



QNAP Turbo NAS

Hardware User Manual

© 2014. QNAP Systems, Inc. All Rights Reserved.

Thank you for choosing QNAP products! This user manual provides description of the hardware of the Turbo NAS and relevant guideline of certain functions. Please read carefully and strictly adhere to the instructions of the manual.

This user manual is applicable to the following Turbo NAS models:

HS-210, HS-251, TS-112P, TS-120, TS-121, TS-212-E, TS-212P, TS-220, TS-221, TS-251, TS-269H, TS-269 Pro, TS-420, TS-420U, TS-421, TS-421U, TS-451, TS-469 Pro, TS-469U-RP/SP, TS-470, TS-470 Pro, TS-569 Pro, TS-651, TS-669 Pro, TS-670, TS-670 Pro, TS-851, TS-869 Pro, TS-869U-RP, TS-870, TS-870 Pro, TS-870U-RP, TS-879 Pro, TS-879U-RP, TS-EC879U-RP, TS-1079 Pro, TS-1269U-RP, TS-1270U-RP, TS-1279U-RP, TS-EC1279U-RP, TS-1679U-RP, TS-EC1679U-RP, IS-400 Pro.

NOTE

- The "Turbo NAS" is hereafter referred to as "NAS".
- The product you purchased may not support certain functions dedicated to specific models.
- All features, functionality, and other product specifications are subject to change without prior notice or obligation.
- Information presented is subject to change without notice.
- No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, mechanical, electronic, photocopying, recording, or otherwise, without prior written permission of QNAP Systems, Inc.
- QNAP and the QNAP logo are registered trademarks of QNAP Systems, Inc. Other products and company names mentioned herein may be the trademarks of their respective companies.

DISCLAIMER

In no event shall QNAP Systems, Inc. (QNAP) liability exceed the price paid for the product from direct, indirect, special, incidental, or consequential damages resulting from the use of the product, its accompanying software, or its documentation. QNAP makes no warranty or representation, expressed, implied, or statutory, with respect to its products or the contents or use of this documentation and all accompanying software, and specifically disclaims its quality, performance, merchantability, or fitness for any particular purpose. QNAP reserves the right to revise or update its products, software, or documentation without obligation to notify any individual or entity.

Note:

- Back up your system periodically to avoid any potential data loss. QNAP disclaims any responsibility of all sorts of data loss or recovery.
- Should you return any components of the NAS package for refund or maintenance, make sure they are carefully packed for shipping. Any form of damages due to improper packaging will not be compensated.

Regulatory Notice



FCC Notice

QNAP NAS comply with different FCC compliance classes. Please refer the Appendix for details. Once the class of the device is determined, refer to the following corresponding statement.

=====

FCC Class A Notice

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

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

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

Modifications: Any modifications made to this device that are not approved by QNAP Systems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

FCC Class B Notice

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

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

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Modifications: Any modifications made to this device that are not approved by QNAP Systems, Inc. may void the authority granted to the user by the FCC to operate this equipment.



QNAP NAS comply with different CE compliance classes. Please refer to the Appendix for details.

Symbols in this document



 Warning	This icon indicates the instructions must be strictly followed. Failure to do so could result in injury to human body or death.
 Caution	This icon indicates the action may lead to disk clearance or loss OR failure to follow the instructions could result in data damage, disk damage, or product damage.

Table of Contents

Table of Contents	7
Safety Warnings	8
Chapter 1. CPU and Memory Specifications	9
Chapter 2. Power Button and Reset Button Behavior	20
Chapter 3. USB One Touch Copy	22
Chapter 4. LED and Alarm Buzzer Specifications	23
Chapter 5. Upgrade Memory on QNAP Turbo NAS (RAM Module Installation)	26
5.1 TS-651, TS-851, TS-X69 SERIES (2/4/5/6/8-BAY).....	26
5.2 TS-X69U-RP/SP SERIES (4/8/12-BAY)	29
5.3 TS-879U-RP, TS-1279U-RP, TS-EC879U-RP, TS-EC1279U-RP, TS-1679U-RP, TS-EC1679U-RP, TS-870U-RP, TS-1270U-RP	32
5.4 TS-251, TS-451	35
Chapter 6. Network Expansion Card Installation	39
6.1 TS-670/670 PRO, TS-870/870 PRO, TS-879 PRO, TS-1079 PRO	39
6.2 TS-879U-RP, TS-EC879U-RP, TS-1279U-RP, TS-EC1279U-RP, TS-1679U-RP, TS-EC1679U-RP.....	44
6.3 TS-870U-RP, TS-1270U-RP.....	48
Chapter 7. Hot-swap Hard Drives	50
Chapter 8. RAID Recovery	53
Chapter 9. Use the LCD Panel	55
Chapter 10. Install Power Supply Unit	61
10.1 1U TURBO NAS.....	61
10.2 TS-469U-RP/SP	63
10.3 2U/3U TURBO NAS (TS-1279U-RP, TS-EC1279U-RP, TS-1679U-RP, AND TS-EC1679U-RP ONLY)	64
10.4 2U TURBO NAS (EXCEPT TS-1279U-RP AND TS-EC1279U-RP)	66
Technical Support	70
GNU GENERAL PUBLIC LICENSE	71
Appendix A: Product Compliance Class	84

Safety Warnings

1. The NAS can operate normally in the temperature of 0°C–40°C and relative humidity of 0%–95%. Please make sure the environment is well-ventilated.
2. The power cord and devices connected to the NAS must provide correct supply voltage (100W, 90–264V).
3. Do not place the NAS in direct sunlight or near chemicals. Make sure the temperature and humidity of the environment are in optimized level.
4. Unplug the power cord and all connected cables before cleaning. Wipe the NAS with a dry towel. Do not use chemical or aerosol to clean the NAS.
5. Do not place any objects on the NAS for the server's normal operation and to avoid overheat.
6. Use the flat head screws in the product package to lock the hard disks in the NAS when installing hard disks for proper operation.
7. Do not place the NAS near any liquid.
8. Do not place the NAS on any uneven surface to avoid falling off and damage.
9. Make sure the voltage is correct in the location where the NAS is installed. Contact the distributor or the local power supply company for the information.
10. Do not place any object on the power cord.
11. Do not attempt to repair the NAS in any occasions. Improper disassembly of the product may expose the users to electric shock or other risks. For any enquiries, please contact the distributor.
12. The chassis NAS models should only be installed in the server room and maintained by the authorized server manager or IT administrator. The server room is locked by key or keycard access and only certified staff is allowed to enter the server room.



Warning:

- Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.
- Do NOT touch the fan inside the system to avoid serious injuries.

Chapter 1. CPU and Memory Specifications



Caution: Modifying the hardware, software, or firmware of the QNAP products will void the warranty. QNAP is not responsible for any form of damage or loss of data caused by modding the QNAP products. Users should bear their own risks of all sorts of possible data loss or system instabilities due to changing the hardware parts, modifying the default system firmware or installing any unauthorized third party applications on QNAP products.

System	TS-112P
CPU	Marvell 1.6GHz
Memory	512MB DDR2
Flash	16MB
CPU replaceable	No
Memory replaceable	No
Number of SODIMM slots	0
Number of hard drive slots	1

System	TS-212-E	TS-212P
CPU	Marvell 1.2GHz	Marvell 1.6GHz
Memory	256MB DDR2	512MB DDR2
Flash	16MB	16MB
CPU replaceable	No	No
Memory replaceable	No	No
Number of SODIMM slots	0	0
Number of hard drive slots	2	2

System	TS-120	TS-220	TS-420
CPU	Marvell 1.6GHz	Marvell 1.6GHz	Marvell 1.6GHz
Memory	512MB DDR3	512MB DDR3	512MB DDR3
Flash	16MB	16MB	16MB
CPU replaceable	No	No	No
Memory replaceable	No	No	No
Number of SODIMM slots	0	0	0
Number of hard drive slots	1	2	4

System	TS-121	TS-221	TS-421
CPU	Marvell 2.0GHz	Marvell 2.0GHz	Marvell 2.0GHz
Memory	1GB DDR3	1GB DDR3	1GB DDR3
Flash	16MB	16MB	16MB
CPU replaceable	No	No	No
Memory replaceable	No	No	No
Number of SODIMM slots	0	0	0
Number of hard drive slots	1	2	4

System	HS-210
CPU	Marvell 1.6GHz
Memory	512MB DDR3
Flash	16MB
CPU replaceable	No
Memory replaceable	No
Number of SODIMM slots	0
Number of hard drive slots	2

System	TS-420U	TS-421U
CPU	Marvell 1.6 GHz	Marvell 2.0 GHz
Memory	1GB DDR3	1GB DDR3
Flash	16MB	16MB
CPU replaceable	No	No
Memory replaceable	No	No
Number of SODIMM slots	0	0
Number of hard drive slots	4	4

System	TS-470	TS-670	TS-870
CPU	Dual-core Intel® 2.6GHz	Dual-core Intel® 2.6GHz	Dual-core Intel® 2.6GHz
Memory	2GB DDR3	2GB DDR3	2GB DDR3
Flash	512MB (USB DOM)	512MB (USB DOM)	512MB (USB DOM)
CPU replaceable	No	No	No
Memory replaceable	No	No	No
Number of SODIMM slots	2	2	2
Number of hard drive slots	4	6	8
Number of expansion slots	1*	1*	1*

*In addition to the built-in two Gigabit Ethernet ports, a two-port Gigabit Ethernet card will be preinstalled in the NAS for a total of four Gigabit Ethernet ports.

System	TS-470 Pro	TS-670 Pro	TS-870 Pro
CPU	Dual-core Intel® Core™ i3 3.3 GHz	Dual-core Intel® Core™ i3 3.3 GHz	Dual-core Intel® Core™ i3 3.3 GHz
Memory	2GB DDR3	2GB DDR3	2GB DDR3
Flash	512MB (USB DOM)	512MB (USB DOM)	512MB (USB DOM)
CPU replaceable	No	No	No
Memory replaceable	No	No	No
Number of SODIMM slots	2	2	2
Number of hard drive slots	4	6	8
Number of expansion slots	1	1	1

System	TS-879 Pro	TS-1079 Pro	TS-879U-RP
CPU	Dual-core Intel® Core™ i3 3.30 GHz	Dual-core Intel® Core™ i3 3.30 GHz	Dual-core Intel® Core™ i3 3.30 GHz
Memory	2GB DDR3 RAM	2GB DDR3 RAM	4GB DDR3 RAM
Flash	512MB (USB DOM)	512MB (USB DOM)	512MB (USB DOM)
CPU replaceable	No	No	No
Memory replaceable	No	No	Yes
Number of LONG-DIMM slot	2	2	4
Number of hard drive slots	8	10	8
Number of expansion slots	1	1	2

System	TS-1279U-RP	TS-EC879U-RP	TS-EC1279U-RP
CPU	Dual-core Intel® Core™ i3 3.30 GHz	Quad-core Intel® Xeon™ 3.20 GHz	Quad-core Intel® Xeon™ 3.20 GHz
Memory	4GB DDR3 RAM	4GB DDR3 ECC RAM	4GB DDR3 ECC RAM
Flash	512MB (USB DOM)	512MB (USB DOM)	512MB (USB DOM)
CPU replaceable	No	No	No
Memory replaceable	Yes	Yes	Yes
Number of LONG-DIMM slot	4	4	4
Number of hard drive slots	12	8	12
Number of expansion slots	2	2	2

System	TS-1679U-RP	TS-EC1679U-RP
CPU	Dual-core Intel® Core™ i3 3.30 GHz	Quad-core Intel® Xeon™ 3.20 GHz
Memory	4GB DDR3 RAM	4GB DDR3 ECC RAM
Flash	512MB (USB DOM)	512MB (USB DOM)
CPU replaceable	No	No
Memory replaceable	Yes	Yes
Number of LONG-DIMM slot	4	4
Number of hard drive slots	16	16
Number of expansion slots	2	2

System	TS-269 Pro	TS-469 Pro	TS-569 Pro
CPU	Dual-core Intel® Atom™ 2.13 GHz	Dual-core Intel® Atom™ 2.13 GHz	Dual-core Intel® Atom™ 2.13 GHz
Memory	1GB DDR3 (Expandable RAM, up to 3GB)	1GB DDR3 (Expandable RAM, up to 3GB)	1GB DDR3 (Expandable RAM, up to 3GB)
Flash	512MB (USB DOM)	512MB (USB DOM)	512MB (USB DOM)
CPU replaceable	No	No	No
Memory replaceable	Compatible with DDR3 1066 DRAM	Compatible with DDR3 1066 DRAM	Compatible with DDR3 1066 DRAM
Number of SODIMM slots	2	2	2
Number of hard drive slots	2	4	5

System	TS-669 Pro	TS-869 Pro
CPU	Dual-core Intel® Atom™ 2.13 GHz	Dual-core Intel® Atom™ 2.13 GHz
Memory	1GB DDR3 (Expandable RAM, up to 3GB)	1GB DDR3 (Expandable RAM, up to 3GB)
Flash	512MB (USB DOM)	512MB (USB DOM)
CPU replaceable	No	No
Memory replaceable	Compatible with DDR3 1066 DRAM	Compatible with DDR3 1066 DRAM
Number of SODIMM slots	2	2
Number of hard drive slots	6	8

System	TS-469U-RP/SP	TS-869U-RP	TS-1269U-RP
CPU	Dual-core Intel® Atom™ 2.13 GHz	Dual-core Intel® Atom™ 2.13 GHz	Dual-core Intel® Atom™ 2.13 GHz
Memory	1GB DDR3 (Expandable RAM, up to 4GB)	2GB DDR3 (Expandable RAM, up to 4GB)	2GB DDR3 (Expandable RAM, up to 4GB)
Flash	512MB (USB DOM)	512MB (USB DOM)	512MB (USB DOM)
CPU replaceable	No	No	No
Memory replaceable	Compatible with DDR3 1066 DRAM	Compatible with DDR3 1066 DRAM	Compatible with DDR3 1066 DRAM
Number of SODIMM slots	2	2	2
Number of hard drive slots	4	8	12

System	TS-269H
CPU	Dual-core Intel® Atom™ 1.6 GHz
Memory	2GB DDR3
Flash	4GB
CPU replaceable	No
Memory replaceable	No
Number of SODIMM slots	N/A
Number of hard drive slots	2

System	TS-870U-RP	TS-1270U-RP
CPU	Dual-core Intel® 2.10 GHz	Dual-core Intel® 2.10 GHz
Memory	4GB DDR3	4GB DDR3
Flash	512MB	512MB
CPU replaceable	No	No
Memory replaceable	Yes	Yes
Number of SODIMM slots	4	4
Number of hard drive slots	8	12

System	IS-400 Pro
CPU	Dual-core Intel® 1.1 GHz
Memory	2GB DDR3
Flash	512MB (USB DOM)
CPU replaceable	No
Memory replaceable	No
Number of SODIMM slots	2
Number of hard drive slots	4 (2.5" only)

System	TS-251	TS-451	TS-651
CPU	Dual-core Intel® Celeron™ 2.41 GHz	Dual-core Intel® Celeron™ 2.41 GHz	Dual-core Intel® Celeron™ 2.41 GHz
Memory	1GB DDR3L (Expandable RAM, up to 8GB)	1GB DDR3L (Expandable RAM, up to 8GB)	1GB DDR3L (Expandable RAM, up to 8GB)
Flash	512MB (USB DOM)	512MB (USB DOM)	512MB (USB DOM)
CPU replaceable	No	No	No
Memory replaceable	Yes (DDR3L-1333 SODIMM DRAM)	Yes (DDR3L-1333 SODIMM DRAM)	Yes (DDR3L-1333 SODIMM DRAM)
Number of SODIMM slots	2	2	2
Number of hard drive slots	2	4	6

System	TS-851
CPU	Dual-core Intel® Celeron™ 2.41 GHz
Memory	1GB DDR3L (Expandable RAM, up to 8GB)
Flash	512MB (USB DOM)
CPU replaceable	No
Memory replaceable	Yes (DDR3L-1333 SODIMM DRAM)
Number of SODIMM slots	2
Number of hard drive slots	8

System	HS-251
CPU	Dual-core Intel® Celeron™ 2.41 GHz
Memory	1GB DDR3L
Flash	512MB (USB DOM)
CPU replaceable	No
Memory replaceable	No
Number of SODIMM slots	N/A
Number of hard drive slots	2

Chapter 2. Power Button and Reset Button Behavior

- Power button: Press to turn on or turn off.

System	Power button (Turn on)	Power button (Hardware turn off)	Power button (Force turn off)
All models	Press once	1.5 sec	5 sec

- Reset button: Press to reset the system settings.

System	Basic system reset (1 beep)	Advanced system reset (2 beeps)
All models	3 sec	10 sec

Basic system reset (3 sec)

Press the reset button for 3 seconds, a beep sound will be heard. The following settings are reset to default:

- System administration password: admin
- TCP/IP configuration: Obtain IP address settings automatically via DHCP
- TCP/IP configuration: Disable Jumbo Frame
- TCP/IP configuration: If port trunking is enabled (dual LAN models only), the port trunking mode will be reset to "Active Backup (Failover)".
- System Port: 8080 (system service port)
- Security Level: Low (Allow all connections)
- LCD panel password: (blank)*
- VLAN will be disabled

*This feature is only provided by the NAS models with LCD panels. Please visit <http://www.qnap.com> for details.

Advanced system reset (10 sec)

Press the reset button for 10 seconds; you will hear two beeps at the third and the tenth seconds. The NAS will reset all the system settings to default as it does by web-based system reset in "Administration" > "Restore to Factory Default" except all the data are reserved. The settings such as the users, user groups, and the network share folders previously created will be cleared. To retrieve the old data after the advanced system reset, create the same network share folders on the NAS and the data will be accessible again.

Chapter 3. USB One Touch Copy

System	Number of seconds (press the one touch copy button to trigger data copy)
All NAS models	0.5 sec

Data Copy by the Front USB Port

The NAS supports instant data copy backup from the external USB device to the NAS or the other way round by the front one touch copy button. To use this function, follow the steps below:

1. Make sure a hard drive is installed and formatted on the NAS. The default network share Qusb or Usb is created.
2. Turn on the NAS.
3. Configure the behavior of the Copy button on "Backup" > "USB one touch copy" page.
4. Connect the USB storage device to the front USB port of the NAS.
5. Press the Copy button. The USB LED will flash. The data will be copied to or from the USB device according to the NAS settings.

Note:

- This feature adopts incremental backup. After the first time data backup, the NAS only copies the changed files since the last backup.
- This feature is only available on certain NAS models. Please refer to the product specification table for details at www.qnap.com.

Chapter 4. LED and Alarm Buzzer Specifications

The LED indicators of the NAS indicate the system status and information. When the NAS is turned on, check the following items to make sure the system status is normal. Note that the following LED information is applicable only when users have properly installed the hard drive, and connected the NAS to the network and the power supply.

LED	Color	LED Status	Description
System Status	Red/ Green	Flashes green and red alternately every 0.5 sec	<ol style="list-style-type: none"> 1. The hard drive on the NAS is being formatted. 2. The NAS is being initialized. 3. The system firmware is being updated. 4. RAID rebuilding is in process. 5. Online RAID Capacity Expansion is in process. 6. Online RAID Level Migration is in process.
		Red	<ol style="list-style-type: none"> 1. The hard drive is invalid. 2. The disk volume has reached its full capacity. 3. The disk volume is going to be full. 4. The system fan is out of function. 5. An error occurs when accessing (read/write) the disk data. 6. A bad sector is detected on the hard drive. 7. The NAS is in degraded read-only mode (2 member drives fail in a RAID 5 or RAID 6 configuration, the disk data can still be read). 8. Hardware self-test error.
		Flashes red every 0.5 sec	The NAS is in degraded mode (one member drive fails in RAID 1, RAID 5 or RAID 6 configuration).
		Flashes green every 0.5 sec	<ol style="list-style-type: none"> 1. The NAS is starting up. 2. The NAS is not configured. 3. A hard disk drive is not formatted.
		Flashes green every 2 seconds	The NAS is in S3 sleep mode ¹ .

¹ This feature is only available on certain NAS models. Please refer to the product specification table for details at www.qnap.com.

LED	Color	LED Status	Description
		Green	The NAS is ready.
		Off	All the hard disk drives on the NAS are in standby mode.
LAN	Orange	Orange	The disk data is being accessed from the network and a read/write error occurs during the process.
		Flashes orange	The NAS is being accessed from the network.
10 GbE ²	Green	Green	The 10GbE network expansion card is installed.
		Off	No 10GbE network expansion card is installed.
HDD ³	Red/ Green	Flashes red	The disk data is being accessed and a read/write error occurs during the process.
		Red	A hard disk drive read/write error occurs.
		Flashes green	The disk data is being accessed.
		Green	The hard disk drive can be accessed.
USB ³	Blue	Flashes blue every 0.5 sec	<ol style="list-style-type: none"> 1. A USB device (connected to the front USB port) is being detected. 2. A USB device (connected to the front USB port) is being removed from the NAS. 3. The USB device (connected to the front USB port of the NAS) is being accessed. 4. The data is being copied to or from the external USB or eSATA device.
		Blue	A front USB device is detected (after the device is mounted).
		Off	<ol style="list-style-type: none"> 1. No USB device is detected. 2. The NAS has finished copying the data to or from the USB device connected to the front USB port.
eSATA ³	Orange	Flashes	The eSATA device is being accessed.
		Off	No eSATA device can be detected.

² The 10 GbE network expansion function is only supported by the TS-879 Pro, TS-1079 Pro, TS-879U-RP, TS-1279U-RP, TS-EC879U-RP, TS-EC1279U-RP, TS-1679U-RP, TS-EC1679U-RP, TS-870U-RP, and TS-1270U-RP.

³ This feature is only available on certain NAS models. Please refer to the product specification table for details at www.qnap.com.

Beep alarm: All NAS models

The beep alarm can be disabled in "System Administration" > "Hardware Settings".

Beep sound	Number of Times	Description
Short beep (0.5 sec)	1	<ol style="list-style-type: none"> 1. The NAS is starting up. 2. The NAS is being shut down (software shutdown). 3. The user presses the reset button to reset the NAS. 4. The system firmware has been updated.
Short beep (0.5 sec)	3	The user tries to copy the NAS data to the external storage device from the front USB port, but the data cannot be copied.
Long beep (1.5 sec)	3, every 5 min	The system fan is out of function.
Long beep (1.5 sec)	2	<ol style="list-style-type: none"> 1. The disk volume is going to be full. 2. The disk volume has reached its full capacity. 3. The hard drives on the NAS are in degraded mode. 4. The user starts the hard drive rebuilding process. 5. A hard drive is plugged in or out.
	1	<ol style="list-style-type: none"> 1. The NAS is turned off by force shutdown (hardware shutdown). 2. The NAS has been turned on successfully and is ready.

Chapter 5. Upgrade Memory on QNAP Turbo NAS (RAM Module Installation)



Warning:

- The following instructions should only be performed by an authorized and trained technician.
- Strictly adhere to the instructions to install a RAM module on the NAS. Failure to do so could result in injury to human body or death.

QNAP provides different RAM modules (optional purchase) for users to upgrade the memory of Turbo NAS. Follow the steps below to install an extra memory module on the NAS to upgrade the memory.



5.1 TS-651, TS-851, TS-x69 series (2/4/5/6/8-bay)

Follow the steps below to install a RAM module on the NAS.

1. Turn off the NAS. Disconnect the power adaptor, network cable(s), and any other connectors or cables from the NAS.
2. Before installing the memory module, put on an antistatic wrist strap to prevent electrostatic discharge. The crocodile clip should be connected to the ground.

3. Loosen the three screws on the rear of the NAS.



4. Remove the case cover of the NAS gently.



5. Locate the memory slot. Make sure the slot is empty.

Note: For TS-651 and TS-851 models, always ensure that a memory module is installed in the Primary slot (red). If not, then the system will fail to start. □When installing two memory modules, please ensure that they are the same size and ideally use the same type of RAM for both memory slots. The maximum supported memory is 8GB combined.



6. Grasp the edge of the memory module. Align the notch on the gold edge of the module with the notch in the memory slot. Slide the memory module to the slot at a 45-degree angle (approximately).



7. Gently press the memory module into the slot until it is seated fully.
8. Rotate the memory module towards the motherboard until the securing clips clicks into place.



9. Close the case cover and fasten the screws. Connect the power adaptor and cables back to the NAS.
10. To check that the memory module is recognized by the NAS, power up the NAS and login the web interface as an administrator. Go to "System Status" > "System Information" and check the total memory in "Hardware Information".

5.2 TS-x69U-RP/SP series (4/8/12-bay)

Follow the steps below to install a RAM module on the NAS.

1. Turn off the NAS. Disconnect the power adaptor, network cable(s), and any other connectors or cables from the NAS.
2. Before installing the memory module, put on an antistatic wrist strap to prevent electrostatic discharge. The crocodile clip should be connected to the ground.
3. Open the NAS.
 - a. TS-469U-RP/SP: Loosen the six screws on the top of the NAS.



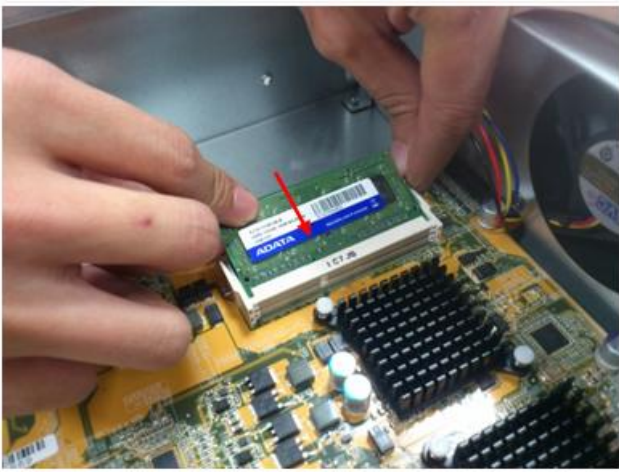
- b. TS-869U-RP and TS-1269U-RP: Loosen the two screws on the rear of the NAS.



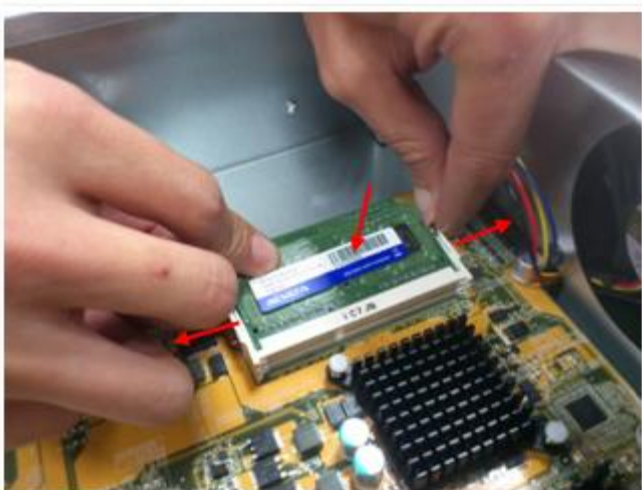
4. Open the NAS.



5. Slide the memory module to the slot at a 45-degree angle (approximately).



6. Press the memory module down while holding the clips open.



7. Make sure the memory module sits in properly with the clips in place.



8. Close the NAS cover and fasten the screws. Connect the power adaptor and cables back to the NAS.

5.3 TS-879U-RP, TS-1279U-RP, TS-EC879U-RP, TS-EC1279U-RP, TS-1679U-RP, TS-EC1679U-RP, TS-870U-RP, TS-1270U-RP

QNAP provides a 4GB DDR3* RAM module and a 4GB DDR3 ECC** RAM module (optional purchase) for users to upgrade the memory of the NAS. Insert an extra RAM module on the motherboard of the NAS to upgrade the memory. The total memory will be shown in "System Information" of the administration page.



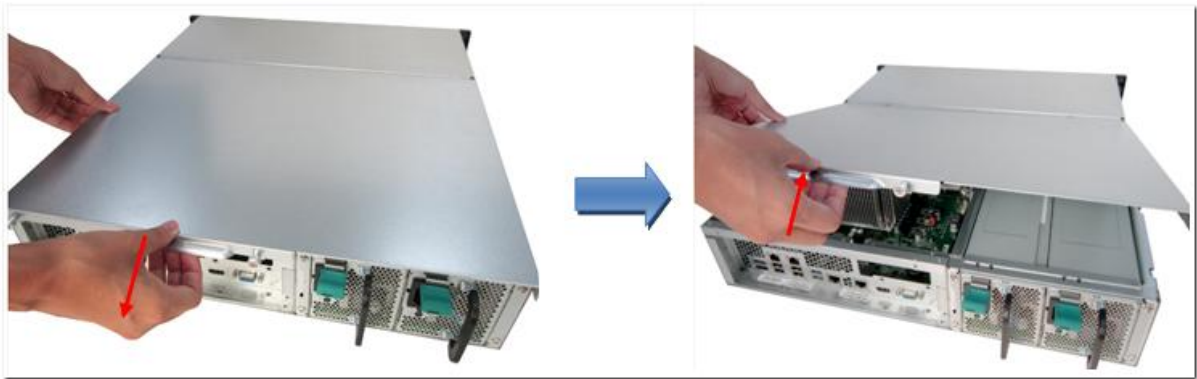
*Applied models: TS-879U-RP, TS-1279U-RP, TS-1679U-RP, TS-870U-RP, TS-1270U-RP.

**Applied models: TS-EC879U-RP, TS-EC1279U-RP, TS-EC1679U-RP.

1. Loosen the 2 screws on the rear of the NAS as shown in the illustration.



2. Hold the notch at the edge of the top cover. Remove the top cover in both hands.



3. Release the ejector clips gently by pulling them out of the sides of the RAM slot.



4. Grasp the edge of the RAM module. Align the notch on the gold edge of the RAM module with the notch in the RAM slot. Insert the RAM module to the RAM slot until it cannot go any further.



5.4 TS-251, TS-451

Follow the steps below to install a RAM module on the NAS.

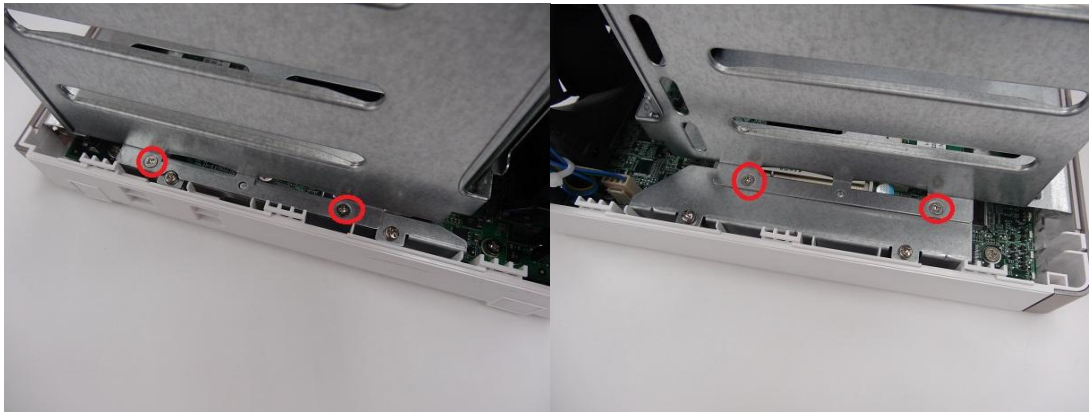
1. Turn off the NAS. Disconnect the power adaptor, network cable(s), and any other connectors/cables from the NAS.
2. Remove any installed hard drives from the NAS.
3. Before installing the memory module, put on an antistatic wrist strap to prevent electrostatic discharge. The crocodile clip should be grounded.
4. Remove the screws on the rear (top and bottom) of the NAS. If you have a 2-bay NAS, it will have **two** screws. A 4-bay NAS will **have** four.



5. Gently remove the case cover of the NAS by sliding it apart (see the underside of the NAS for visual indicators of the NAS case being locked/unlocked)



6. Remove the four inner screws (two on each side) of the hard drive cage.



7. If it is a 4-bay NAS, you will also need to remove two screws on the top of the hard drive cage.



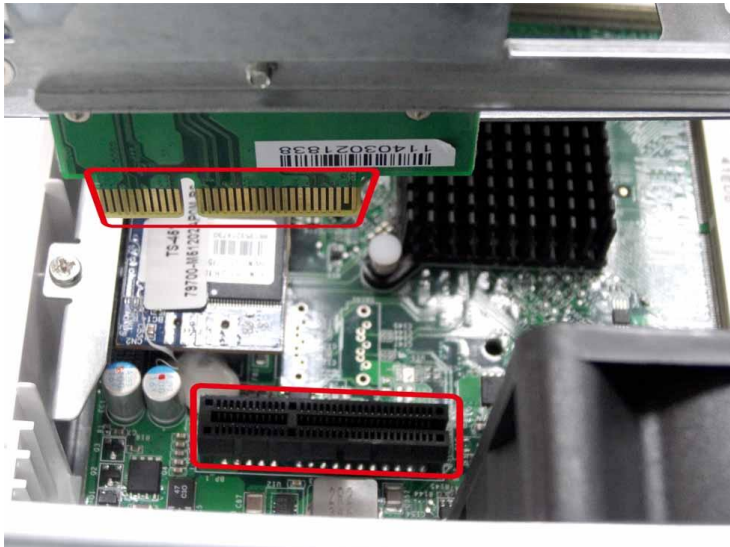
8. Gently remove the hard drive cage from the NAS by lifting it out of its slot.



9. **Always ensure that a memory module is installed in the Primary slot (red). If not, then the system will fail to start.** When installing two memory modules, please ensure that they are the same size and ideally use the same type of RAM for both memory slots. The maximum supported memory is 8GB combined.



10. Reattach the hard drive cage to the NAS. Please ensure that it correctly plugs into the slot.



11. Secure the hard drive cage by fastening the four inner screws (for the 4-bay NAS, please fasten the two additional top screws.) Then reattach the case cover of the NAS by gently sliding it back together.

12. Fasten the two/four screws onto the rear of the NAS.

13. Reinsert your hard drives to the NAS.

14. Connect the power adaptor and cables back to the NAS.

15. To check that the memory module is recognized by the NAS, power up the NAS and login the web interface as an administrator. Go to "System Status" > "System Information" and check the total memory in "Hardware Information".

Chapter 6. Network Expansion Card Installation



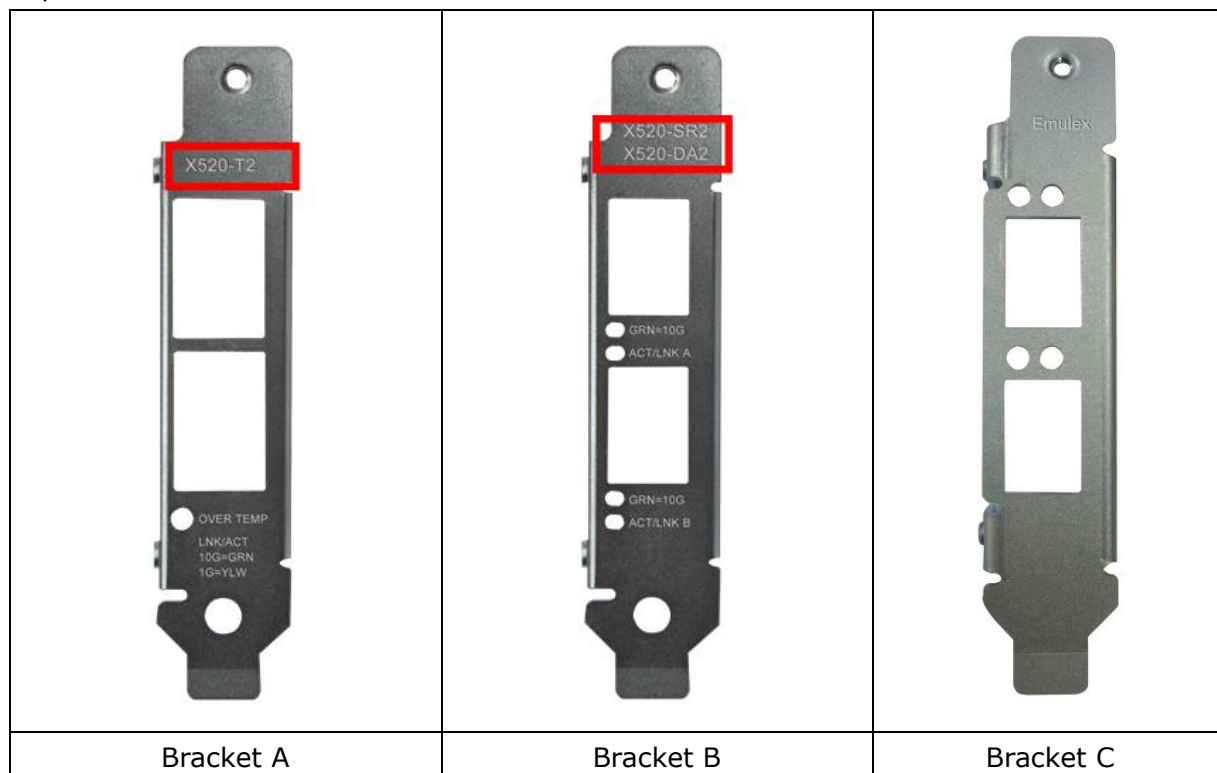
Warning:

- The following instructions should only be performed by an authorized and trained technician.
- Strictly adhere to the instructions to install a network expansion card on the NAS. Failure to do so could result in injury to human body or death.

The TS-x79 Pro, TS-x70/x70 Pro series provides expansion slots for network expansion. Insert an extra network expansion card (optional purchase) to the motherboard of the NAS to increase the network bandwidth.

6.1 TS-670/670 Pro, TS-870/870 Pro, TS-879 Pro, TS-1079 Pro

Please refer the compatibility table below and replace a proper bracket for the network expansion card.



	Network Expansion Card Compatibility
Bracket A (X520-T2)	Intel® Ethernet Server Adapter X520-T2 (E10G42B)
Bracket B (X520-SR2/X520-DA2)	1. Intel® Ethernet Server Adapter X520-SR2 (E10G42BFSR) 2. Intel® Ethernet Server Adapter X520-DA2 (E10G42BTDA)
Bracket C (Emulex)	1. Emulex OneConnect 10GbE Network Adapters, SFP+ Direct attach copper (OCe11102-NX) 2. Emulex OneConnect 10GbE Network Adapters, Short reach optical (OCe11102-NM) 3. Emulex OneConnect 10GbE Network Adapters, SFP+ Direct attach copper (OCe11102-IX) 4. Emulex OneConnect 10GbE Network Adapters, Short reach optical (OCe11102-IM)

1. Turn off the NAS. Disconnect the power adaptor, network cable(s), and any other connectors or cables from the NAS.
2. Before installing the network expansion card, put on an antistatic wrist strap to prevent electrostatic discharge. The crocodile clip should be connected to the ground.
3. Loosen the screws on the rear of the NAS.



4. Remove the case cover of the NAS gently.



TS-470/TS-470 Pro:



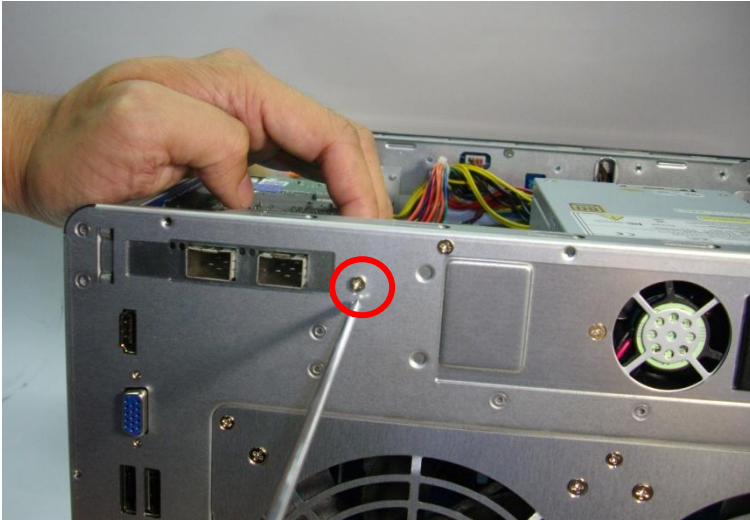
5. Loosen the screws and remove the expansion slot cover.



6. Grasp the edge of the network expansion card. Align the notch on the gold edge of the card with the notch in the PCIe slot. Insert the network expansion card to the PCIe slot until it cannot go any further.



7. Fasten the screws.

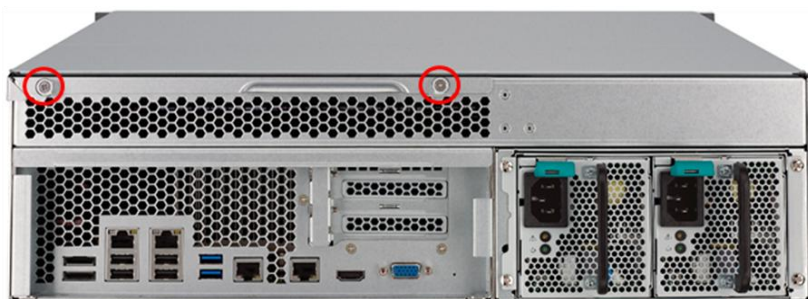


8. Close the case cover and fasten the screws. Connect the power adaptor and cables to the NAS.

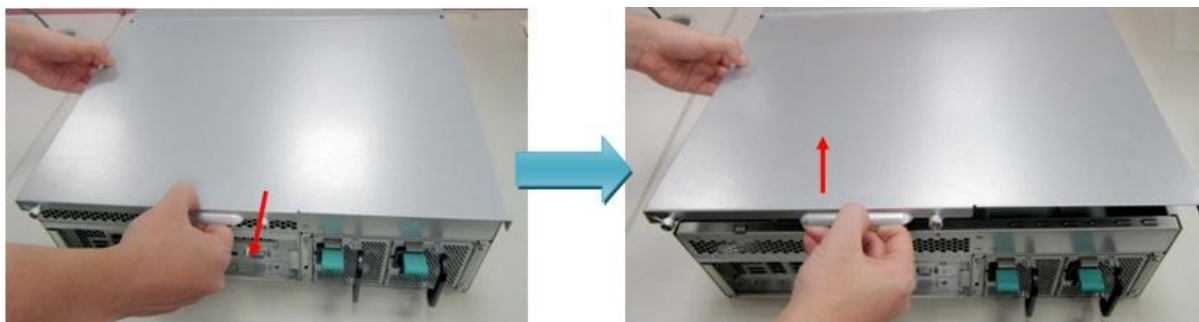
9. To check that the network expansion is recognized by the NAS, power up the NAS and login the web interface as an administrator. Go to "System Administration" > "Network" > "TCP/IP" and check the total number of network interfaces.

6.2 TS-879U-RP, TS-EC879U-RP, TS-1279U-RP, TS-EC1279U-RP, TS-1679U-RP, TS-EC1679U-RP

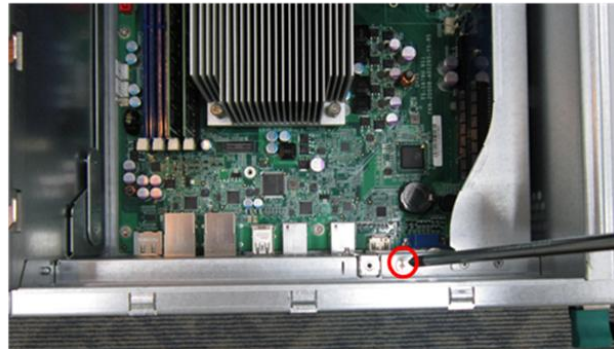
1. Turn off the NAS. Disconnect the power adaptor, network cable(s), and any other connectors or cables from the NAS.
2. Before installing the network expansion card, put on an antistatic wrist strap to prevent electrostatic discharge. The crocodile clip should be connected to the ground.
3. Loosen the 2 screws on the rear of the NAS as shown in the illustration.



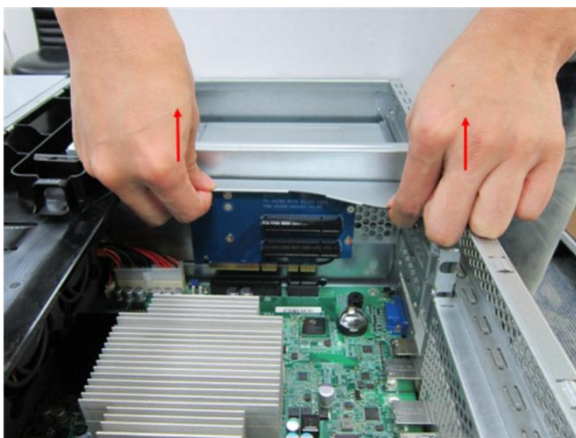
4. Hold the notch at the edge of the top cover. Remove the top cover in both hands.



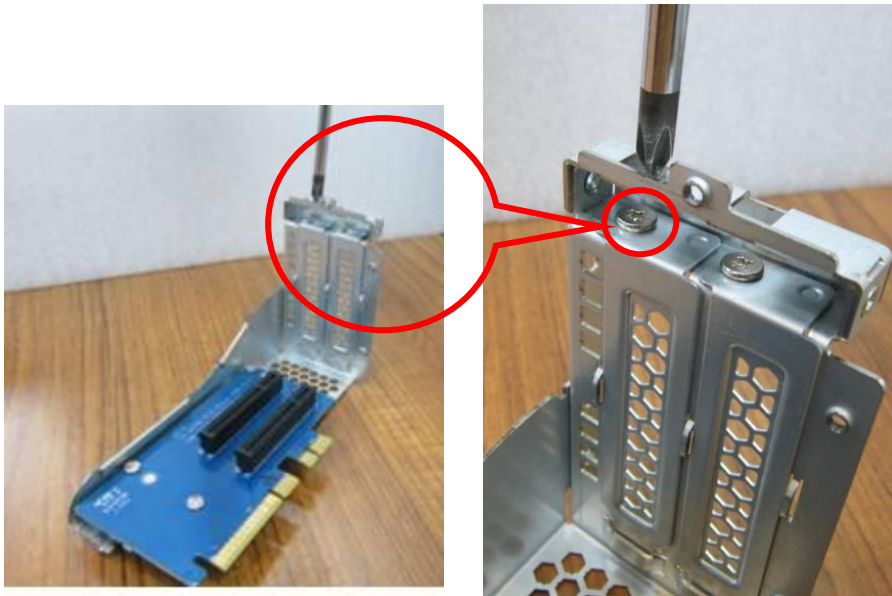
5. Loosen the 4 screws as shown in the illustration.



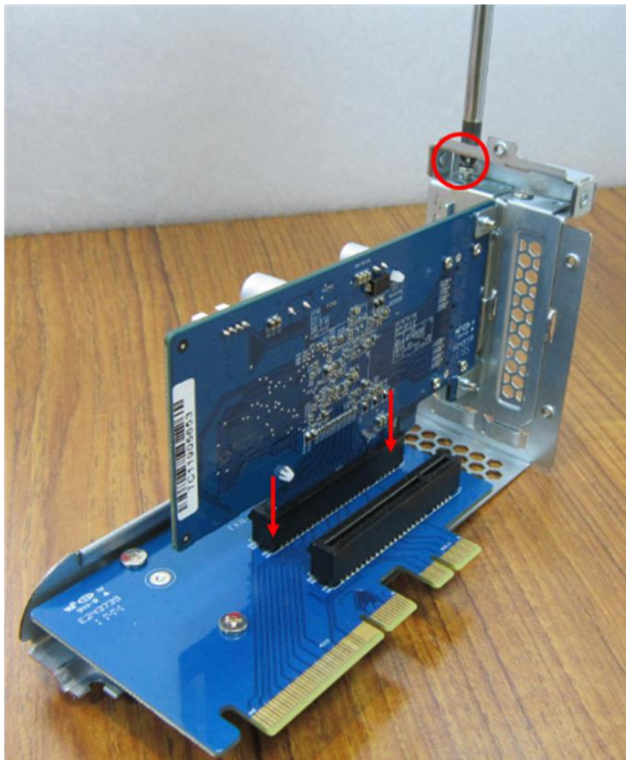
6. Grasp the metal edge of the riser card module. Remove the module gently.



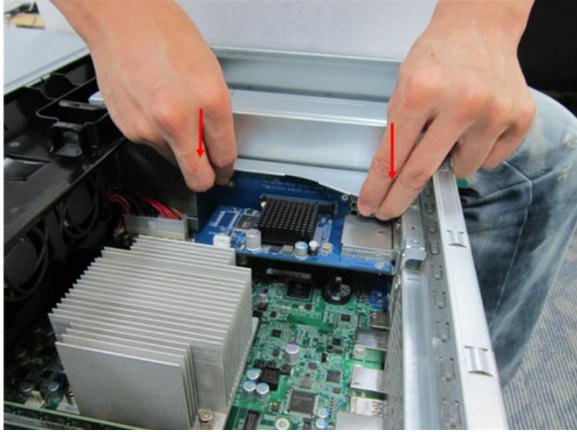
7. Loosen the screw and remove the expansion slot cover.



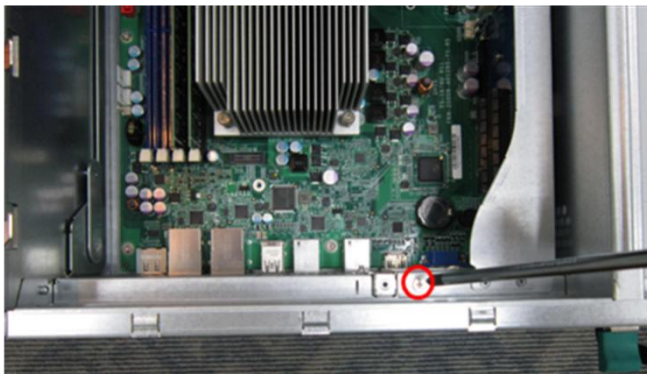
8. Insert the network expansion card to the PCIe slot until it cannot go any further. Then fasten the screw.



9. Grasp the metal edge of the riser card module. Align the notch on the gold edge of the riser card with the notch in the PCIe slot. Insert the riser card module to the PCIe slot until it cannot go any further.



10. Fasten the screws. Close the case cover and fasten the screws.



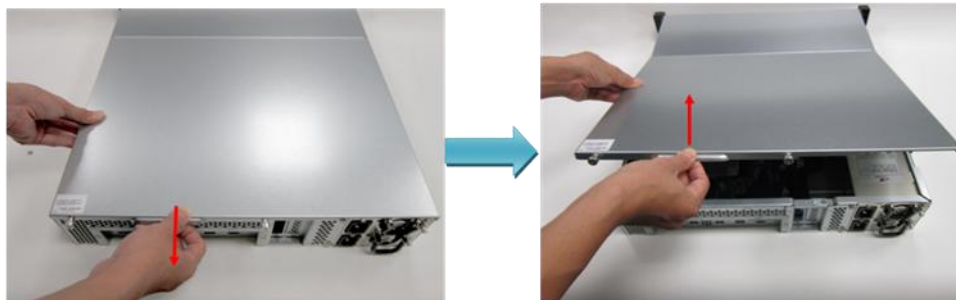
11. Connect the power adaptor and cables to the NAS.
12. To check that the network expansion is recognized by the NAS, power up the NAS and login the web interface as an administrator. Go to "System Administration" > "Network" > "TCP/IP" and check the total number of network interfaces.

6.3 TS-870U-RP, TS-1270U-RP

1. Turn off the NAS. Disconnect the power adaptor, network cable(s), and any other connectors or cables from the NAS.
2. Before installing the network expansion card, put on an antistatic wrist strap to prevent electrostatic discharge. The crocodile clip should be connected to the ground.
3. Loosen the two screws on the rear of the NAS.



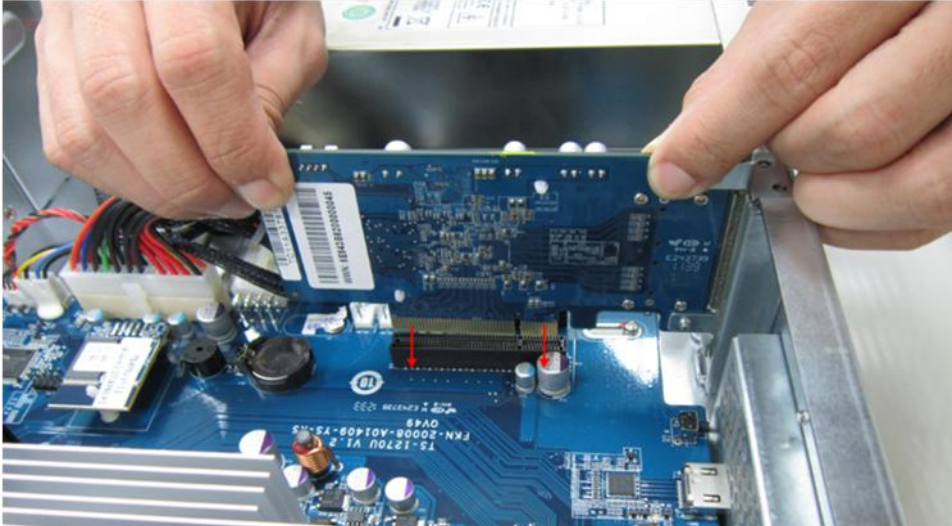
4. Hold the notch at the edge of the top cover. Remove the top cover in both hands.



5. Loosen the screw and remove the expansion slot cover.



6. Grasp the edge of the expansion card. Align the notch on the gold edge of the card with the notch in the PCIe slot. Insert the network expansion card to the PCIe slot until it cannot go any further.



7. Fasten the screws.



8. Close the case cover and fasten the screws. Connect the power adaptor and cables to the NAS.
9. To check that the network expansion is recognized by the NAS, power up the NAS and login the web interface as an administrator. Go to "System Administration" > "Network" > "TCP/IP" and check the total number of network interfaces.

Chapter 7. Hot-swap Hard Drives

The QNAP NAS is compatible with 2.5-inch/3.5-inch SATA hard disk drives from major hard disk brands. For the updated hard drive compatibility list, please visit <http://www.qnap.com>.



Caution:

- QNAP disclaims any responsibility for product damage/malfunction or data loss/recovery due to misuse or improper installation of hard disks in any occasions for any reasons.
- Note that if a hard drive (new or used) which has never been installed on the NAS before is installed, the hard drive will be formatted and partitioned automatically and all the disk data will be cleared.

System	Supports 3.5-inch SATA Hard Drives	Supports 2.5-inch SATA Hard Drives	Supports SSD	Supports Hot-swapping Hard Drives (RAID 1 or above only)
TS-112, TS-212	Yes	No	No	No
TS-120, TS-121	Yes	Yes	Yes	No
HS-210, HS-251, TS-220, TS-221, TS-251, TS-412, TS-412U, TS-420, TS-420U, TS-421, TS-421U, TS-451, TS-459 Pro II, TS-651, TS-851, TS-879 Pro, TS-1079 Pro, TS-879U-RP, TS-1279U-RP, TS-EC879U-RP, TS-EC1279U-RP, TS-1679U-RP, TS-EC1679U-RP, TS-269 Pro, TS-469 Pro, TS-569 Pro, TS-669 Pro,	Yes	Yes	Yes	Yes

System	Supports 3.5-inch SATA Hard Drives	Supports 2.5-inch SATA Hard Drives	Supports SSD	Supports Hot-swapping Hard Drives (RAID 1 or above only)
TS-869 Pro, TS-469U-RP/SP, TS-869U-RP, TS-1269U-RP, TS-870U-RP, TS-1270U-RP, TS-470/470, Pro, TS-670/670, Pro, TS-870/870, Pro.				
IS-400 Pro	No	Yes	Yes	Yes

The NAS supports hot-swapping the hard drives when 1 member drive crashes in RAID 1, 1–2 member drives crash in RAID 5 or RAID 6. Follow the steps below to hot-swap the hard drive when a member drive fails in a RAID configuration.

1. Login the NAS and check the disk volume configuration in “Volume Management”.
2. The volume status should be “in degraded mode”.
3. Prepare a new hard drive to replace the failed one. The capacity of the new hard drive should be the same as or larger than the failed hard drive.
4. Unplug the failed drive from the NAS. Wait for about 20 seconds or until the server beeps twice.
5. Remove the failed drive from the drive tray.
6. Install the new hard drive on the drive tray. Insert it to the NAS.
7. The server should beep 1.5 seconds twice.
8. Check the volume status on the web administration page. The volume should be rebuilding.



Warning: Users are strongly recommended to turn OFF the server before replacing the hard drive to reduce the risk of electric shock.

Chapter 8. RAID Recovery

The QNAP NAS supports exclusive RAID recovery technology to recover a failed RAID disk volume from unintentional disconnection or removal of the hard drives from the system. Using the RAID recovery, users can recover an inactive RAID 1, RAID 5, or RAID 6 volume to degraded mode, or an inactive RAID 0 and JBOD configuration to normal.

Disk volume	Supports RAID recovery	Maximum number of disk removal allowed
Single	No	-
JBOD	Yes	1 or more
RAID 0	Yes	1 or more
RAID 1	Yes	1 or 2
RAID 5	Yes	2 or more
RAID 6	Yes	3 or more
RAID 10	No	-

If the volume status is not active, users can install the same hard drives back to the same slots of the NAS. Then click "RECOVER" on the "Disk Management" > "Volume Management" page. Wait for about 60 seconds for the process to complete. When finished, the data can be accessed.

Note:

- ✓ After recovering a RAID 1, RAID 5, or RAID 6 disk volume from not active to degraded mode by the RAID recovery, users can read or write the volume normally. The volume status will be recovered to normal after synchronization.
- ✓ If the disconnected drive member is damaged, the RAID recovery function will not work.

	Standard RAID 5	QNAP RAID 5	Standard RAID 6	QNAP RAID 6
Degraded mode	N-1	N-1	N-1 & N-2	N-1 & N-2
Read only protection (for immediate data backup & hard drive replacement)	N/A	N-1, bad blocks found in the surviving drives of the array.	N/A	N-2, bad blocks found in the surviving drives of the array.
RAID recovery (RAID status: Not active)	N/A	If re-inserting all the original hard disk drives to the NAS and they can be spun up, identified, accessed, and the hard drive superblock is not damaged.	N/A	If re-inserting all the original hard disk drives to the NAS and they can be spun up, identified, accessed, and the hard drive superblock is not damaged).
RAID crash	N-2	N-2 failed hard drive and any of the remaining hard drives cannot be spun up or identified or accessed.	N-3	N-3 and any of the remaining hard drives cannot be spun up or identified or accessed.

N = Number of hard disk drives in the array

Chapter 9. Use the LCD Panel

This feature is only provided by the NAS models with LCD panels. Please visit <http://www.qnap.com> for details.

The NAS provides a handy LCD panel for users to perform disk configuration and view the system information.

When the NAS has started up, the server name and IP address will be shown.

```

N A S 5 F 4 D E 3
1 6 9 . 2 5 4 . 1 0 0 . 1 0 0
  
```

For the first time installation, the LCD panel shows the number of hard drives detected and the IP address. Configure the hard drives.

Number of hard drives detected	Default disk configuration	Available disk configuration options*
1	Single	Single
2	RAID 1	Single -> JBOD ->RAID 0 -> RAID 1
3	RAID 5	Single -> JBOD -> RAID 0 -> RAID 5
4 or above	RAID 5	Single ->JBOD -> RAID 0 -> RAID 5 -> RAID 6

*Press the "Select" button to choose the option, and press the "Enter" button to confirm.

For example, when 5 hard drives installed are available on the NAS, the LCD panel shows:

```

C o n f i g . D i s k s ?
→ R A I D 5
  
```

Press the "Select" button to browse more options, for example, RAID 6.

Press the "Enter" button and the following message shows. Press the "Select" button to select "Yes" to confirm.

```

C h o o s e R A I D 5 ?
→ Y e s N o
  
```

When RAID 1, RAID 5, or RAID 6 configuration is executed, the system will initialize the hard drives, create the RAID device, format the RAID device, and mount it as a volume on the NAS. The progress will be shown on the LCD panel. When it reaches 100%, the RAID volume can be accessed. Users can create share folders and upload files to the folders on the NAS. In the meantime, to make sure the stripes and blocks in all the RAID component devices are ready, the NAS will execute RAID synchronization and the progress will be shown on "Disk Management" > "Volume Management" page. The synchronization rate is around 30–60 MB/s (vary by hard drive models, system resource usage, etc.).

Note: If a member drive of the RAID configuration was lost during the synchronization, the RAID device will enter degraded mode. The volume data is still accessible. If a new member drive is added, the NAS will start to rebuild. The status can be checked on the "Volume Management" page.

To encrypt the disk volume*, select "Yes" when the LCD panel shows <Encrypt Volume?>. The default encryption password is "admin". To change the password, please login the web-based administration interface as an administrator and change the settings in "Device Configuration" > "Disk volume Encryption Management".

E	n	c	r	y	p	t		V	o	l	u	m	e	?	
→	Y	e	s					N	o						

When the configuration is finished, the server name and IP address will be shown. If the NAS fails to create the disk volume, the following message will be shown.

C	r	e	a	t	i	n	g	.	.	.					
R	A	I	D	5		F	a	i	l	e	d				

Note: The data encryption functions may not be available in accordance to the legislative restrictions of some countries.

View system information by the LCD panel

When the LCD panel shows the server name and IP address, press the "Enter" button to enter the Main Menu. The Main Menu consists of the following items:

1. TCP/IP
2. Physical disk
3. Volume
4. System
5. Shut down
6. Reboot
7. Password
8. Back

1. TCP/IP

The following options are available:

- LAN1 IP Address
- LAN1 Subnet Mask
- LAN1 Gateway
- LAN 1 PRI. DNS
- LAN 1 SEC. DNS
- Enter Network Settings
 - ✓ Network Settings – DHCP
 - ✓ Network Settings – Static IP*
 - ✓ Network Settings – BACK
- Back to Main Menu

* In Network Settings – Static IP, users can configure the IP address, subnet mask, gateway, and DNS of LAN 1 and LAN 2.

2. Physical disk

The following options are available:

- Disk Info
- Back to Main Menu

The disk info shows the temperature and the capacity of the hard drive.

```
D i s k : 1   T e m p : 5 0 ° C
S i z e :   2 3 2   G B
```

3. Volume

This section shows the disk configuration of the NAS. The first line shows the RAID configuration and storage capacity; the second line shows the member drive number of the configuration.

```
R A I D 5   7 5 0 G B
D r i v e   1 2 3 4
```

If there is more than one volume, press the "Select" button to view the information.

The following table shows the description of the LCD messages for RAID 5 configuration.

LCD Display	Drive configuration
RAID5+S	RAID5+spare
RAID5 (D)	RAID 5 degraded mode
RAID 5 (B)	RAID 5 rebuilding
RAID 5 (S)	RAID 5 re-synchronizing
RAID 5 (U)	RAID 5 is unmounted
RAID 5 (X)	RAID 5 non-activated

4. System

This section shows the system temperature and the rotation speed of the system fan.

C	P	U		T	e	m	p	:		5	0	°	C		
S	y	s		T	e	m	p	:		5	5	°	C		

S	y	s		F	a	n	:	8	6	5	R	P	M		

5. Shut down

Use this option to turn off the NAS. Press the "Select" button to select "Yes". Then press the "Enter" button to confirm.

6. Reboot

Use this option to restart the NAS. Press the "Select" button to select "Yes". Then press the "Enter" button to confirm.

7. Password

The default password of the LCD panel is blank. Enter this option to change the password of the LCD panel. Select "Yes" to continue.

C	h	a	n	g	e		P	a	s	s	w	o	r	d	
					Y	e	s		→	N	o				

Enter a password of maximum 8 numeric characters (0-9). When the cursor moves to "OK", press the "Enter" button. Verify the password to confirm the changes.

N	e	w		P	a	s	s	w	o	r	d	:			
														O	K

8. Back

Select this option to return to the main menu.

System Messages

When the NAS encounters system error, an error message will be shown on the LCD panel. Press the "Enter" button to view the message. Press the "Enter" button again to view the next message.

S y s t e m E r r o r !
P l s . C h e c k L o g s

System Message	Description
Sys. Fan Failed	The system fan fails
Sys. Overheat	The system overheats
HDD Overheat	The hard drive overheats
CPU Overheat	The CPU overheats
Network Lost	Both LAN 1 and LAN 2 are disconnected in failover or load-balancing mode
LAN1 Lost	LAN 1 is disconnected
LAN2 Lost	LAN 2 is disconnected
HDD Failure	The hard drive fails
Vol1 Full	The volume is full
HDD Ejected	The hard drive is ejected
Vol1 Degraded	The volume is in degraded mode
Vol1 Unmounted	The volume is unmounted
Vol1 Nonactivate	The volume is not activated

Chapter 10. Install Power Supply Unit

Note:

- This section applies to rackmount NAS models only.
- The power supply units of TS-879U-RP, TS-EC879U-RP, TS-469U-RP/SP, TS-869U-RP, and TS-1269U-RP should only be replaced by an authorized and trained technician.

10.1 1U Turbo NAS

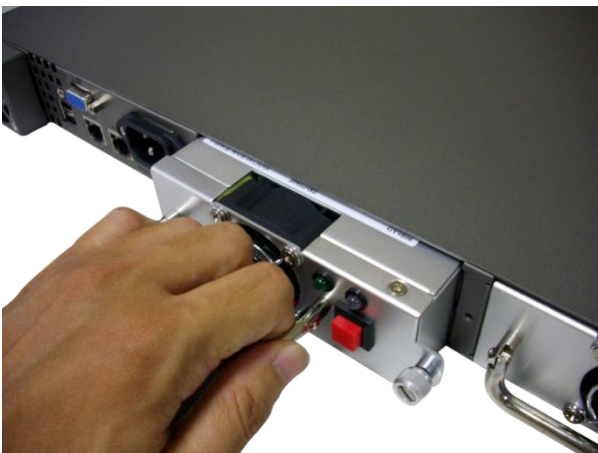
Note: The following instructions should only be performed by an authorized and trained technician.

To install a redundant power supply unit to the 1U Turbo NAS, follow the steps below.

1. Turn off the NAS.
2. Remove the screw and dummy plate.



3. Insert the power supply unit and push it to the end.



4. Fasten the screw tightly.



5. Turn on the NAS.

Note: To replace a failed power supply unit, turn off the NAS. Then remove the failed unit safely and repeat steps 3-5 above to install a new power supply unit.

10.2 TS-469U-RP/SP

Note: The following instructions should only be performed by an authorized and trained technician.

Follow the steps below to replace a failed power supply unit on the TS-469U-RP/SP.

1. Turn off the NAS.
2. Press the green lever and remove the defective power supply unit.



3. Insert a new power supply unit and push it to the end.



4. Turn on the NAS.



Warning: The NAS supports replacing the redundant power supply unit without turning off the server when redundant power supply mode is enabled. However, users are strongly recommended to turn OFF the NAS before replacing the power supply unit to reduce the risk of electric shock.

A second power supply unit can be installed on a single power (SP) rackmount NAS model to upgrade the SP model to redundant power (RP) model.

10.3 2U/3U Turbo NAS (TS-1279U-RP, TS-EC1279U-RP, TS-1679U-RP, and TS-EC1679U-RP only)

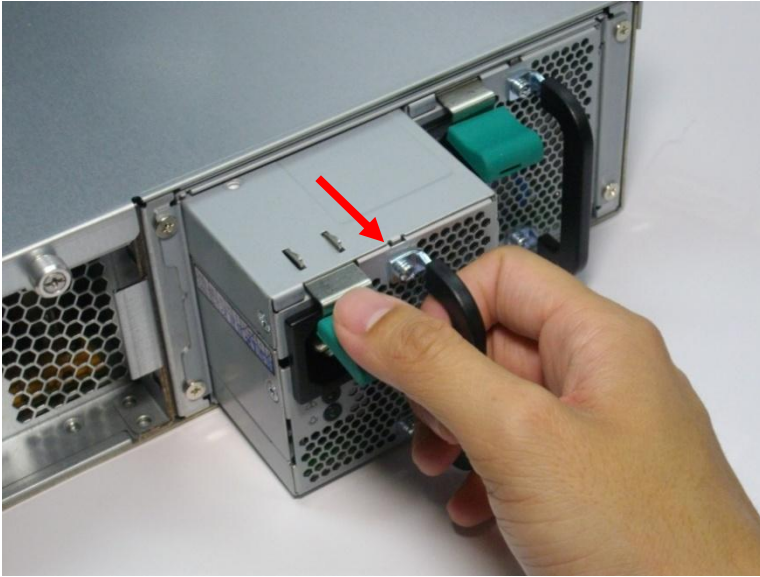
Note: The following instructions should only be performed by an authorized and trained technician.

To replace a failed power supply unit on the TS-1279U-RP, TS-EC1279U-RP, TS-1679U-RP or TS-EC1679U-RP Turbo NAS, follow the steps below.

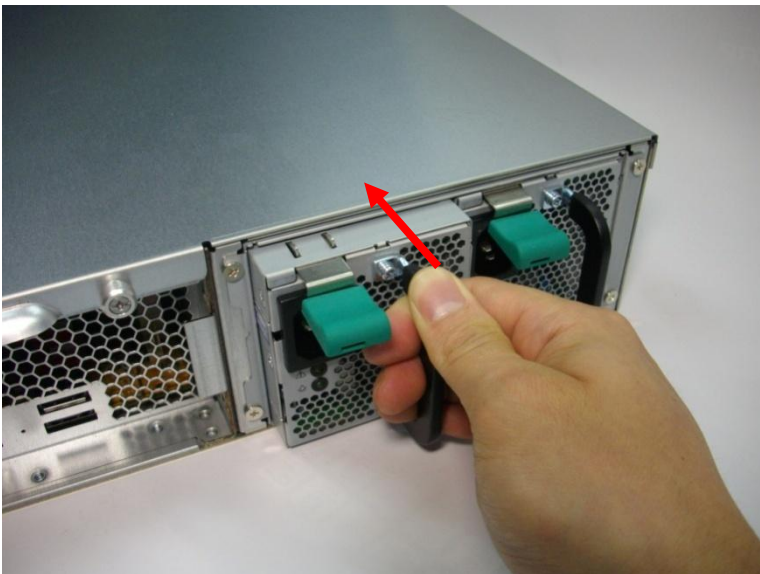
1. Turn off the NAS.
2. Hold the black handler and press and hold the green button firmly.



3. Unplug the failed power supply.



4. Plug in a new power supply to the NAS.



5. Turn on the NAS.

10.4 2U Turbo NAS (except TS-1279U-RP and TS-EC1279U-RP)

Note: The following instructions should only be performed by an authorized and trained technician.

To replace a failed power supply unit on a 2U Turbo NAS, follow the steps below.

1. Turn off the NAS.
2. Unfasten the screw on the failed power supply in an anticlockwise direction.



3. Unplug the failed power supply.



4. Plug in the new power supply to the NAS.



5. Fasten the screw on the power supply in clockwise direction.



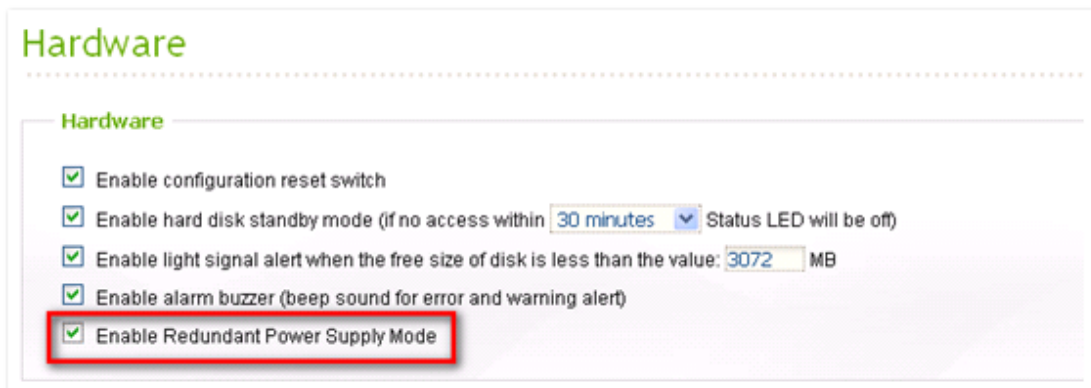
6. Turn on the NAS.

Enable warning alert for redundant power supply on the web-based interface:

If two power supply units (PSU) have been installed on the NAS and connected to the power sockets, both PSU will supply the power to the NAS (applied to 1U and 2U models). Users can enable redundant power supply mode in "System Administration" > "Hardware" to receive warning alert for the redundant power supply. The NAS will beep and record the error messages in "System Logs" when the PSU is plugged out or fails.

If only one PSU is installed on the NAS, users are suggested NOT to enable this option.

* This function is disabled by default.



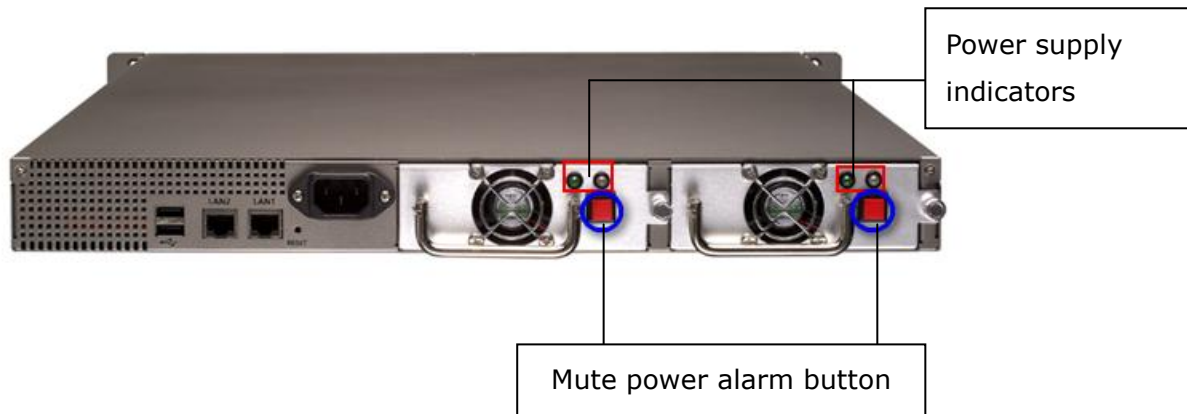
The following description applies to 1U NAS models only.

(1) Power supply indicators:

- ✓ Green (left) power indicator: Indicates the power supply unit is in normal status.
- ✓ Red (right) power indicator: Indicates the power supply unit is in abnormal status.

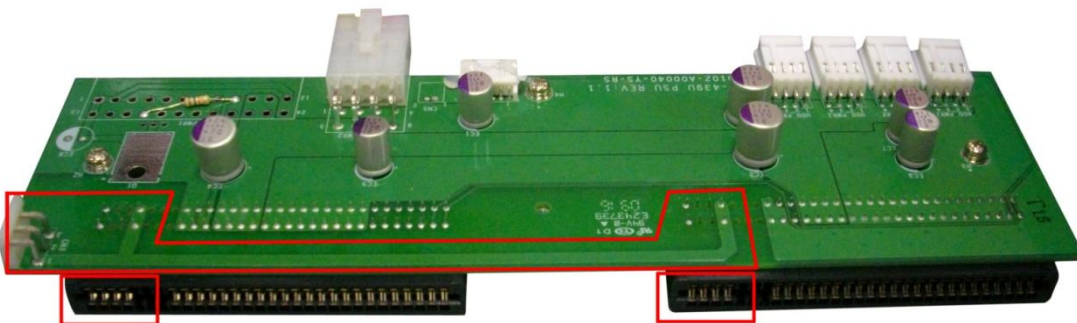
(2) Mute power alarm button:

When an error is detected on power supply unit, the system beeps to alert the administrator. Press this button to turn off the alarm.



WARNING: RISK OF ELECTRIC SHOCK

The connectors on the back panel (bracketed parts below) contain high voltage. Do NOT touch these parts to avoid the risk of electric shock to the maintenance operator.



Technical Support

QNAP provides dedicated online support and customer service via instant messenger.

Online Support: <http://helpdesk.qnap.com/>

Forum: <http://forum.qnap.com>

Technical Support in the USA and Canada:

Email: q_supportus@qnap.com

TEL: +1-909-595-2782 #3

Address: 168 University Parkway, Pomona CA 91768

Service Hours: 06:00-18:00 (GMT- 08:00 Pacific Time, Monday to Friday)

GNU GENERAL PUBLIC LICENSE

Version 3, 29 June 2007

Copyright © 2007 Free Software Foundation, Inc. <<http://fsf.org/>>

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

Preamble

The GNU General Public License is a free, copyleft license for software and other kinds of works.

The licenses for most software and other practical works are designed to take away your freedom to share and change the works. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change all versions of a program--to make sure it remains free software for all its users. We, the Free Software Foundation, use the GNU General Public License for most of our software; it applies also to any other work released this way by its authors. You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps: (1) assert copyright

on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A “covered work” means either the unmodified Program or a work based on the Program.

To “propagate” a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To “convey” a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays “Appropriate Legal Notices” to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

1. Source Code.

The “source code” for a work means the preferred form of the work for making modifications to it. “Object code” means any non-source form of a work.

A “Standard Interface” means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The “System Libraries” of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A “Major Component”, in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

2. Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered by this License only if the output, given its content, constitutes a covered work. This License acknowledges your rights of fair use or other equivalent, as provided by copyright law.

You may make, run and propagate covered works that you do not convey, without conditions so long as your license otherwise remains in force. You may convey covered works to others for the sole purpose of having them make modifications exclusively for you, or provide you with facilities for running those works, provided that you comply with the terms of this License in conveying all material for which you do not control copyright. Those thus making or running the covered works for you must do so exclusively on your behalf, under your direction and control, on terms that prohibit them from making any copies of your copyrighted material outside their relationship with you.

Conveying under any other circumstances is permitted solely under the conditions stated below. Sublicensing is not allowed; section 10 makes it unnecessary.

3. Protecting Users' Legal Rights From Anti-Circumvention Law.

No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on

20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to the covered work, and you disclaim any intention to limit operation or modification of the work as a means of enforcing, against the work's users, your or third parties' legal rights to forbid circumvention of technological measures.

4. Conveying Verbatim Copies.

You may convey verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice; keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

- a) The work must carry prominent notices stating that you modified it, and giving a relevant date.
- b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to "keep intact all notices".
- c) You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.
- d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an “aggregate” if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

- a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.
- b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.
- c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.
- d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.
- e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the

general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

A "User Product" is either (1) a "consumer product", which means any tangible personal property which is normally used for personal, family, or household purposes, or (2) anything designed or sold for incorporation into a dwelling. In determining whether a product is a consumer product, doubtful cases shall be resolved in favor of coverage. For a particular product received by a particular user, "normally used" refers to a typical or common use of that class of product, regardless of the status of the particular user or of the way in which the particular user actually uses, or expects or is expected to use, the product. A product is a consumer product regardless of whether the product has substantial commercial, industrial or non-consumer uses, unless such uses represent the only significant mode of use of the product.

"Installation Information" for a User Product means any methods, procedures, authorization keys, or other information required to install and execute modified versions of a covered work in that User Product from a modified version of its Corresponding Source. The information must suffice to ensure that the continued functioning of the modified object code is in no case prevented or interfered with solely because modification has been made.

If you convey an object code work under this section in, or with, or specifically for use in, a User Product, and the conveying occurs as part of a transaction in which the right of possession and use of the User Product is transferred to the recipient in perpetuity or for a fixed term (regardless of how the transaction is characterized), the Corresponding Source conveyed under this section must be accompanied by the Installation Information. But this requirement does not apply if neither you nor any third party retains the ability to install modified object code on the User Product (for example, the work has been installed in ROM).

The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying.

7. Additional Terms.

“Additional permissions” are terms that supplement the terms of this License by making exceptions from one or more of its conditions. Additional permissions that are applicable to the entire Program shall be treated as though they were included in this License, to the extent that they are valid under applicable law. If additional permissions apply only to part of the Program, that part may be used separately under those permissions, but the entire Program remains governed by this License without regard to the additional permissions.

When you convey a copy of a covered work, you may at your option remove any additional permissions from that copy, or from any part of it. (Additional permissions may be written to require their own removal in certain cases when you modify the work.) You may place additional permissions on material, added by you to a covered work, for which you have or can give appropriate copyright permission.

Notwithstanding any other provision of this License, for material you add to a covered work, you may (if authorized by the copyright holders of that material) supplement the terms of this License with terms:

- a) Disclaiming warranty or limiting liability differently from the terms of sections 15 and 16 of this License; or
- b) Requiring preservation of specified reasonable legal notices or author attributions in that material or in the Appropriate Legal Notices displayed by works containing it; or
- c) Prohibiting misrepresentation of the origin of that material, or requiring that modified versions of such material be marked in reasonable ways as different from the original version; or
- d) Limiting the use for publicity purposes of names of licensors or authors of the material; or
- e) Declining to grant rights under trademark law for use of some trade names, trademarks, or service marks; or
- f) Requiring indemnification of licensors and authors of that material by anyone who conveys the material (or modified versions of it) with contractual assumptions of liability to the recipient, for any liability that these contractual assumptions directly impose on those

licensors and authors.

All other non-permissive additional terms are considered “further restrictions” within the meaning of section 10. If the Program as you received it, or any part of it, contains a notice stating that it is governed by this License along with a term that is a further restriction, you may remove that term. If a license document contains a further restriction but permits relicensing or conveying under this License, you may add to a covered work material governed by the terms of that license document, provided that the further restriction does not survive such relicensing or conveying.

If you add terms to a covered work in accord with this section, you must place, in the relevant source files, a statement of the additional terms that apply to those files, or a notice indicating where to find the applicable terms.

Additional terms, permissive or non-permissive, may be stated in the form of a separately written license, or stated as exceptions; the above requirements apply either way.

8. Termination.

You may not propagate or modify a covered work except as expressly provided under this License. Any attempt otherwise to propagate or modify it is void, and will automatically terminate your rights under this License (including any patent licenses granted under the third paragraph of section 11).

However, if you cease all violation of this License, then your license from a particular copyright holder is reinstated (a) provisionally, unless and until the copyright holder explicitly and finally terminates your license, and (b) permanently, if the copyright holder fails to notify you of the violation by some reasonable means prior to 60 days after the cessation.

Moreover, your license from a particular copyright holder is reinstated permanently if the copyright holder notifies you of the violation by some reasonable means, this is the first time you have received notice of violation of this License (for any work) from that copyright holder, and you cure the violation prior to 30 days after your receipt of the notice.

Termination of your rights under this section does not terminate the licenses of parties who have received copies or rights from you under this License. If your rights have been terminated and not permanently reinstated, you do not qualify to receive new licenses for the same material under section 10.

9. Acceptance Not Required for Having Copies.

You are not required to accept this License in order to receive or run a copy of the Program. Ancillary propagation of a covered work occurring solely as a consequence of using peer-to-peer transmission to receive a copy likewise does not require acceptance. However, nothing other than this License grants you permission to propagate or modify any covered work. These actions infringe copyright if you do not accept this License. Therefore, by modifying or propagating a covered work, you indicate your acceptance of this License to do so.

10. Automatic Licensing of Downstream Recipients.

Each time you convey a covered work, the recipient automatically receives a license from the original licensors, to run, modify and propagate that work, subject to this License. You are not responsible for enforcing compliance by third parties with this License.

An "entity transaction" is a transaction transferring control of an organization, or substantially all assets of one, or subdividing an organization, or merging organizations. If propagation of a covered work results from an entity transaction, each party to that transaction who receives a copy of the work also receives whatever licenses to the work the party's predecessor in interest had or could give under the previous paragraph, plus a right to possession of the Corresponding Source of the work from the predecessor in interest, if the predecessor has it or can get it with reasonable efforts.

You may not impose any further restrictions on the exercise of the rights granted or affirmed under this License. For example, you may not impose a license fee, royalty, or other charge for exercise of rights granted under this License, and you may not initiate litigation (including a cross-claim or counterclaim in a lawsuit) alleging that any patent claim is infringed by making, using, selling, offering for sale, or importing the Program or any portion of it.

11. Patents.

A "contributor" is a copyright holder who authorizes use under this License of the Program or a work on which the Program is based. The work thus licensed is called the contributor's "contributor version".

A contributor's "essential patent claims" are all patent claims owned or controlled by the contributor, whether already acquired or hereafter acquired, that would be infringed by some manner, permitted by this License, of making, using, or selling its contributor version, but do not include claims that would be infringed only as a consequence of further

modification of the contributor version. For purposes of this definition, "control" includes the right to grant patent sublicenses in a manner consistent with the requirements of this License.

Each contributor grants you a non-exclusive, worldwide, royalty-free patent license under the contributor's essential patent claims, to make, use, sell, offer for sale, import and otherwise run, modify and propagate the contents of its contributor version.

In the following three paragraphs, a "patent license" is any express agreement or commitment, however denominated, not to enforce a patent (such as an express permission to practice a patent or covenant not to sue for patent infringement). To "grant" such a patent license to a party means to make such an agreement or commitment not to enforce a patent against the party.

If you convey a covered work, knowingly relying on a patent license, and the Corresponding Source of the work is not available for anyone to copy, free of charge and under the terms of this License, through a publicly available network server or other readily accessible means, then you must either (1) cause the Corresponding Source to be so available, or (2) arrange to deprive yourself of the benefit of the patent license for this particular work, or (3) arrange, in a manner consistent with the requirements of this License, to extend the patent license to downstream recipients. "Knowingly relying" means you have actual knowledge that, but for the patent license, your conveying the covered work in a country, or your recipient's use of the covered work in a country, would infringe one or more identifiable patents in that country that you have reason to believe are valid.

If, pursuant to or in connection with a single transaction or arrangement, you convey, or propagate by procuring conveyance of, a covered work, and grant a patent license to some of the parties receiving the covered work authorizing them to use, propagate, modify or convey a specific copy of the covered work, then the patent license you grant is automatically extended to all recipients of the covered work and works based on it.

A patent license is "discriminatory" if it does not include within the scope of its coverage, prohibits the exercise of, or is conditioned on the non-exercise of one or more of the rights that are specifically granted under this License. You may not convey a covered work if you are a party to an arrangement with a third party that is in the business of distributing software, under which you make payment to the third party based on the extent of your activity of conveying the work, and under which the third party grants, to any of the parties who would receive the covered work from you, a discriminatory patent license (a) in

connection with copies of the covered work conveyed by you (or copies made from those copies), or (b) primarily for and in connection with specific products or compilations that contain the covered work, unless you entered into that arrangement, or that patent license was granted, prior to 28 March 2007.

Nothing in this License shall be construed as excluding or limiting any implied license or other defenses to infringement that may otherwise be available to you under applicable patent law.

12. No Surrender of Others' Freedom.

If conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot convey a covered work so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not convey it at all. For example, if you agree to terms that obligate you to collect a royalty for further conveying from those to whom you convey the Program, the only way you could satisfy both those terms and this License would be to refrain entirely from conveying the Program.

13. Use with the GNU Affero General Public License.

Notwithstanding any other provision of this License, you have permission to link or combine any covered work with a work licensed under version 3 of the GNU Affero General Public License into a single combined work, and to convey the resulting work. The terms of this License will continue to apply to the part which is the covered work, but the special requirements of the GNU Affero General Public License, section 13, concerning interaction through a network will apply to the combination as such.

14. Revised Versions of this License.

The Free Software Foundation may publish revised and/or new versions of the GNU General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies that a certain numbered version of the GNU General Public License "or any later version" applies to it, you have the option of following the terms and conditions either of that numbered version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of the GNU General Public License, you may choose any version ever published by the Free Software Foundation.

If the Program specifies that a proxy can decide which future versions of the GNU General Public License can be used, that proxy's public statement of acceptance of a version permanently authorizes you to choose that version for the Program.

Later license versions may give you additional or different permissions. However, no additional obligations are imposed on any author or copyright holder as a result of your choosing to follow a later version.

15. Disclaimer of Warranty.

THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. Limitation of Liability.

IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MODIFIES AND/OR CONVEYS THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

17. Interpretation of Sections 15 and 16.

If the disclaimer of warranty and limitation of liability provided above cannot be given local legal effect according to their terms, reviewing courts shall apply local law that most closely approximates an absolute waiver of all civil liability in connection with the Program, unless a warranty or assumption of liability accompanies a copy of the Program in return for a fee.

END OF TERMS AND CONDITIONS

Appendix A: Product Compliance Class

NAS Models	FCC	CE
TS-EC1679U-RP	Class A	Class A
TS-EC1279U-RP	Class A	Class A
TS-EC879U-RP	Class A	Class A
TS-1679U-RP	Class A	Class A
TS-1279U-RP	Class A	Class A
TS-1270U-RP	Class A	Class A
TS-1269U-RP	Class A	Class A
TS-879U-RP	Class A	Class A
TS-870U-RP	Class A	Class A
TS-869U-RP	Class A	Class A
TS-469U-RP/SP	Class A	Class A
TS-421U	Class A	Class A
TS-420U	Class A	Class A
TS-412U	Class A	Class A
TS-1079 Pro	Class A	Class A
TS-879 Pro	Class A	Class A
TS-870 Pro	Class B	Class B
TS-869 Pro	Class B	Class B
TS-670 Pro	Class B	Class B
TS-669 Pro	Class B	Class B
TS-569 Pro	Class B	Class B
TS-470 Pro	Class B	Class B
TS-469 Pro	Class B	Class B
TS-269 Pro	Class B	Class B
TS-870	Class B	Class B
TS-851	Class B	Class B
TS-670	Class B	Class B
TS-651	Class B	Class B
TS-470	Class B	Class B
TS-451	Class B	Class B
TS-421	Class B	Class B
TS-251	Class B	Class B
TS-221	Class B	Class B

NAS Models	FCC	CE
TS-121	Class B	Class B
TS-420	Class B	Class B
TS-220	Class B	Class B
TS-120	Class B	Class B
TS-412P	Class B	Class B
TS-212P	Class B	Class B
TS-112P	Class B	Class B
TS-269H	Class B	Class B
TS-212-E	Class B	Class B
HS-251	Class B	Class B
HS-210	Class B	Class B