID) is an array of several hard disks that provide data security and high performance. A RAID system accesses several hard disks simultaneously, which improves I/O performance over a single hard disk. Data security is enhanced by a RAID, since data loss due to a hard disk failure is minimized by regenerating redundant data from the other RAID hard disks.

Benefits

RAID improves I/O performance, and increases data security through fault tolerance and redundant data storage.

Improved Performance

RAID provides access to several hard disk drives simultaneously, which greatly increases I/O performance.

Data Security

Hard disk drive failure unfortunately is a common occurrence. A RAID helps prevent against the loss of data due to hard disk failure. A RAID offers additional hard disk drives that can avert data loss from a hard disk drive failure. If a hard drive fails, the RAID volume can regenerate data from the data and parity stored on its other hard disk drives.

RAID Levels

The Thecus VisoGuard supports standard RAID levels 0, 1, 5, 6, 10, 50, 60 and JBOD. You choose a RAID level when you create a system volume. The factors for selecting a RAID level are:

- Your requirements for performance
- Your need for data security
- Number of hard disk drives in the system, capacity of hard disk drives in the system

The following is a description of each RAID level:

RAID 0

RAID 0 is best suited for applications that need high bandwidth but do not require a high level of data security. The RAID 0 level provides the best performance of all the RAID levels, but it does not provide data redundancy.

RAID 0 uses disk striping and breaking up data into blocks to write across all hard drives in the volume. The system can then use multiple hard drives for faster read and write. The stripe size parameter that was set when the RAID was created determines the size of each block. No parity calculations complicate the write operation.

RAID 1

RAID 1 mirrors all data from one hard disk drive to a second one hard disk drive, thus providing complete data redundancy. However, the cost of data storage capacity is doubled.

This is excellent for complete data security.

RAID 5

RAID 5 offers data security and it is best suited for networks that perform many small I/O transactions at the same time, as well as applications that require data security such as office automation and online customer service. Use it also for applications with high read requests but low write requests.

RAID 5 includes disk striping at the byte level and parity information is written to several hard disk drives. If a hard disk fails the system uses parity stored on each of the other hard disks to recreate all missing information.

RAID 6

RAID 6 is essentially an extension of RAID level 5 which allows for additional fault tolerance by using a second independent distributed parity scheme (dual parity) Data is striped on a block level across a set of drives, just like in RAID 5, and a second set of parity is calculated and written across all the drives; RAID 6 provides for an extremely high data fault tolerance and can sustain two simultaneous drive failures.

This is a perfect solution for mission critical applications.

RAID 10

RAID 10 is implemented as a striped array whose segments are RAID 1 arrays.
RAID 10 has the same fault tolerance as RAID level 1.
RAID 10 has the same overhead for fault-tolerance as mirroring alone. High I/O rates are achieved by striping RAID 1 segments.
Under certain circumstances, RAID 10 array can sustain up to 2 simultaneous drive failures

Excellent solution for applications that would have otherwise gone with RAID 1 but need an additional performance boost.

RAID 50

A RAID 50 combines the straight block-level striping of RAID 0 with the distributed parity of RAID 5. This is a RAID 0 array striped across RAID 5 elements. It requires at least 6 drives.

RAID 60

A RAID 60 combines the straight block-level striping of RAID 0 with the distributed double parity of RAID 6. That is, a RAID 0 array striped across RAID 6 elements. It requires at least 8 disks.

JBOD

Although a concatenation of disks (also called JBOD, or "Just a Bunch of Disks") is not one of the numbered RAID levels, it is a popular method for combining multiple physical disk drives into a single virtual one. As the name implies, disks are merely concatenated together, end to beginning, so they appear to be a single large disk.

As the data on JBOD is not protected, one drive failure could result total data loss.

Stripe Size

The length of the data segments being written across multiple hard disks. Data is written in stripes across the multiple hard disks of a RAID. Since multiple disks are accessed at the same time, disk striping enhances performance. The stripes can vary in size.

Disk Usage

When all disks are of the same size, and used in RAID, Thecus VisoGuard disk usage percentage is listed below:

RAID Level	Percentage Used
RAID 0	100%
RAID 1	1/n x 100%
RAID 5	(n-1)/n x 100%
RAID 6	(n-2)/n x 100%
RAID 10	50%
RAID 50	(n-1)/n x 100%
RAID 60	(n-2)/n x 100%
JBOD	100%

n：HDD number

Appendix C: Licensing Information

Overview

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