

ENTERPRISE iSCSI Open-E

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1 Before you get started

Congratulations on purchasing Open-E iSCSI, the ideal solution for network-based storage management. This manual will assist you as you install and configure the hardware.

In order to quickly reach the desired configuration, please read the following pages thoroughly. The time invested is well spent - after all, you have purchased this solution for your invaluable data.

1.1 Content of this package

Before you begin installing Open-E iSCSI ENTERPRISE, make sure that the package contains the following items:

- Open-E flash module
- Power adapter
- Quick Start brochure
- A CD containing the manual (this document), brochures, images and additional information material.
- Source CD.

If something is missing, please contact your dealer.

1.2 System requirements

- x86-compatible PC
- CPU 1 GHz or faster
- at least 512 MB main memory
- Hardware RAID Controller
- IDE port
- One or several suitable hard drives
- Network Interface Card (NIC)

Open-E iSCSI contains its own operating system, no additional software is required.

- **note** In order to generate maximum performance, we recommend using a network card with 1 Gb or more, as well as a processor with at least 2.8 GHz. If several computers are accessing the iSCSI system, we recommend 1024 MB main memory or more.

1.3 Supported clients

- Microsoft Windows (all versions)
- Linux
- Unix
- Mac OS 8.0, 9.0 and MAC OS X

1.4 Supported network protocols

- TCP/IP
- SNMP

1.5 Required tools

Grounding strap or mat in order to avoid electrostatic discharge (ESD)
Tools for opening the computer's enclosure (typically, a screwdriver)

1.6 Safety precautions

1.6.1 Personal safety

- **caution** High voltages may occur inside computer equipment. Before removing the enclosure, please turn off the power switch and disconnect the power cords.

1.6.2 Safety for your data

If you are not using new hard drives for operating Open-E iSCSI, please backup all important data prior to installation. Adding a hard drive to Open-E iSCSI goes hand in hand with complete formatting of the hard drive, which can possibly delete existing data.

1.6.3 ESD precautions

In order to avoid damage to your computer or to Open-E iSCSI, please ensure you are grounded before opening the PC or the ESD package that contains Open-E iSCSI. Using grounding straps or mats is the best way to ensure this safety. If you don't have grounding equipment handy, please make sure you are grounded before working with Open-E iSCSI, for instance, by touching a heater.

- Avoid unnecessary touching of the components inside the PC
- Please touch Open-E iSCSI only on the edges

2 Features

2.1 What is iSCSI?

iSCSI (internet SCSI) is a protocol that encapsulates SCSI (Small Computer System Interface) commands and data in TCP/IP packets for linking storage devices with servers over common IP infrastructures. By using iSCSI, you can supply high performance SANs (Storage Area Networks) using standard IP networks like LAN, MAN, WAN or the Internet.

iSCSI solutions are based on a separate operating system and often also on a special hardware. Typically, this operating system allows operating iSCSI technology.

iSCSI solutions allow users to add additional disk devices to existing networks quickly, easily, and cost-efficiently.

iSCSI is a client-server architecture. Clients of an iSCSI interface are called "initiators". Initiators issue iSCSI "commands" to request services from components, logical units, of a server known as a "target". The "device server" on the logical unit accepts iSCSI commands and processes them.

2.2 Description of the functions

Open-E iSCSI is one of the easiest ways of implementing an iSCSI technology in your network. Through its simple architecture; it is a flash memory with an IDE interface and Open-E iSCSi as its operating system, Open-E iSCSI can be used with all x86 PCs containing an IDE controller. Older computers may also be used.

To begin working with Open-E iSCSI, all you need to do is to assign an IP address to the iSCSI Target, either automatically through an existing DHCP server or by assigning it manually. All other settings are handled via a web front-end, which can be easily accessed through the IP address of Open-E iSCSI using the encrypted https protocol.

Open-E iSCSI allows users of client stations to delegate disk devices and aggregation and form iSCSI Targets and their local mounting from any site in the network.

2.3 Why Open-E iSCSI?

Often, storage in network environments is expanded the following way: File servers have to be shut down in order to install additional drives. In the next step, they need to be reconfigured. It is tedious work data often has to be copied manually onto larger drives, consuming a lot of time and money.

With Open-E iSCSI, you can:

- Consolidated storage and backups for multiple servers.
- Improve data availability and efficiency.

- Lower costs by centralizing storage management.
- iSCSI also simplifies the installation and on-going management of a SAN versus using Fibre Channel.

With Open-E iSCSI, you can add storage to your existing network quickly, easily, and most important cost-efficiently. Expensive hardware is no longer necessary. Take any computer, a new rack server or an old desktop PC and exchange the system drive for the Open-E iSCSI flash module. To store data Open-E iSCSI ENTERPRISE uses IDE (ATA), SATA or SCSI hard drives and hardware RAID controllers.

Within a few minutes, you will have up to several hundred gigabytes available on your network without much effort or any downtime.

2.4 RAID types

This manual is not intended to replace your RAID controller manual. But we want to provide you with an overview of common RAID types so that you can make an informed decision on which type to choose. Depending on whom you ask, RAID means either Redundant Array of Independent Disks or Redundant Array of Inexpensive Disks. Both are correct. In essence, you combine the capacity, speed and security of several disks into one.

RAID 0 forms one large hard disk by concatenating stripes from each member drive. Stripe size is configurable roughly between 64 KB and 1 MB. The result is a lightning-fast RAID, but with no added security. One failing drive may ruin the entire RAID.

RAID 1 mirrors hard drives. By writing identical data onto more than one drive, security is enhanced. A completely defective drive does not cause any loss of data. The drawback is reduced performance and capacity.

RAID 5 combines data striping from RAID 0 with parity checking, therefore combining speed and improved security. The loss of one drive is tolerable.

RAID 6 extends RAID 5 by adding an additional parity block, thus it uses block-level striping with two parity blocks distributed across all member disks. It was not one of the original RAID levels. The user capacity of a RAID 6 array is $N-2$, where N is the total number of drives in the array. RAID 6 does not have a performance penalty for read operations, but it does have a performance penalty on write operations due to the overhead associated with the additional parity calculations.

RAID 10 is a combination of RAID 1 and 0, hence the name. Data is written in a striped and mirrored configuration, providing high performance and robust security.

3 Hardware installation

3.1 Getting ready

Switch off the computer, remove the power supply, and open the PC's enclosure. In tower cases, the side parts often can be removed individually (on the backside of the enclosure you just need to remove a few screws). Many machines have U- or O shaped covers that have to be pulled off (either towards the front or the back). Should you need any assistance, please contact your dealer.

Now localize the IDE connectors on your motherboard:

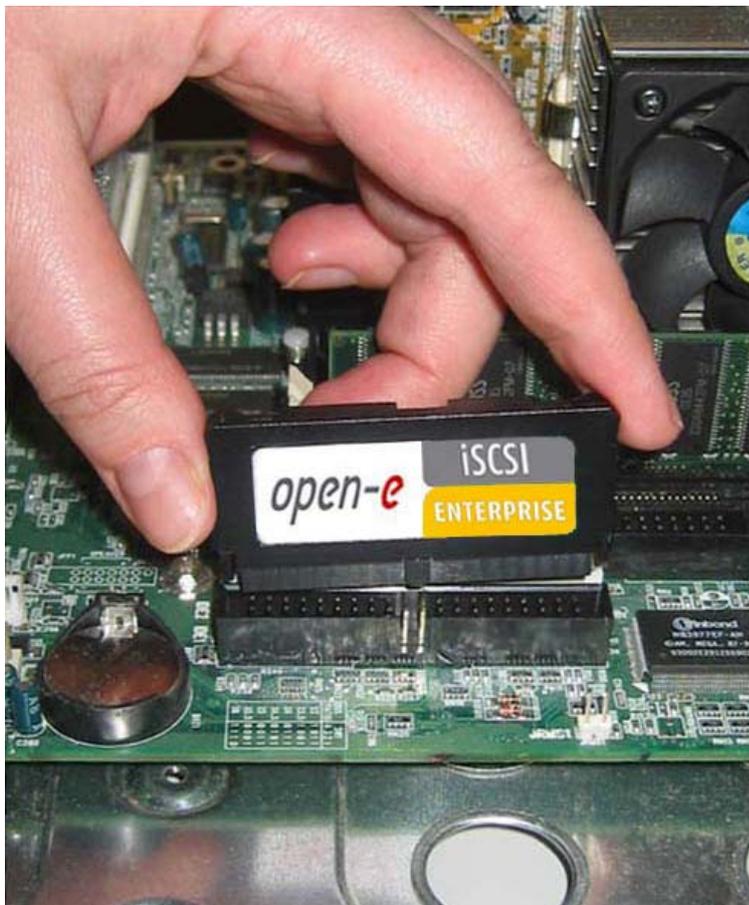


Every motherboard has at least two such ports. To install Open-E iSCSI, you have to use the first (primary) port.

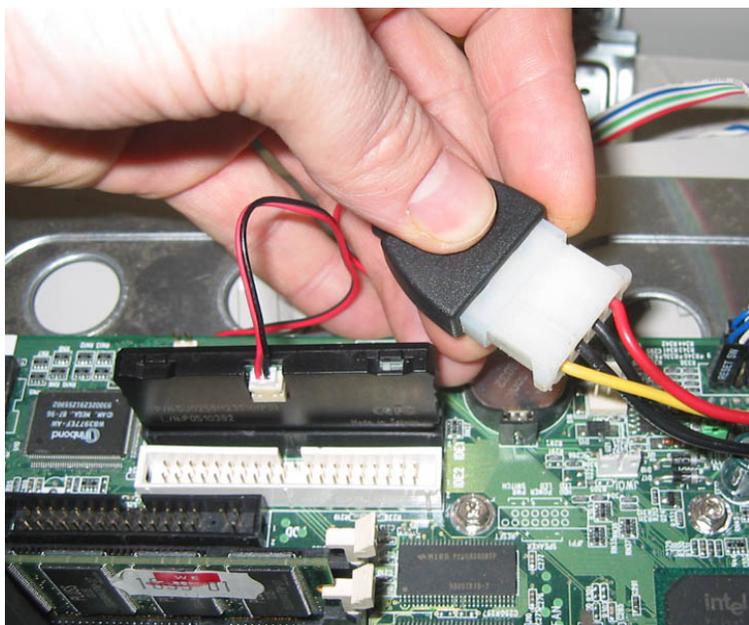
Often, the labeling on the IDE connectors may be tiny, but it is always there, on each and every board. Preferably look for "IDE 0" If this connector does not exist, the first port is called "IDE 1" (with the second connector being 2).

3.2 Installing Open-E iSCSI

If necessary, remove the flat band cable that connects your hard drive with the controller. Open-E iSCSI should now be carefully inserted into the connector. As IDE ports can have a notch on one side, you can only insert the connector at the preset position.



In the package you will find an adapter cable, which provides Open-E iSCSI with power. The little white plug corresponds with the matching connector on Open-E iSCSI. As a final step, the adapter has to be connected to the white power-supply plug (see photo):



That should conclude the installation! Before putting the enclosure on your computer again, do not forget to connect your hard drives to the IDE second connector, SATA connector or to the SATA port on the RAID controller.

4 Configuration

4.1 The basic configuration of the iSCSI computer

Connect your keyboard and a monitor to the iSCSI computer. You will only need those devices for the basic configuration or extended maintenance configuration.

● note You may have to change the function “Halt On: All Errors” in your PC's BIOS, so that the system starts even without the keyboard. The correct configuration is “Halt On: All But Keyboard.”

4.2 First-time operation of Open-E iSCSI

Now start your system.



After booting graphical screen is complete, Open-E iSCSI will provide you with information on the current software version and the network settings:

```

Welcome to Open-E iSCSI                                     (Press F1 for Help)
-----

Model:              Open-E iSCSI ENTERPRISE
Version:            1.61.IE00000000.1838
Release date:       2006-05-22
S/N:                1357186427

Network settings:
interface 1:        eth0          ip: 192.168.0.220/255.255.255.0
interface 2:        eth1          ip: 192.168.1.220/255.255.255.0

Https settings:
                    port          443
                    allow from    all
  
```

If the network has a DHCP server, Open-E iSCSI should gain access to the IP settings automatically. If that is the case, you can proceed at 3.5. If your network does not have a DHCP server, Open-E iSCSI will start with the default settings: IP address 192.168.0.220 and subnet mask 255.255.255.0.

You can change these values again by typing in the following key combination: left CTRL, left ALT and N. You can select a different IP address now. All other available functions on of the console will appear after pressing F1 key (see below).

After a connection has been established, all settings can also be changed remotely via the web browser. If your network requires it, the address of the standard gateway and the broadcast address can be changed.

```

----- Help -----
You can use below key sequences (C-means 'Left Ctrl',A-'Left Alt')
C-A-N - to edit static IP addresses
C-A-P - to restore default factory administrator settings
C-A-I - to restore default factory IP configuration
C-A-T - to run console tools
C-A-X - to display extended tools
C-A-H - to display hardware and drivers info
F2    - to display all network interface
F5    - to refresh console info
C-A-S - to shutdown the system
----- (100 %) -----
< EXIT >

```

● **note** For additional information, please read the chapter “Functions of the console display.”

4.3 Logging into Open-E iSCSI ENTERPRISE

You can establish a connection to Open-E iSCSI from every network computer. To establish this connection, use a browser (e.g. Microsoft Internet Explorer) and enter the IP address or the name of the computer hosting the Open-E iSCSI server into the URL entry line: <https://192.168.0.220>.

● **note** For security reasons, Open-E iSCSI uses the encrypted SSL protocol (https).

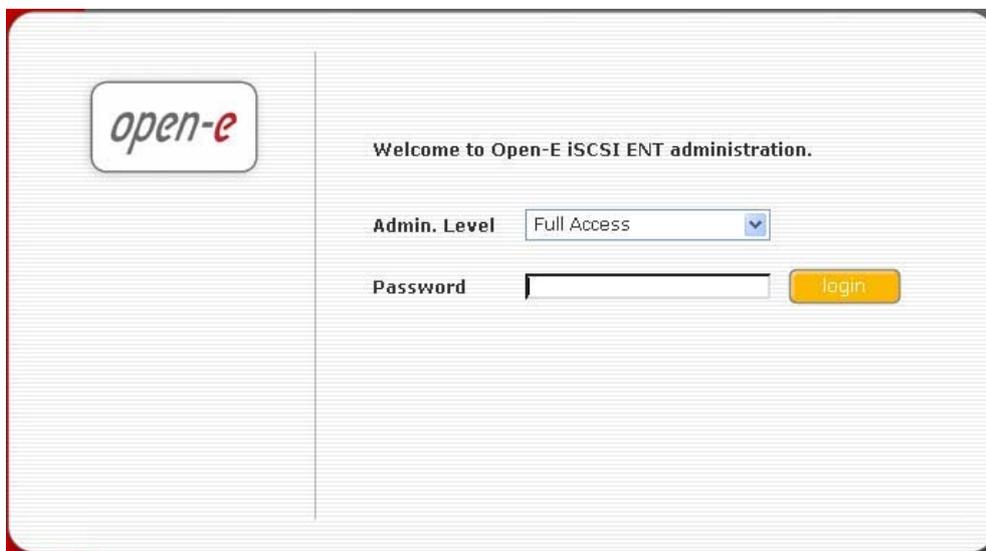
You will now be asked for verification of the encryption certification. Since Open-E iSCSI does not allow for creating shares on the Internet but only on the Intranet, there is no need for global certification by an authorized body. You can accept the certificate for the session only, but also for all future use.

Now you have to accept the license in order to use the Open-E software and you can choose the language you want to use.



- **note** Page with the software agreement and available language option will be shown after first launching Open-E iSCSI. Later you can change the language using Language Settings, which are located in server through Setup.

After accepting license agreement you can log into Open-E iSCSI Target using the standard password "ancom" (this can be changed later). In order to start working, you can now set all parameters.



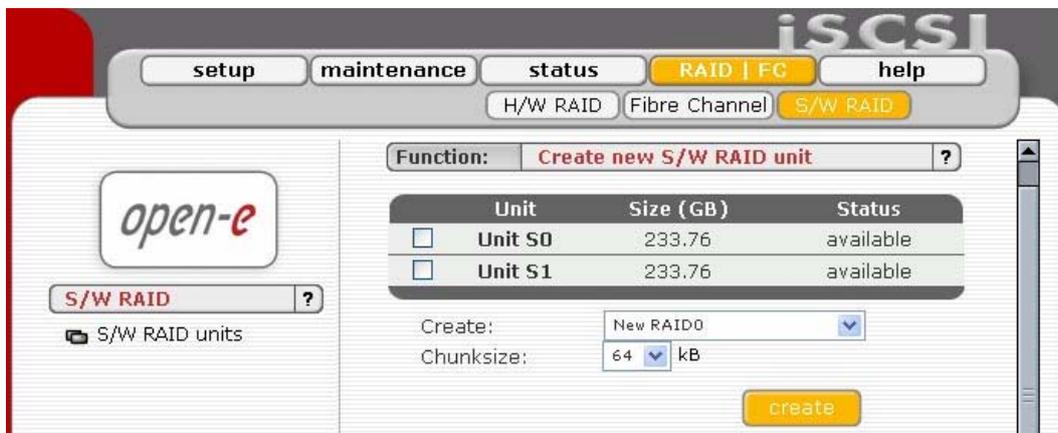
- **note** Password checking is case-sensitive. If you cannot log into Open-E iSCSI, please check the status of the Shift and Caps Lock keys.

4.4 Create RAID Units

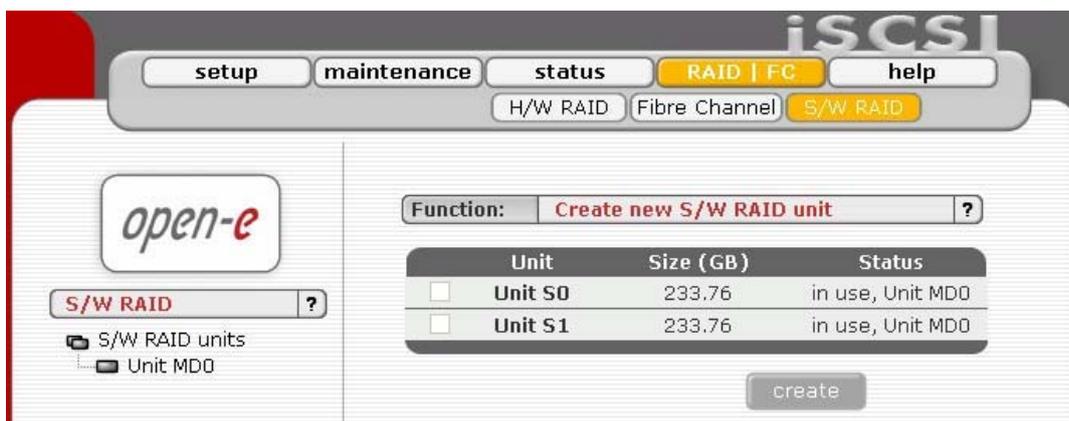
Use the RAID manager to build a disk array, when a hardware RAID controller is installed in Open-E iSCSI. To create disk arrays utilize 3ware RAID manager (3DM or 3DM2) for RAID controllers series 7000/8000/9000. Use an ICP console for INTEL / ICP Vortex RAID controllers. For any additional information refer to a RAID controller user manual. You can use also storage devices connected to a Fibre Channel. If the hardware RAID controller is not installed, you can use software RAID, select "RAID | FC" in the menu and then "S/W RAID".

You will find a list of any available disk drives (units).

To create a disk array, please mark any selected unit(s) and choose the appropriate RAID from the "destination". Created RAID units appear as RAID 0, 1, 5 and 6.

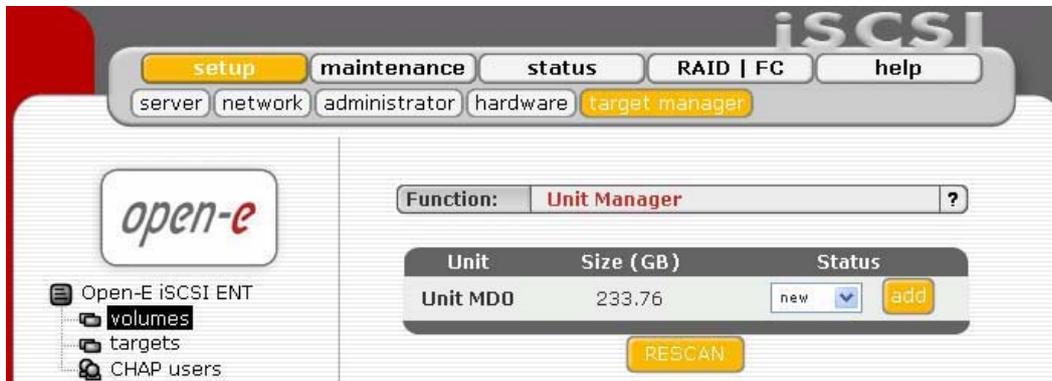


After clicking "create" button, the status will change to "in use" with additional information describing the kind of a disk array (e.g. MD0 is RAID 1)

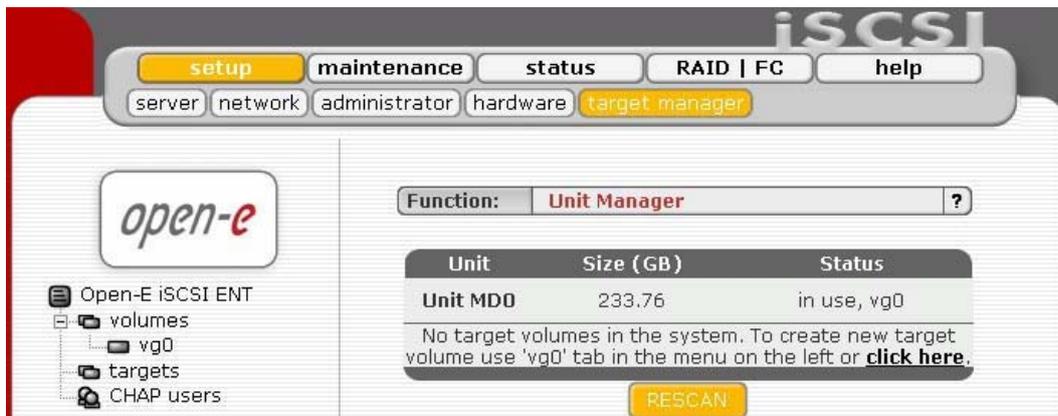


4.5 Adding Disk Units

Please select “setup” → “target manager” and then “volumes” on the left page. After selecting “volumes” you will find a list of all logical units. To add a new unit to the iSCSI, please click “Add”. After the initializing procedure, the status of the unit will change from the “Add” button into “in use, vg0”.

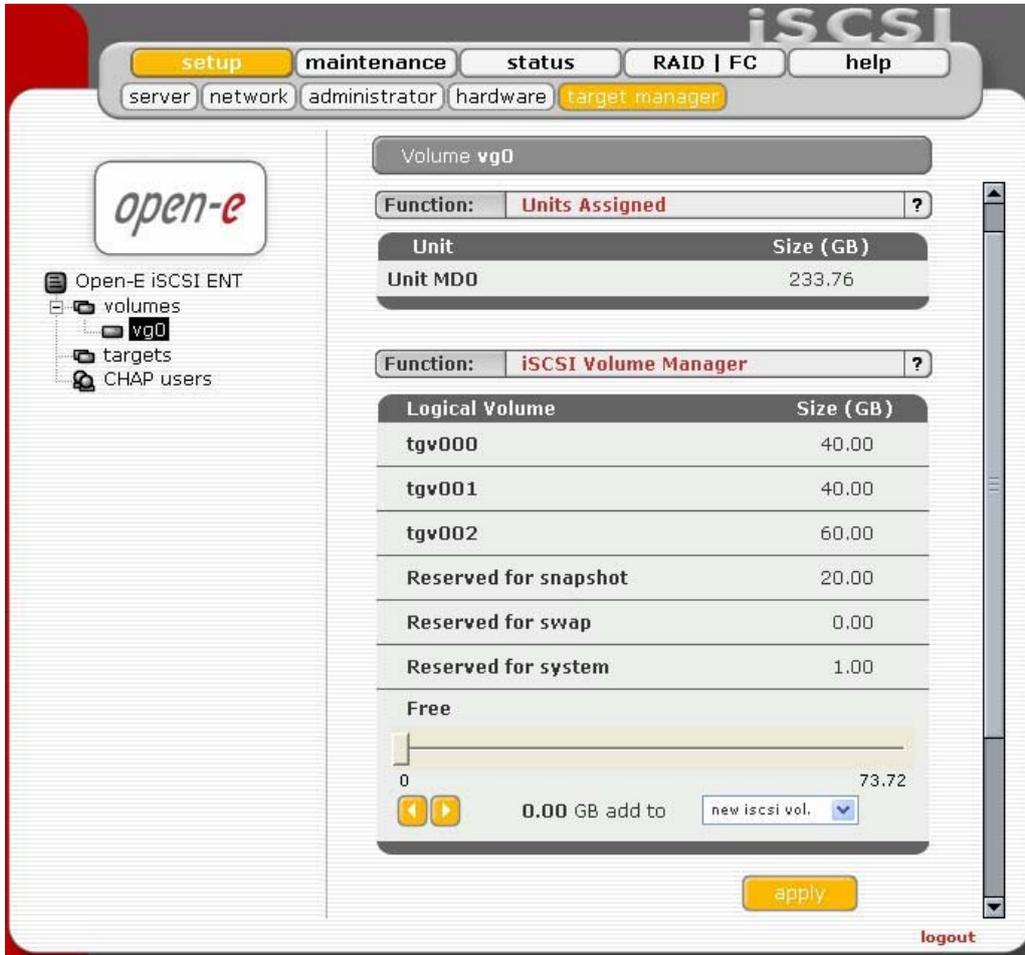


Please note that you can expand the storage capacity by adding new disk drives. In the “Unit Manager” Function Open-E iSCSI will show both “in use” and “new units”. In order to add a new unit to the Volume Group (vg0), please simply click 'Add' after which Open-E iSCSI page will be restarted (see below).

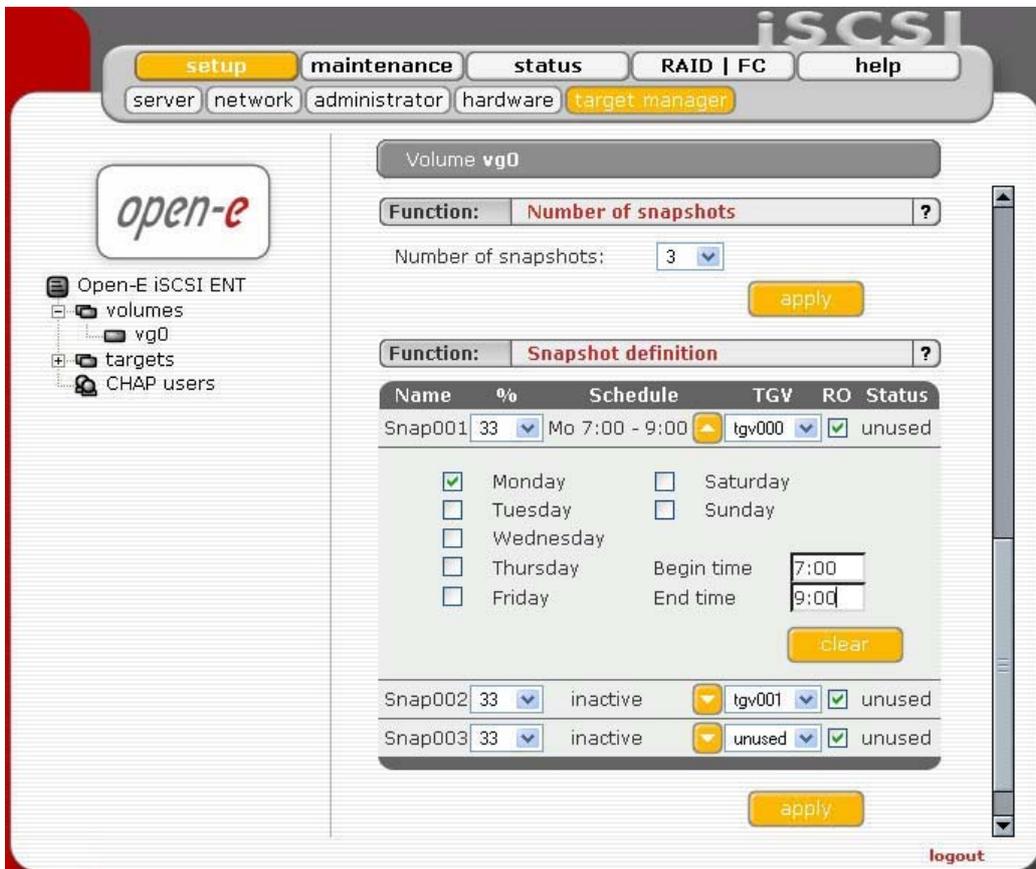


4.6 Creating iSCSI targets volume

Next, by clicking on the branch “vg0” you can add disk volume to new “targets volume (tgv)” and snapshot or increase size on existing tgv's and snapshot (you can't decrease tgv size and snapshot). To set needed tgv size just use scrollbar, next to it on the right side it shows the available size to use (see below).



Here you can also set the snapshots number, and add them to the particular „targets volume”.



After creating “tgv” and “snapshots” click on the branch “targets” in Target Volume Manager Function, where you add “targets volumes” only in the premises of one vg0. Next, by clicking “CHAP user” on the branch, you can management the name and secure access to “tgv” by giving CHAP user name and password (password must consist from 12 to 16 characters if you use Microsoft iSCSI Initiator).

4.7 Configuring end user workstation

For iSCSI technology to work correctly on end-user computers, you need to install iSCSI Initiator software (if it is not provided with the operating system). For Microsoft Windows 2000/XP/2003 systems, it is an option and the Microsoft iSCSI Initiator is available to download from the web.

Correct software configuration depends on installing individual “target volumes” by adding another disk letter in the system (in Windows XP and 2003) or as subfolder the same as with folders in UNIX system. All these functions are available via “administrative tools” → disks management.

How to connect iSCSI in Windows 2000/XP/2003:

- a. First, you have to install the iSCSI Initiator package. You must be logged in as administrator to install the Microsoft iSCSI Software Initiator package,
- b. Next, launch iSCSI Initiator software,
- c. If you set passwords on iSCSI and Target Access, press on branch “Initiator Setting” in “Initiator CHAP secret”, enter your passwords, and after entering each click “Save” button (your passwords is “Target secret”),
- d. In branch: “Target Portals” click button “Add”, then enter your Open-E iSCSI IP address,
- e. Next click “Advanced...” button, and mark “CHAP logon information”, next give User name and Target secret and then click “O.K.” button,
- f. In the branch “Available Targets” you will see name of available iSCSI targets e.g. “iqn.2005.05:iscsi.target0”,
- g. Click “Log On” button, and if you entered password, you have to do the same as in point “e”, then press “O.K.” button, then the chosen target status will change for “Connected”
- h. Next choose settings → control panel → administrative tools → computer management → disk management,
- i. Now all available iSCSI TARGET drives will be displayed. In order to use them you have to format them and mount to the system as a next disk letter.

● **note** Microsoft iSCSI Initiator ver. 1.06 does not support dynamic disk. Target password must consist of minimum 12 and maximum 16 alphanumeric characters. Please read Manual and Release Notes of Microsoft iSCSI Initiator for more details, which you can also find on Microsoft website.

● **note** Please do not ignore time settings on Open-E iSCSI and client station. Those settings must be the same. Time can be synchronized in the menu Web Interface “setup” → “server” in Function “Clock settings”

5 Description of functions

5.1 Functions of the console display

While Open-E iSCSI can be fully administered remotely through a secure Web interface, some of the functions you can access on the console. Open-E iSCSI constantly displays following basic parameters:

- IP address
- Https settings

CTRL+ALT+n

If you press the left CTRL key + the left ALT key + n, you will be asked for the new IP address and the subnet mask. The DHCP server will be shut down.

CTRL+ALT+p

If you press the left CTRL key + the left ALT key + p, the access restrictions are lifted by entering the administrator password (in addition, there is a reset to the standard https port 443).

CTRL+ALT+i

By pressing a combination of left CTRL key + left ALT key +i, you can reset the original IP address (192.168.0.220) and the subnet settings (255.255.255.0). In this process, the DHCP server support is turned on.

CTRL+ALT+t

By pressing a combination of left CTRL key, left ALT key and t, you can run Console Tools. The menu will appear, with choice of following functions: Ping, DHCP Ping, Hardware info, Memory info, Time configuration, DNS configuration, Language settings, Modify driver option and Boot option.

CTRL+ALT+x

By pressing the left CTRL key, left ALT key and x, it will display extended tools.

CTRL+ALT+r

By pressing the left CTRL key, left ALT key and r, it will display CLI Management Tools for ICP Vortex.

● **note** This function appears in Help Console only when an ICP Vortex hardware RAID controller is installed in the iSCSI system. In order to get additional information read the user manual of ICP Vortex RAID controller manufacturer.

CTRL+ALT+h

By pressing the left CTRL key, left ALT key and h, it will display hardware and driver information.

F1, F2 and F5

Function key F1 is available to display help information while F5 will reset the console display to default. If you press F2 key all network interface information will be displayed.

Shutting down and restarting

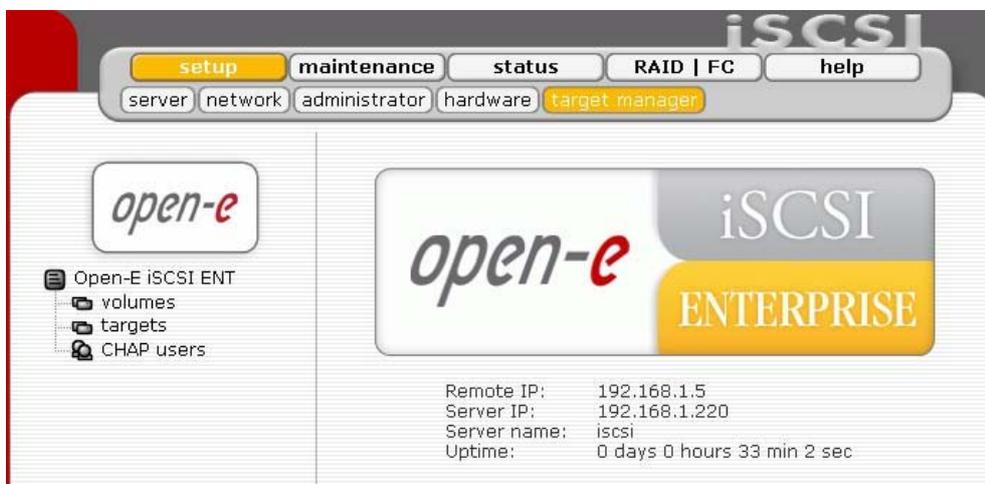
With Ctrl + ALT + DEL the Open-E iSCSI host computer will be shut down and restart, while CTRL + ALT + S shut it down. Please be careful with this option when users are connected.

5.2 Functions of Open-E iSCSI via browser access

On the following pages, we will thoroughly describe every function of Open-E iSCSI. The functions are divided by menu options, which are located at the top part of the screen.

5.2.1 Setup

In this menu option, you will find the following sub-functions: server, network, administrator, hardware and target manager.



5.2.1.1 Server

This is a key component of the setup menu, as some of the most crucial parameters are defined here.

Function „Server name“

Select a server name, which will be used to identify iSCSI target names.

The screenshot shows the Open-E iSCSI web interface. At the top, there are navigation tabs: 'setup' (highlighted), 'maintenance', 'status', 'RAID | FC', and 'help'. Below these are sub-tabs: 'server', 'network', 'administrator', 'hardware', and 'target manager'. The 'open-e' logo is on the left. The main content area shows two function panels. The first panel is titled 'Function: NAS Server name' and contains a text input field for 'Server name' with the value 'iscsi' and an 'apply' button. The second panel is titled 'Function: Language Settings' and contains a dropdown menu for 'Choose language' with 'English' selected and an 'apply' button.

Function “Language Settings”
English and German are supported.

5.2.1.2 Network

In this place you can find functions helpful in management of nets parameters Open-E iSCSI system.

The screenshot shows the Open-E iSCSI web interface with the 'network' sub-tab selected. The main content area displays three function panels. The first panel is 'Function: IP address' and includes fields for 'Interface::' (eth0), 'IP:' (192.168.1.220), 'Netmask:' (255.255.255.0), 'Broadcast:' (192.168.1.255), 'Gateway:' (192.168.1.1), and 'DNS:' (192.168.1.1), with a 'Use dhcp' checkbox and an 'apply' button. The second panel is 'Function: IPSEC' and includes a checked 'Use IPSEC' checkbox, an 'IP:' field (192.168.0.220), a 'Password:' field, and an 'apply' button. The third panel is 'Function: Bonding' and includes 'Set bonding' (new), 'Mode' (balance-rr), 'MII' (100), checkboxes for 'eth0' and 'eth1' (both set to 'no priority'), and a 'create' button. A 'logout' link is visible at the bottom right.

Function “IP address”

Here you can set TCP/IP parameters for selected NIC.

You can activate or deactivate network interface by setting "Activate" checkbox.

You can use static or dynamic(DHCP) network interface configuration.

If you want to dynamically get DNS address, select "get DNS".

When using static configuration of network interface, enter address IP, netmask, broadcast and gateway.

If you set new IP address, during activation, you will lose your connection to the server and you will have to log in again. In the URL entry line of your browser, please enter the new IP address.

If you do not get access, please try the console to set new IP address. In order to access servers in another subnet, you need to enter the address of a router as Gateway.

● **note** In case you use NTP server to maintain proper time & date, please make sure you have proper Gateway and DNS settings.

Function “IPSEC”

IPSEC provides strong authentication and encryption for the connections. It makes it nearly impossible to eavesdrop or forge the transmitted data.

● **note** Encrypted data transmission imposes considerable overhead and depending on the amount data transmitted can impact the performance significantly.

Function “Bonding”

Bonding allows for load-balancing or fail-over for the incoming and outgoing connections.

● **note** In order to take advantage of bonding more than one ethernet NIC need to be plugged into the box.

set bonding

Allows you to add new, remove or view settings of the existing bond group.

mode

Specifies one of the bonding policies:

- **balance-rr**
Transmissions are received and sent out sequentially on each bonded slave interface. This mode provides fault tolerance and load balancing.
- **active-backup**
Only one slave in the bond is active. Another bonded slave interface is only used if the active bonded slave interface fails. This mode provides fault tolerance.
- **balance-xor**

Transmit based on [(source MAC address XOR'd with destination MAC address) modulo slave count]. This selects the same slave for each destination MAC address. This mode provides load balancing and fault tolerance. This mode provides fault tolerance and load balancing.

- **broadcast**
Transmits everything on all slave interfaces. This mode provides fault tolerance.
- **802.3ad**
IEEE 802.3ad Dynamic link aggregation. Creates aggregation groups that share the same speed and duplex settings. Utilizes all slaves in the active aggregator according to the 802.3ad specification. Require: a switch that supports IEEE 802.3ad Dynamic link aggregation.
- **balance-tlb**
Channel bonding that does not require any special switch support. The outgoing traffic is distributed according to the current load (computed relative to the speed) on each slave. Incoming traffic is received by the current slave. If the receiving slave fails, another slave takes over the MAC address of the failed receiving slave. This mode provides fault tolerance and load balancing.
- **balance-alb**
Adaptive load balancing: includes balance-tlb plus receive load balancing (rlb) for IPV4 traffic, and does not require any special switch support. The receive load balancing is achieved by ARP negotiation. The bonding driver intercepts the ARP Replies sent by the local system on their way out and overwrites the source hardware address with the unique hardware address of one of the slaves in the bond such that different peers use different hardware addresses for the server.

mii

Specifies the MII link monitoring frequency in milliseconds. This determines how often the link state of each slave is inspected for link failures. A value of zero disables MII link monitoring. A value of 100 is a good starting point. The `use_carrier` option, below, affects how the link state is determined. See the High Availability section for additional information. The default value is 0.

primary

A string (eth0, eth2, etc) specifying which slave is the primary device. The specified device will always be the active slave while it is available. Only when the primary is off-line will alternate devices be used. This is useful when one slave is preferred over another, e.g., when one slave has higher throughput than another. The primary option is only valid for active-backup mode.

5.2.1.3 Administrator

In this section you may change parameters of administrator's access, enabling e-mail notification, downloading SLL Certificate for your browser and defining power button action.

Function “Administrator Password”

Using this function, you can change the password for Open-E iSCSI administrator.

For security reasons, please make sure you change the standard password and select a new one.

- **note** Password-checking is case-sensitive. For security reasons, the password you enter will not be displayed. Please check the status of the Shift and Caps Lock keys.

Function “Administrator Access”

Use this function to restrict access to the server administration.

- Set port: you can change https port (default 443)
- IP address: you can assign IP addresses (separated by a semicolon) that are allowed to access the Open-E iSCSI Web administration. This field left blank means no restriction.
- Lock console without password: disables access to the console
- Lock console with password: to get access to the console you need to type in a password. Note that this password should be exactly 8 characters long and include only 1-4 digits.
- Unlock console: the unrestricted access to the console

The screenshot displays the Open-E iSCSI web administration interface. The top navigation bar includes tabs for 'setup', 'maintenance', 'status', 'RAID | FC', and 'help'. Below this, a secondary bar shows 'server', 'network', 'administrator', 'hardware', and 'target manager'. The 'administrator' tab is active, showing three configuration sections:

- Administrator password:** Features a dropdown for 'Admin. Level' set to 'Full Access', and two input fields for 'Enter password:' and 'Confirm pass.:'. An 'apply' button is located below the fields.
- Administrator access:** Includes a 'Set port:' field with '443', an empty 'IP address:' field, and 'Lock console:' options: 'without password' (selected), 'with password' (with an input field), and 'Unlock' (selected). An 'apply' button is at the bottom.
- E-mail notification:** Contains checkboxes for 'Send errors' and 'Send test message', both checked. A 'Destination e-mail:' input field is present. Below is a 'Hide advanced <<' link and an 'E-mail server:' field with 'open-e.com'. An 'apply' button is at the bottom.

The 'open-e' logo is visible on the left side of the interface. A 'logout' link is located at the bottom right corner of the page.

- **note** Please exercise caution with this function when all computers in the network have assigned IP addresses via DHCP: any current IP can be replaced by a new one only after the lease ends. Please use Lock console feature carefully in case of any erroneous IP address settings you will not be able to reset default administrator access from the console. To restore default settings you have to re-update software in the Open-E iSCSI module or contact technical support.

Function “E-mail notification”

In case of significant events, critical errors, warnings, etc., system can send an email to the administrator. Please enter administrator email address.

- **note** When SMTP server receiving mail, uses the monitoring function of IP numbers, it compares IP number from SMTP server (for example open-e.com) with IP number of a computer from which email was sent. This email may be treated as “spam” and will not be accepted. To avoid the above problem, use different SMTP server then the computer currently uses. The best solution for a correct email distribution is to use your local mail server.

The screenshot displays the Open-E iSCSI web interface. The top navigation bar includes tabs for 'setup', 'maintenance', 'status', 'RAID | FC', and 'help'. Below this, a secondary bar shows 'server', 'network', 'administrator', 'hardware', and 'target manager'. The 'administrator' tab is active. On the left, the 'open-e' logo is visible. The main content area is divided into three sections:

- Function: SSL Certificate Authority**: Includes a link to download 'SSLCert.crt' for the browser.
- Function: Use SNMP**: Features three radio buttons for 'Use SNMP', 'Use SNMP v2', and 'Use SNMP v3'. Below are input fields for 'Community:', 'Password:', 'Confirm Password:', 'Contact:', and 'Location:'. An 'apply' button is at the bottom right of this section.
- Function: Remote Access**: Features a checked checkbox for 'Remote access set'. Below are input fields for 'Allow IP:' (containing '192.168.1.5'), 'Set port:' (containing '22222'), 'Password:', and 'Confirm password:'. An 'apply' button is at the bottom right of this section.

A 'logout' link is located at the bottom right corner of the interface.

Function “SSL Certificate Authority”

If you want to install Certificate Authority (CA) to your web browser, click on the SSLCert.crt link. Download CA on Desktop, click on it and "Install Certificate". Browser will show you a warning that CA is not trusted and it is normal. Following the instructions, you will install CA to your web server.

- **note** If you want to delete or view CA go to: Tools->Internet Preferences->Content->Certificates->Trusted Root Certification Authorities and OPEN-E GMBH which should be there.

Function “USE SNMP”

Simple Network Management Protocol (SNMP) is a protocol for monitoring a network and computer equipment.

With SNMP you can get a lot of information:

- ethernet traffic,
- memory info,
- usage of CPU,
- system load,
- running processes
- uptime,
- MAC addresses of network card.

System location and system contact are only for your information, for example when you connect from SNMP client, you will see your location and name.

This function enables you change the access over the SNMP protocol in version 2 or 3.

SNMP in version 2 does not have encrypted transmission and authentication is only by community.

SNMP in version 3 has encrypted transmission and authentication by community, login and password.

The **community** you are setting can be max up to 20 characters and **password** min 8 characters.

Links to SNMP clients:

<http://www.muonics.com>

<http://www.mg-soft.com>

<http://www.adventnet.com>

- **note** For better security use only SNMP 3 version ! This version provides login, password and encrypted transmission.

How to retrieve information from SNMP?

From Linux:

- snmpwalk - → it is command-line tool from snmp-package.

You can get information by:

```
snmpwalk -v 3 -u public -l AuthNOPriv -A MD5 -A public123 adres_ip
SysUpTime
- v 3      --> use only 3 version
- u public --> community name
- A MD5    --> encrypted by MD5
- A public123 --> password
address_IP --> IP of iSCSI server
SysUpTime  --> OID with system uptime information
```

To use SNMP from command line you have to know OID's, for example:

- ssCpu (processor load), mem (memory info), Location.

But it is not the best choice to retrieve info from command line. You have to install SNMP client, so you can easily read any information you want.

From MS Windows you can use following Windows Clients: PRTG, MIB Browser Professional, SNMP MIB Query Manager and INFTRAF.

● note If you can't retrieve information from SNMP client, you can check iSCSI_ip/check_sys/index.html. There are SystemLoad, CPU, Memory, Swap, Uptime.

Function: Remote access

Using this function, you can administrate console tools remotely by ssh protocol (secure shell). Default user is 'cli' and you cannot change it, but password can be change.

Allow IP: You can assign IP addresses (separated by a semicolon) that are granted to iSCSI remote access. The field left blank means no restriction.

Set port: Default port is 22222 for security reasons, because high ports are invisible for port scanners. You can change it only from range 1024-65535 except ports already used.

Password: Length of password is minimum 8 characters. Be sure to use strong passwords.

Confirm pass.: Please retype your new password.

Password cannot contain:

- characters: ' " ` ^ & \$ # [] \ | *
- spaces.

To connect to iSCSI from Linux/MacOSX systems use:

```
ssh -2 -p 22222 -l cli address_ip
```

- option: -2 is a version of ssh protocol used for connection.

- option: -p is a port for Remote Access.
- option: -l is a user (In our product the user must be "cli").
- option: address_ip is a address of server you want to connect to.

You will be ask for a password you entered on server for Remote Access. To connect to server from Microsoft Windows, download free ssh client Putty (www.putty.nl).

- In Host Name (or IP address) field please enter IP address of the server
- In Port field please enter the same port as in the server GUI (default 22222)
- In Protocol please choose **SSH**
- In Category: Connection -> Data -> Auto-login-username please enter: "cli"
- In Terminal -> Keyboard -> The Function Keys and keypad please select "VT100+"
- Go back to Category Session, enter session name in field Saved Sessions and click on "Save" button.
- Then **click on new saved session**, click "Open" and enter the "password". (In case you did not enter Auto-login-username, it will prompt for username, so please enter: "cli")

5.2.1.4 Hardware

Function: "UPS configuration"

In the function you can select a UPS device desired (Uninterrupted Power Supply). For the connection of the UPS device to the Open-E iSCSI, the USB port is most frequently used.

The screenshot shows the Open-E iSCSI web interface. The top navigation bar includes tabs for 'setup', 'maintenance', 'status', 'RAID | FC', and 'help'. Below this, there are sub-tabs for 'server', 'network', 'administrator', 'hardware', and 'target manager'. The 'hardware' tab is selected. The main content area is divided into two sections:

- UPS configuration:** This section has a 'Function:' dropdown set to 'UPS configuration'. It contains five dropdown menus: 'UPS mode' (single), 'UPS model' (BackUPS Office USB), 'Cable type' (usb), 'Port' (usb), and 'Timeout' (15). An 'apply' button is located below these settings.
- Clock Settings:** This section has a 'Function:' dropdown set to 'Clock Settings'. It contains a text input for 'NTP Servers' (ntp0.fau.de), a checkbox for 'Continuous adjusting using NTP' (unchecked), and a dropdown for 'Time Zone' (Europe/Berlin). An 'apply' button is located below these settings.

A 'logout' link is visible in the bottom right corner of the interface.

In the settings you can select the UPS model, cable type, connection port and the length of the time out. The time-out defines the time between a power failure and the moment the system will shut down. UPS support in mode "Single"

means that Open-E iSCSI is the only system attached to this UPS and that there is no action necessary to do remote shutdown for other systems in the network.

Single means, that Open-E iSCSI is the only system attached to this UPS and that there is no action necessary to do remote shutdown for other systems in the network.

Master means, that Open-E iSCSI is connected to the UPS and sends a signal through the network to shutdown other systems in the network.

Slave means, that Open-E iSCSI is reacting on a "power down-signal" from an UPS master.

- **note** During a power failure you cannot log into the Open-E iSCSI. Users, who are connected to the Open-E iSCSI server during the UPS-time continue to have full access to all files on the iSCSI target.

Function “Clock settings”

Here you define an NTP server (Network Time Protocol) to synchronize your Open-E iSCSI with a time server on the Internet.

- **note** Time and date display are static. What is shown are the time and date at which the setup menu was accessed.

The screenshot displays the Open-E iSCSI web interface. At the top, there is a navigation bar with buttons for 'setup', 'maintenance', 'status', 'RAID | FC', and 'help'. Below this, a secondary navigation bar contains 'server', 'network', 'administrator', 'hardware', and 'target manager'. The main content area is titled 'open-e' and contains three sections:

- Function: Set Time**: Includes radio buttons for 'Manual', 'Use this PC time', and 'NTP Server' (selected). It features input fields for 'New time: 13:59:01' and 'New date: 2006-06-13', and an 'apply' button.
- Function: Power button settings**: Includes a dropdown menu for 'Button action' set to 'None' and an 'apply' button.
- Function: Motherboard info**: Includes radio buttons for 'Autodetect' and 'Manual' (selected), a dropdown menu for 'winbond', and a message: 'Chipset autodetection failed. Please select manually;'. It also has an 'apply' button.

A 'logout' link is located at the bottom right of the interface.

Function “Set time”

With this function, date and time can be entered manually. Alternatively, take the route via an NTP server, which has to be defined in the previous function.

Function “Power button settings”

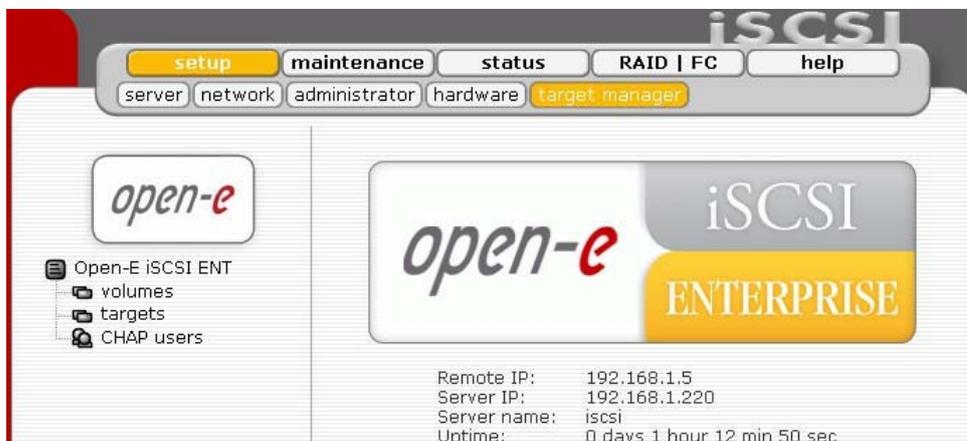
In this section you specify which action will be performed in case of power button is pressed Options:

- no action (**none** option),
- restart computer (**reboot** option),
- power off computer (**halt** option).

Function “Motherboard info”

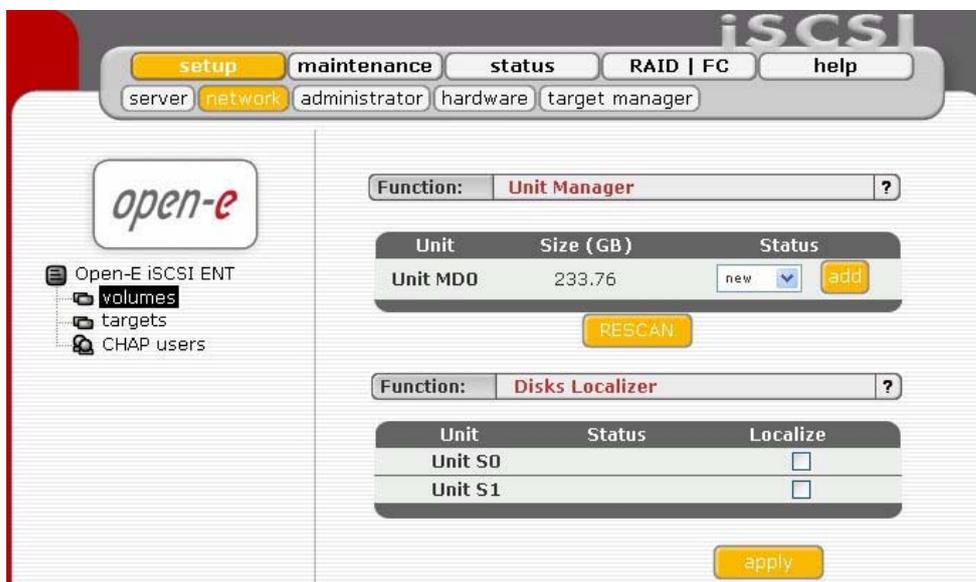
With this function you can check info about your motherboard.

5.2.1.5 Target Manager



Function “Unit Manager”

After clicking on the branch “volumes” in the left part of page you will find a list of all available units with entire disk size. In order to integrate available units into the volume group, just use the “add” button, after which the unit will be combined into one volume group.



Next, the page will be reloaded, and status field will show your units as “in use” and with new group e.g. “vg0”. The Volume Group is the equivalent of a physical disk from the system point of view. It is also possible to combine two (or more) units into one Volume Group by choosing one of actually existing groups like “vg0”, or by choosing “new” option, which will create new group “vg1” after using “add” button.

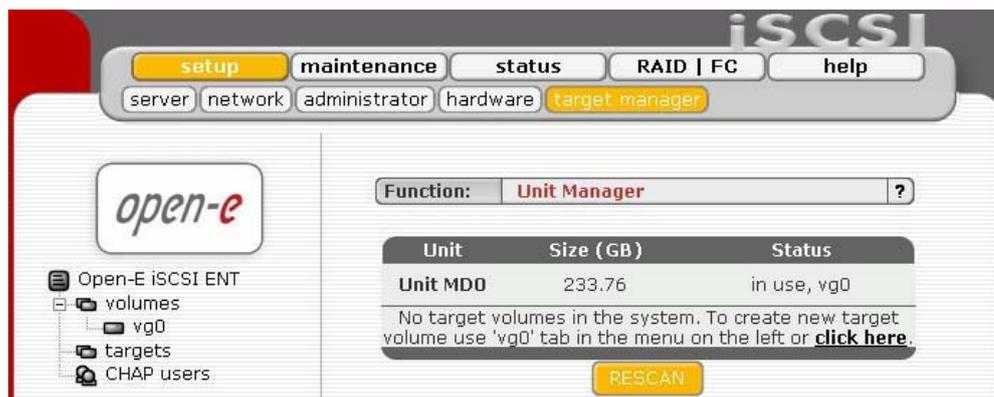
Function: Disks Localizer

This function helps find disks in cage in your iSCSI server.

If you connect hard drives to hardware RAID controller then you may not be able to determine which unit is which disk using S.M.A.R.T. tool or hardware RAID management tool (depends on manufacturer of RAID controller).

When you click on "start" button then appropriate disk will start reading and you can determine which disk is it by watching "disk-activity LEDs". For proper operation of this function there should be no other activity on hard drives.

- **note** Localization will stop automatically after one minute if you will not stop it manually (by unsetting appropriate checkbox and hitting apply button). Using this function during normal operation is highly not recommended and will cause slowing down your server.



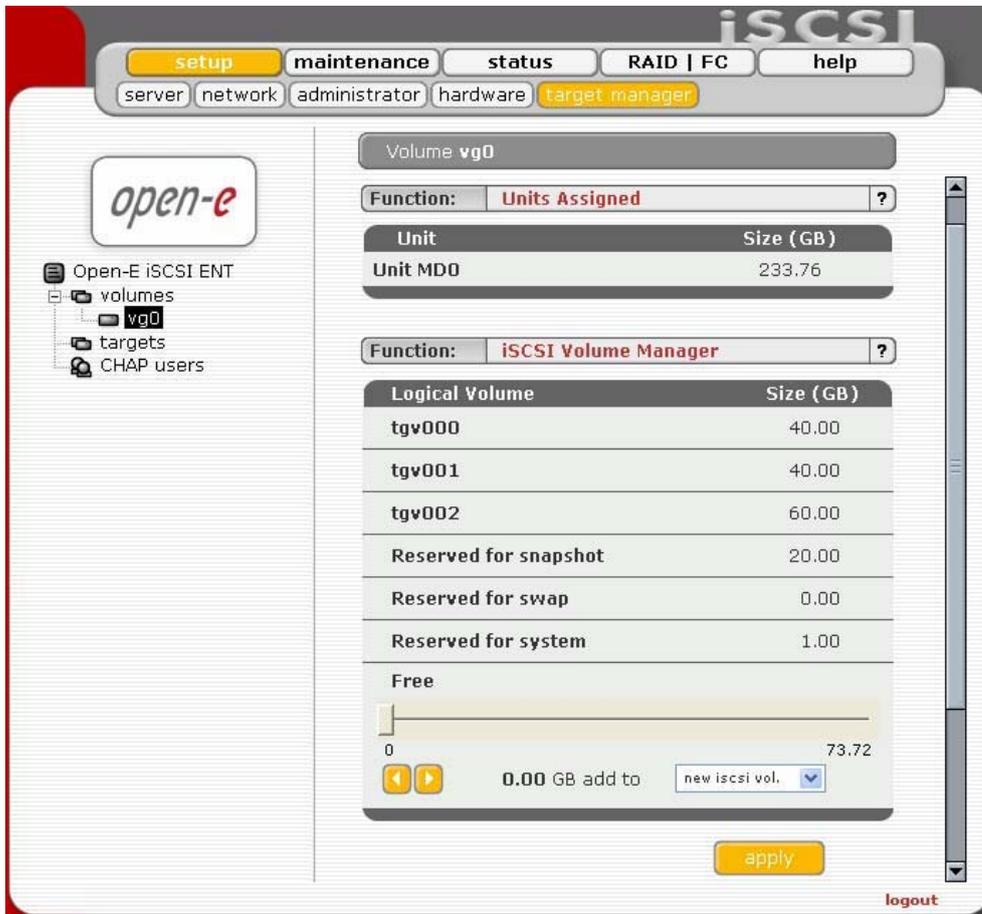
- **note** When the added unit is integrated, it cannot be remove in Web Interface. You need to use extended tools in console.
- **note** You can only add units with capacity greater than 5 GB, smaller units are not supported.

Function “Units Assigned”

Here listed units are assigned to current volume group.

Function “iSCSI Volume Manager”

Using this function you can create new iSCSI target volumes inside one Volume Group. The iSCSI Volume is the equivalent of partitions, which are available for client stations. You can increase capacity of existing Logical Volume.

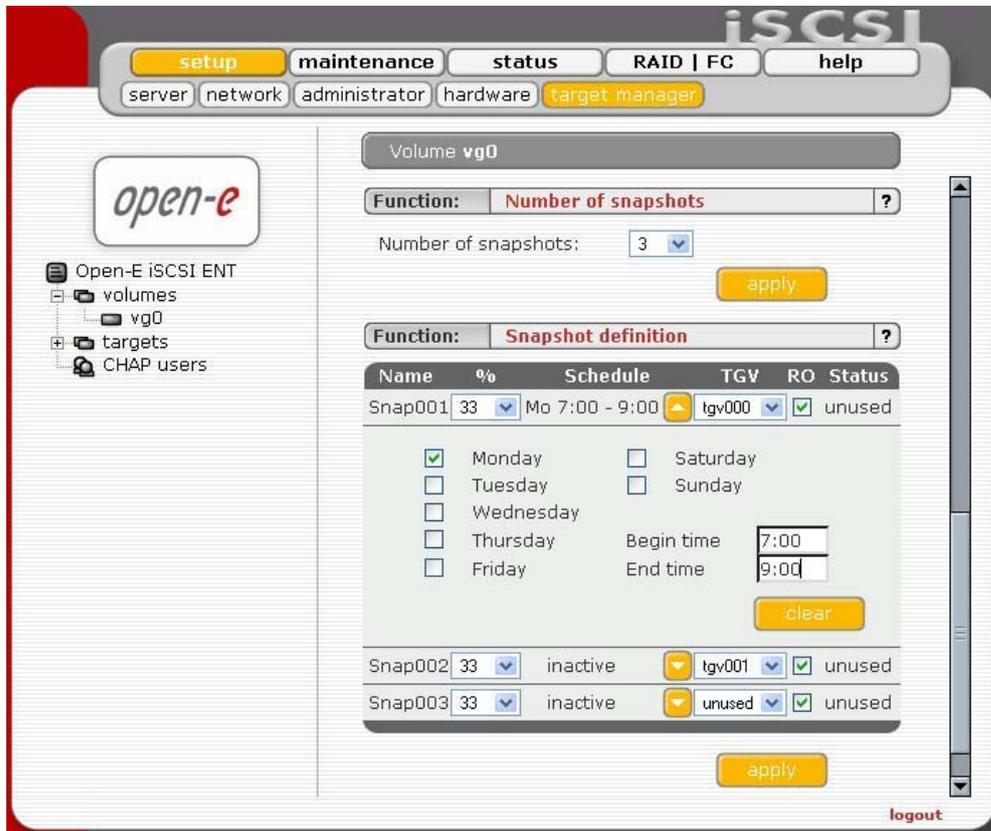


Depending on needed capacity administrator can add more capacity to particular Logical Volume. Using iSCSI Volume Manager Function you can add disk space to new LV and “snapshot” or increase size on existing iSCSI Volume and snapshot (you can’t decrease the size). To set needed iSCSI Volume size use scrollbar on the right side, it shows size available for use. In order to set the precise iSCSI Logical Volume size use left or right keyboard cursor key. This function can be also used to reserve disk space for “swap”. The SWAP is additional disk space used by the system to temporarily release some amount of used RAM memory. So you can reserve some shared disk space for the system SWAP memory. We have added a lot of new features in our latest release that consume additional memory, so in some cases e.g. 512MB of RAM would not be enough and some processes like SWAP would not function without additional RAM.

Function “Number of snapshots”

Here you can define number of snapshots for the server.

- **note** Please take into account that changing the amount of snapshots will automatically reset all the settings in function Snapshot definition.



Function “Snapshot definition”

This feature takes so-called snapshots of the file system. The Snapshot function of Open-E iSCSI enables the system administrator to freeze the data content of the targets volume at a period of time, this function is transparent to the user. From this moment on, the users work on a virtual data volume, all changes to the volume are stored in a different partition. The storage of all changes is independent of the file-system Open-E iSCSi uses on block-level. Only when the snapshot is deleted / removed the changes are permanently transferred to the actual data volume. Through a separate share, which is only available for the administrator, a complete backup of the dataset can be done. With the snapshot technology even a database can be backed up while the users are working on it. Snapshots can be activated / deactivated manually or automatically.

In the schedule options "Begin time" and "End time" and day of week are used for automatic snapshots: this is the time of automatic activation and deactivation (syntax is “h:m”). When snapshot start is set, the snapshot will be deactivated and activated again at the given time.

Alternatively, snapshots can be taken manually in the Maintenance->Snapshot menu even if snapshots are automatically created under “Snapshot Definition”. The button remove all can be useful for removing all snapshots at one time.

Function “Target Volume Manager”

By using this function you can add available target volumes in premises of one target. In case of defining more than one target – free volumes will be available in actually edited volume. Analogically as with SCSI devices, it is possible to define LUN address device.

The screenshot displays the Open-E iSCSI Target Manager web interface. The top navigation bar includes tabs for 'setup', 'maintenance', 'status', 'RAID | FC', and 'help'. Below this, a secondary bar shows 'server', 'network', 'administrator', 'hardware', and 'target manager' (which is highlighted). On the left, a tree view shows the system structure: 'Open-E iSCSI ENT' containing 'volumes', 'vg0', 'targets', 'target0', 'snapshots', and 'CHAP users' with a user named 'John'. The main content area is titled 'Target: iqn.2006-03:iscsi.target1'. It features a 'Function:' dropdown menu set to 'Target Volume Manager'. Below this is a table of target volumes:

Volume	Size (GB)	LUN:	RO	Action:
tgV000	40.00	0	<input type="checkbox"/>	Remove
tgV001	40.00	1	<input type="checkbox"/>	Remove
tgV002	60.00	2	<input type="checkbox"/>	Add

Below the table, there are several other function sections: 'CHAP User Target Access' with an unchecked checkbox for 'Enable CHAP user access authentication' and an 'apply' button; 'Target IP access' with input fields for 'Deny access:' and 'Allow access:' and an 'apply' button; 'Target Rename' with a 'New name:' field containing 'iqn.2006-03:iscsi.target1' and an 'apply' button; and 'Target Remove' with a 'remove' button. A 'logout' link is located at the bottom right of the interface.

Function “Target IP Access”

You can assign network classes or specify individual IP addresses that have permission to access the target. Entries should be delimited by commas. When no entries are present everyone is permitted to access the target. Specifying at least one entry excludes all the clients that do not match it from accessing the target.

Please note that already active sessions to the target will persist regardless of the newly applied settings. You can ensure that the settings are in force immediately after you apply them by going to maintenance->shutdown->Connection reset and resetting the connections manually. Keep in mind that all the unsaved client data might be lost.

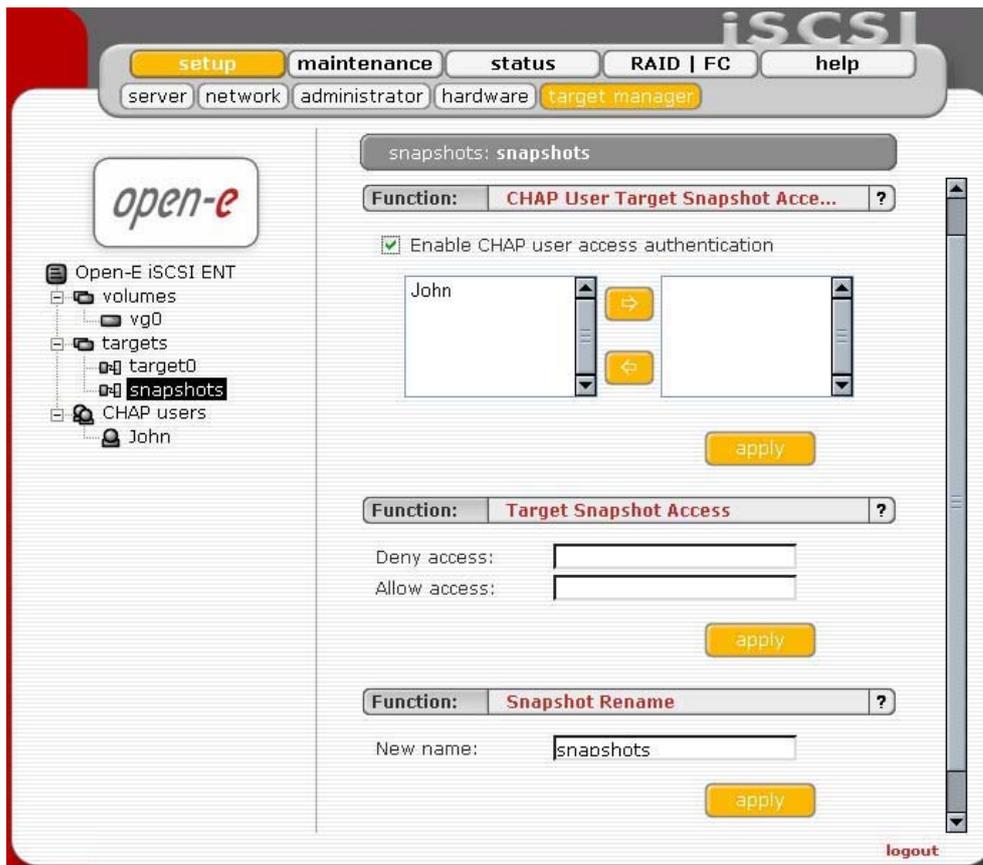
Function “Target Rename”

This function provides a new target name.

Function “Target Remove”

Removing target removes all the volumes from the target.

- **note** Please note that the data stored on the volumes are not automatically removed. You can assign the volumes to different targets and still see the data. Please remove the data prior to removing target in order to prevent leakage of sensitive or classified information.



Function: CHAP User Target Snapshot Access

Add CHAP users that are granted to access the Target Snapshot.

- **note** You can use following keyboard keys in the lists (first set focus to desired list):
 - Home: jump to the first
 - End: jump to the last
 - Shift + arrow key: for multi-select
 - letter key: jump to the first position starting with pressed key

If you enable CHAP user access authentication but will not select any users to have access, then nobody will have access to the Snapshot.

Additionally you can set password required to establish connection of iSCSI Initiator to iSCSI Target Server.

Function: Target Snapshot Access

You can assign network classes or specify individual IP addresses that are permitted or denied to access the snapshot. Entries should be delimited by commas. When no entries are present in Denied access or Allowed access fields everyone is permitted to access the snapshot. Specifying at least one entry in Allowed access field excludes all the clients that doesn't match it from accessing the snapshot. When you specify at least one entry in Denied access field, every CHAP user or CHAP users from network class address are denied from accessing the snapshot. When you specify any IP address in Allowed access field, CHAP users from that address are allowed to access the snapshot even if the same address has been specified in Denied access field. If you enter only Allowed access field then Denied access field will be automatically entered with 0.0.0.0/0 entry.

● note Please note that already active sessions to the snapshots will persist regardless of the newly applied settings. You can ensure that the settings are forced immediately after you apply them by going to maintenance->shutdown->connection reset and resetting the connections manually. Keep in mind that all the unsaved client data might be lost.

There is possibility of entering network class address in two ways:

- 192.168.2.0/255.255.255.0 - normal form
- 192.168.2.0/24 - short form.

When You enter network class address in normal form, it will be automatically converted to short form.

Examples:

Denied access: 0.0.0.0/0

Allowed access: 192.168.2.30/0, 192.168.3.45

This settings deny access from every IP address or network class address, only addresses in Allowed access field are granted for accessing the snapshot.

Denied access: 192.168.0.0/16

Allowed access: 192.168.2.30, 192.168.10.230, 192.168.30.0/24

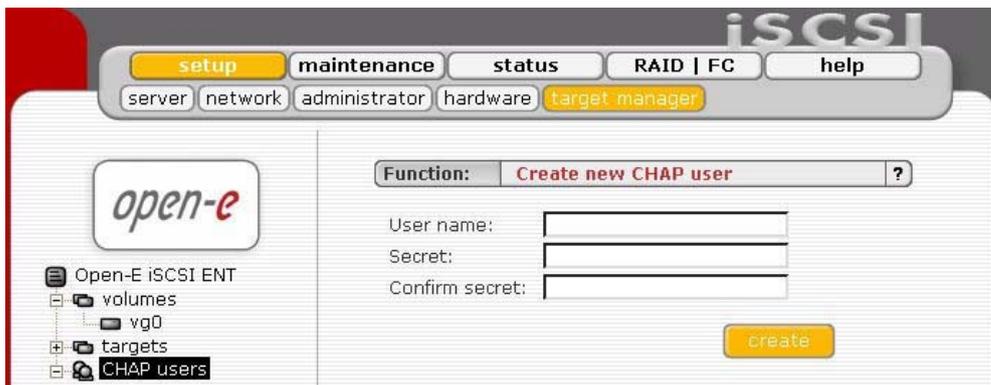
This settings deny access to any IP addresses from network 192.168.0.0/16. Grant access for IP addresses 192.168.2.30, 192.168.10.230, all IP addresses from network 192.168.30.0/24 and all IP addresses that have not been denied in Denied access field.

Function “Snapshot rename”

With this function you will provide a new name for the snapshot target.

Function: Create new CHAP user

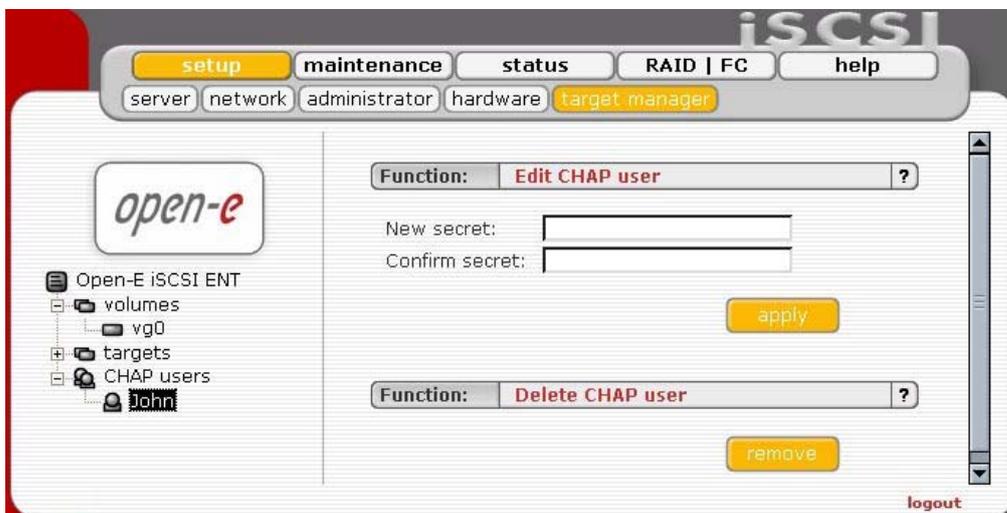
To create CHAP user enter name, password, retype password and press create button.



- **note** CHAP user name cannot:
 - contain characters: ~ ! @ # \$ ^ & () + [] { } * ; : ' " . , % | < > ? / \ = `
 - begin or end with a space.

- **note** Password cannot:
 - contain characters: ' " `
 - spaces.
 - The length of the password must be within 12 - 16 characters.

If CHAP users forget their password, there is no way to retrieve it. You can only set a new password. do this please use the function iSCSI Access Password situated in setup -> target manager -> targets.



Function: Edit CHAP user

To change CHAP user password enter and confirm password, and press "apply" button.

- **note** Password cannot:
 - contain characters: ' " `
 - spaces.
 The length of the password must be within 12 - 16 characters.

Function: Delete CHAP user

Click "remove" button to remove the CHAP user form the system.

Using snapshot with Open-E iSCSI

Usage snapshot facility heavily depends on the initiator of software support for dynamic units* and the partition scheme which you use on the operating system where you attach the targets. The most common error is if on the client side that uses an LVM/LVM2 (Linux) scheme or Microsoft's Dynamic Disks which connect to the snapshot and original volume from the same client malfunctions. This is due to the fact that normally an LVM volume bares special metadata which is used as the identify information and since a snapshot simply doubles those metadata it can confuse your partitioning software (for example logical volume manager sees two identical volumes).

In order to take proper advantage of Open-E iSCSI Target's snapshot technology the volumes your Open-E iSCSI Target exports should be imported in your operating system as Basic Volume (Windows) and you should not incorporate them as logical volumes in LVM/LVM2 (on Linux) if you plan to use snapshots and access them from the same machine at the same time.

If you plan to take snapshots and import them alongside the original volume - access them from the same client. Below is instruction how to import a target in a Microsoft basic volume:

- a. Create target volumes (tgv),
- b. Create a target in Open-E iSCSI,
- c. Add chosen volumes to the target.
- d. In MS iSCSI Initiator add Open-E iSCSI Target as an iSCSI portal in the MS iSCSI Initiator console,
- e. Log onto the target,
- f. Open the computer management,
- g. Select the disk management,
- h. Add the volumes as basic disks,
- i. On Open-E iSCSI Target create snapshots: setup → target manager and reserve desired space for snapshots (reserve about 5-20% of total space for the snapshots). Determine number of snapshots, assigned to the volumes and distribute the reserved space as needed. To activate a snapshot go Maintenance → Snapshot.
- j. Follow the steps e-h to log and attach the snapshot target.

*) Currently iSCSI Microsoft Initiator ver1.06 does not support dynamic volumes.

● hint The best solution to use snapshots without decreasing Open-E iSCSI performance is to assign separate RAID. This RAID will be optimized for a writing speed (e.g. few disks in RAID 0 only for snapshots). Follow the steps below:

- a. Add RAID chosen for data as NEW (Vg0) in the menu WebGui: setup → target manager → Volumes,
- b. Create one or more Tgv's. At this point, there is no free space reserved for snapshots,
- c. Add the second RAID to existing Vg0, intended for snapshots, (RAID previously configured as RAID 0),
- d. Now only reserve all available space for snapshots.

- e. The above procedure will greatly decrease the overload of a disk intended for data and will cut down the performance drop off in Open-E iSCSI with a snapshot turned on.

5.2.2 Maintenance

This page accessed with the Maintenance tab contains settings and functions pertaining to general management operations.

5.2.2.1 Shutdown



Function “System Shutdown“

When using this function, you can shut down the Open-E iSCSI.

● **note** The Open-E iSCSI can only be turned on again manually.

Function “Schedule for shutdown“

Here you can set more specific information like the time and day of a week for the shutdown.

Function “System Restart“

This function is self-explanatory: It allows restarting the system.

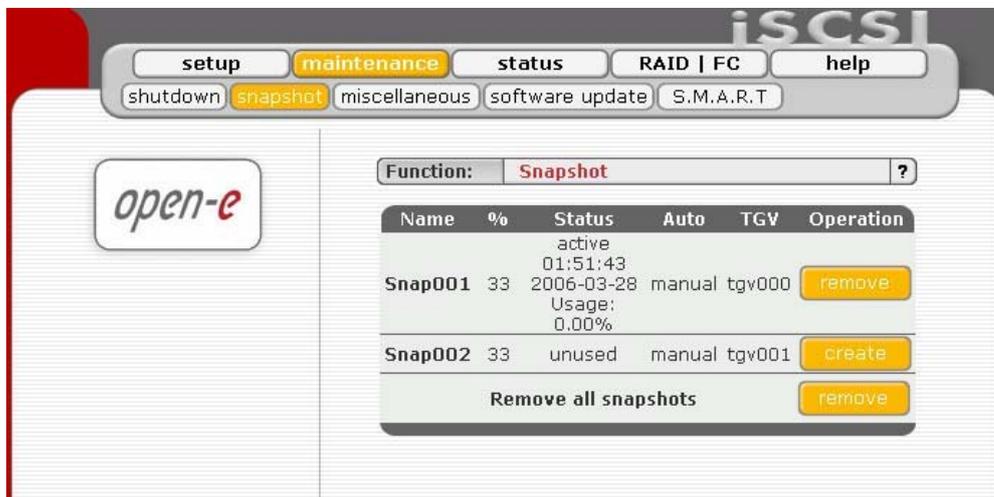
Function “Connection reset”

It might be necessary to restart the iSCSI daemon to inform client about specific setting changes, e.g. resize of the volumes.

- **caution** All current connections with iSCSI initiators will be terminated immediately. It may cause loss of unsaved data files.
- **note** If your client does not reestablish the connections automatically you will have to do it manually from the clients.

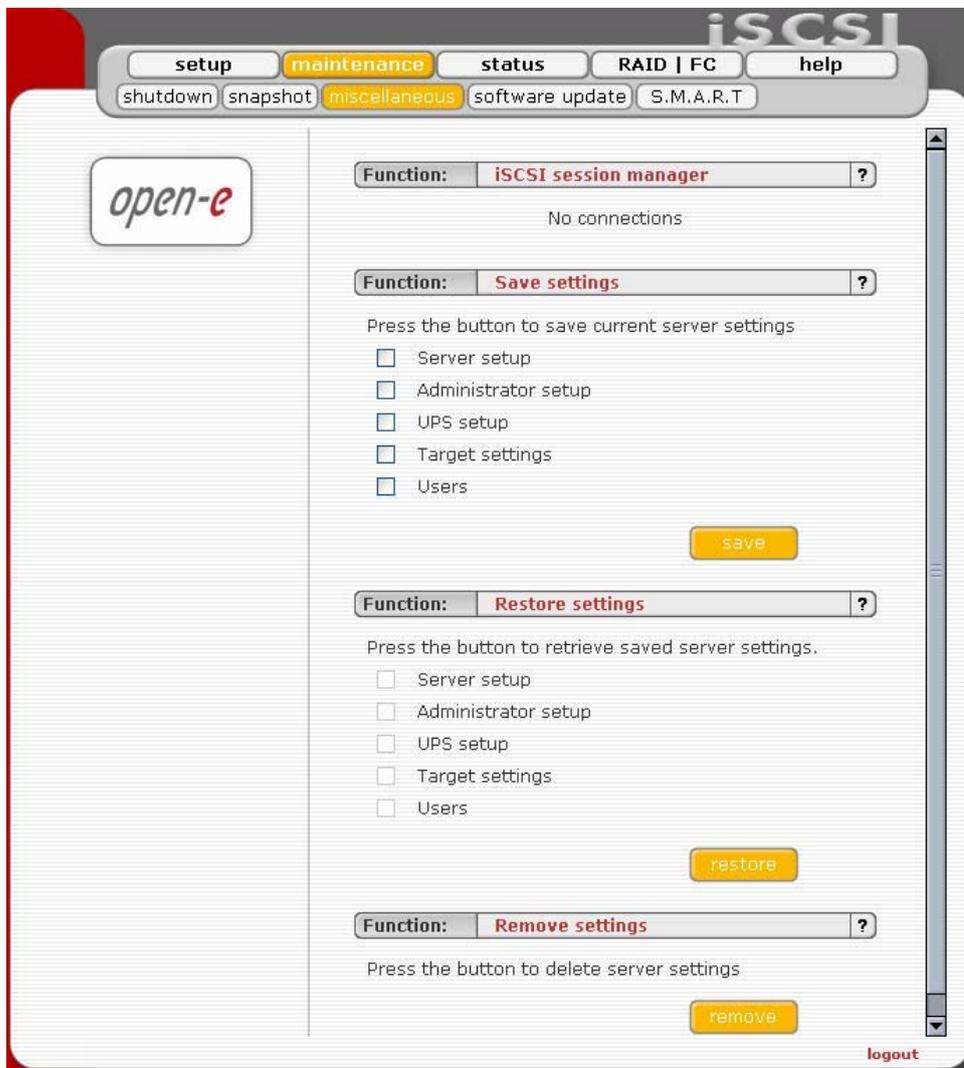
5.2.2.2 Snapshot

Here you can instantly create and remove snapshots. This can be useful if you need to make considerable changes to your data while you do not know if these changes are supposed to be permanent.



5.2.2.3 Miscellaneous

The next menu option is “miscellaneous” This function allows you to save settings, to retrieve them, and to remove them. To use those functions you must have had pen drive (USB Flash Memory) connected to USB port.



5.2.2.4 Software Update

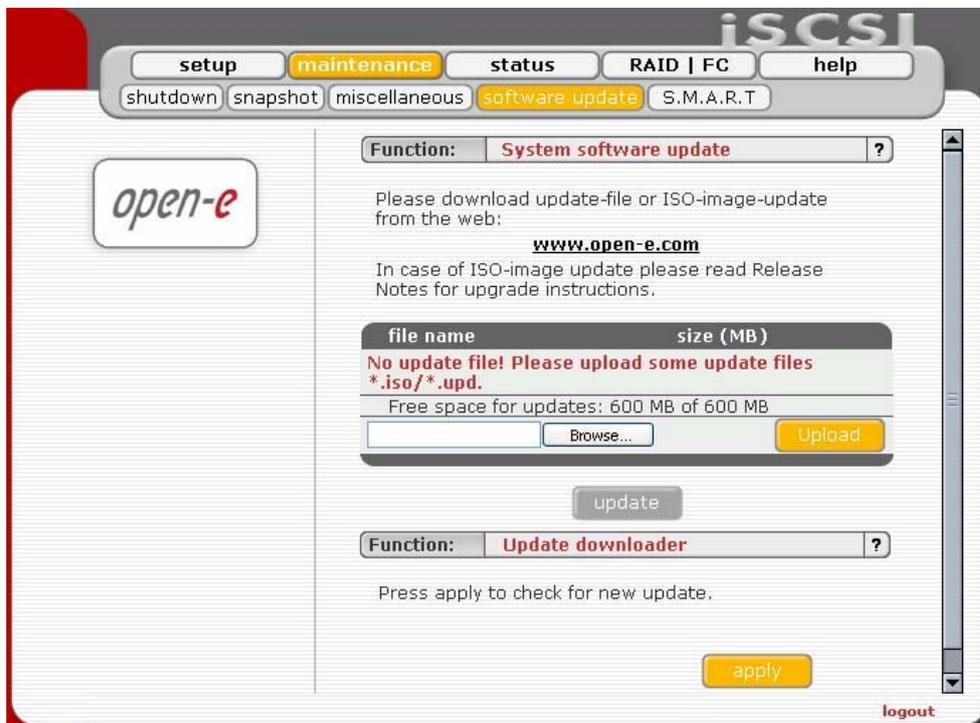
This function allows you to update the system software. There are two ways of updating Open-E iSCSI software.

During updating from share please follow this steps:

In resources menu create share "update" with default path.

1. .Copy update file into update folder.
2. .Press Update button.
3. .Confirm update when you will be asked.

● note Some updates need a system restart. In this case you will be informed about needed restart in confirmation message.



During update from CD please follow this steps:

1. Write down the actual NAS server IP address and NAS server name. After having updated NAS, please re-enter both.
2. Write down authorization settings. Before Updating, please save “User”, “Groups”, “Shares” and
3. Under Menu: “Maintenance -> Resources Misc -> Save resources”.
4. Download and save NAS Server Logs: Menu status -> hardware in Function Logs click on “Download”, then save on your local HDD.
5. The ISO-Files which include in update file must be burned on a CD with your favorite Burning software. (For example: Nero Burning ROM - option: “Burn Image”, etc.)
6. In order to re-flash the module, please install CD-ROM as Secondary-Master and DOM (disk-on-module) as Primary-Master.

● **note** USB CD-ROM can be used as well.

7. Set the BIOS to boot from CD-ROM drive.
8. Boot from the ISO-CD and wait until prompt: “Update complete, Please Remove CD and restart”
9. After re-fleshing, please reset the BIOS to boot from Primary-master HDD.

Updating the system may take about 10 minutes.

● **caution** Please remember that making an update is activity that cannot be stopped in any way. We strongly recommend to update system when UPS is connected.

Function: Update downloader

With this function you can check if there is new update available and download it.

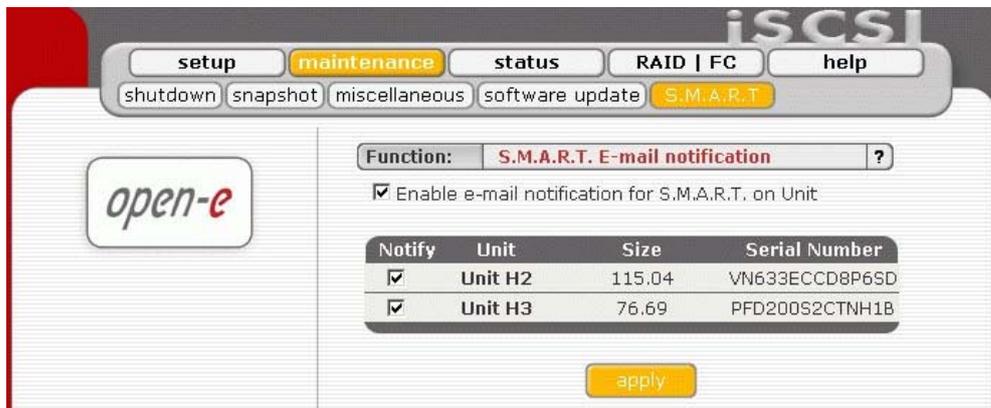
In order to download a new update you need to be registered at www.open-e.com. You also have to remember to setup correct DNS and Gateway address in "setup" -> "network menu".

5.2.2.5 S.M.A.R.T.

Function: S.M.A.R.T. e-mail notification

This function allows you to check S.M.A.R.T. status of hard disks and send it to e-mail address.

S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) is a monitoring system for computer hard disks to detect and report on various indicators of reliability, in the hope of anticipating failures.



In order to enable S.M.A.R.T. e-mail notification, you have to first enable E-mail notification function in setup -> administrator menu, then enable S.M.A.R.T. in Console tools at special options (press F1 on console to find out keyboard shortcuts).

When S.M.A.R.T. is enabled you will see all detected hard drives with information about unit number, size and serial number.

Select the checkbox of unit, from which you want to receive S.M.A.R.T. status and press "apply". If everything is ok, then status will be PASSED, in another case FAILED.

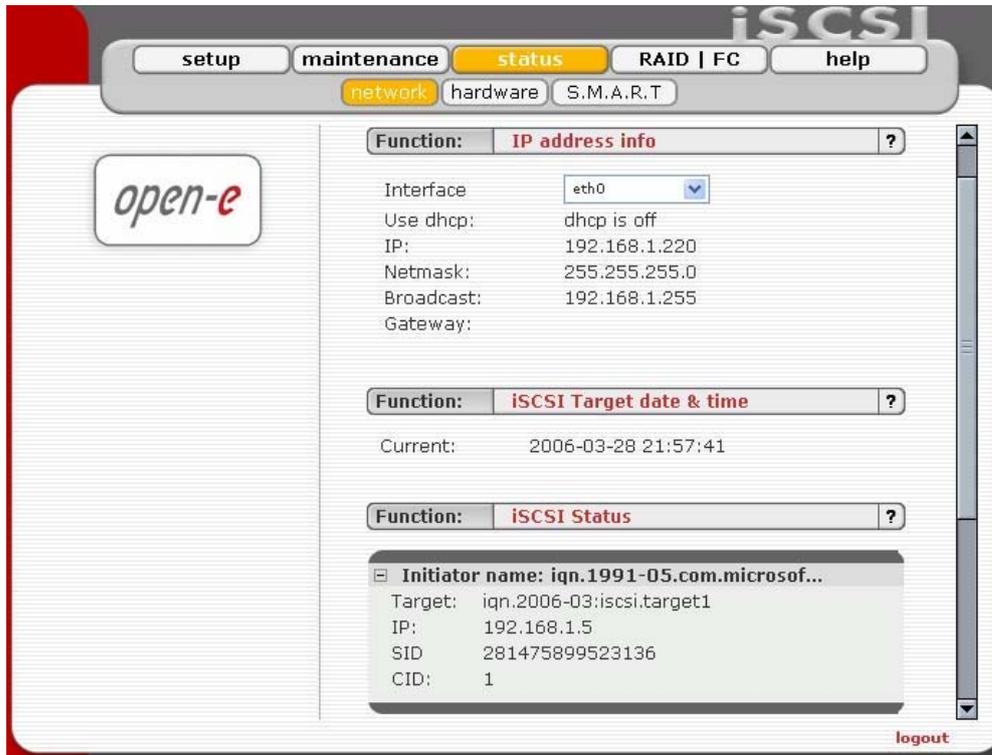
- **note** It will be possible to enable S.M.A.R.T. when all hard disks support it and it is enabled in BIOS settings.

5.2.3 Status

This function provides you with a quick overview of the most important system parameters of your Open-E iSCSI. The corresponding sub-functions are network, hardware and S.M.A.R.T.

5.2.3.1 Network

This function provides information on the IP address, Open-E iSCSI date and time and iSCSI status connections.



5.2.3.2 Hardware

The “Hardware” option provides you with information on storage and network controllers and the drivers (e.g. network driver and IDE driver). In addition, you may also download the latest Open-E iSCSI log files, remove them, check memory (RAM) usage and motherboard info..

The screenshot shows the 'status' page of the iSCSI Open-E web interface. The navigation bar includes 'setup', 'maintenance', 'status', 'RAID | FC', and 'help'. Below this, there are sub-navigators for 'network', 'hardware', and 'S.M.A.R.T.'. The 'open-e' logo is on the left. The main content area has a 'Function: UPS status' dropdown. Below it, the status is 'not available'. The next section is 'Function: Controllers info', which lists 'Network controllers' (two Intel PRO/1000 MT Dual Port Network Connection) and 'RAID/SCSI controllers' (Intel Corporation ICP Vortex GDT8546RZ). Below that is 'Function: Drivers info', listing 'Network drivers' (Intel(R) PRO/1000 Network Driver) and 'RAID/SCSI drivers' (SCSI low-level driver for Intel PIIX/ICH ATA controllers, Library module for ATA devices, and SCSI disk (sd) driver). The final section is 'Function: Logs', with instructions to download or remove logs, and 'download' and 'remove' buttons. A 'logout' link is at the bottom right.

The screenshot shows the 'hardware' page of the iSCSI Open-E web interface. The navigation bar is the same as the previous page. The sub-navigators are 'network', 'hardware', and 'S.M.A.R.T.'. The 'open-e' logo is on the left. The main content area has a 'Function: Logs viewer' dropdown, showing a directory tree with folders: '..', 'apache-ssl', 'exim', 'ram', and 'status'. Below that is 'Function: Memory (RAM) info', which displays a progress bar and the following data:

Used memory (MB):	64.84
System cache (MB):	154.94
Physical free memory (MB):	274.20
Total system memory (MB):	493.98

The next section is 'Function: Memory (SWAP) info', which shows 'No space reserved for swap'. Below that is 'Function: Motherboard info', which has a 'Hardware Monitor method' section with radio buttons for 'Autodetect' and 'Manual' (selected). There is a 'Select chipset family:' dropdown menu with 'winbond' selected. Below this, it says 'Selected chipset is not supported' and has an 'apply' button. A 'logout' link is at the bottom right.

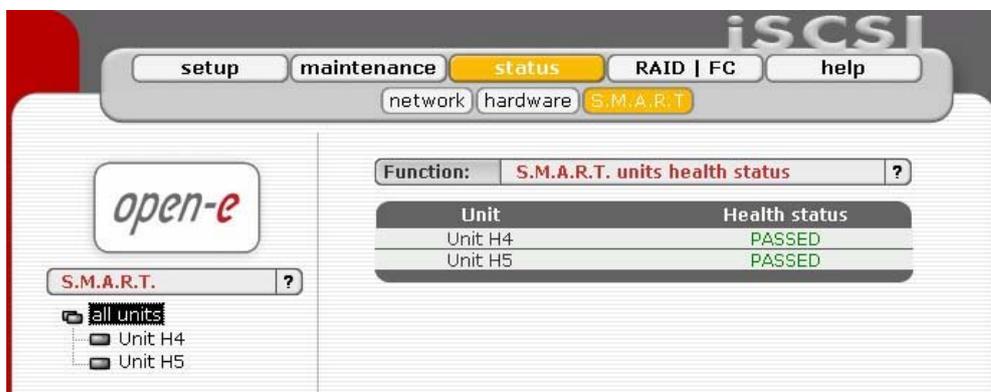
5.2.3.3 S.M.A.R.T.

Through the S.M.A.R.T. system, modern hard disk drives incorporate a suite of advanced diagnostics that monitor the internal operations of a drive and provide an early warning for many types of potential problems. When a potential problem is detected, the drive can be repaired or replaced before any data is lost or damaged.

Here you can find a tree with hard drives for which you can view S.M.A.R.T. information.

It is possible to view information about separate hard drives or a summary for all drives in the system.

- To view S.M.A.R.T. information for a hard drive - please click on appropriate drive name.
- To view summary please click on "all units"



Function: S.M.A.R.T. unit's health status

This function allows you to check S.M.A.R.T. status of hard disks. S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) is a monitoring system for computer hard disks to detect and report on various indicators of reliability, in the hope of anticipating failures.

To enable S.M.A.R.T. checks you need to use console tools and enable it in "special options"

- **note** It will be possible to enable S.M.A.R.T. when all hard disks support it and it is enabled in BIOS settings.

When S.M.A.R.T. is enabled you will see all detected hard drives with information if specified drive has passed health checks. To view more information and/or do more advanced test click on drive in drives tree on left side.



Function: S.M.A.R.T. info

This function allows you to view S.M.A.R.T. parameters which this disk is able to return.

In the upper part of this function you can see elementary parameters of hard drive such as device model or serial number. Below there is a table with S.M.A.R.T. attributes. In first column you will find an attribute name, in second - minimum threshold value of this parameter, then current value, next worst value and after the status.

- **note** If the value of this attribute ever exceeds the worst of this value then the status will be "failed". If value of attribute is on the edge of the worst value then the status can be "pre-failed". On some hard drives part of the attributes can be displayed as "Unknown Attribute". This can happen when the manufacturer of that hard drive have done some modifications in S.M.A.R.T. and these changes are not yet supported by our software.

Button "view errors" provide you ability to view S.M.A.R.T. log of that drive which is generated automatically.

Function: S.M.A.R.T. test

This function allows you to perform short and long tests of the hard drive. You will be informed about progress of the test. After the test finishes please click on "results" button to view test log.

Performing a test is not recommended during normal (daily) usage of that hard drive.

● **note** On some motherboards and controllers S.M.A.R.T. tests can not be performed.

5.2.4 RAID | FC

In this place you can manage hardware RAID controllers, Fibre Channel or create disk array using software RAID.

5.2.4.1 H/W Raid



Please note that the RAID controller should be supported by the Open-E software. If a 3ware controller is installed you can click on RAID in the menu and the 3ware web base will start automatically.

Function: "3ware administrations"

This function will reset the 3DM password to factory default. (Default 3DM/3DM2 password: 3ware)

● **note** It is important to realize the need for time synchronization between an Open-E NAS/iSCSI box and the client browser you use to access the configuration panel. Since access to 3ware configuration utility expires after a certain time period (after period of inactivity). Open-E iSCSI/NAS must be in the same time zone as client station, if the difference becomes too large you'll lose authorization token too early or your authorization will be invalid immediately.

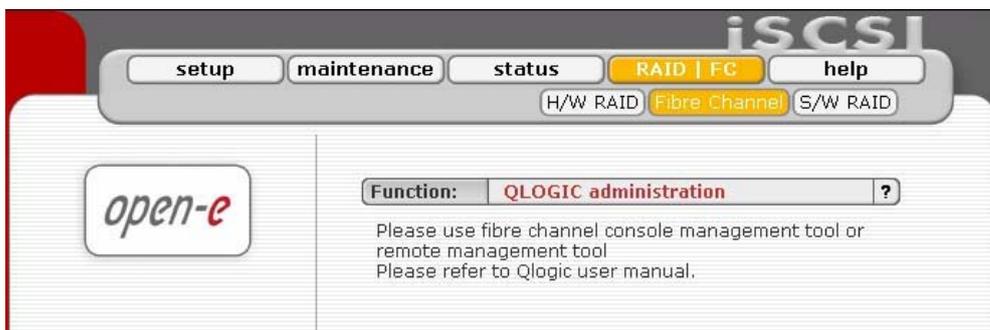
5.2.4.2 Fibre Channel

When a fibre channel controller is detected you will find utilities and options specific to that hardware.

Function: QLOGIC administration

If a QLA23xx series controller is installed, you can use commandline tool in the Console Tools (press CTRL+ALT+F).

The QLA23xx controller allows for remote administration. To access the configuration daemon download the client application SANsurfer from homepage provided by QLOGIC. Install it on your system and configure to access this server. Follow the online instructions to configure. If in doubt consult documentation manual. Make sure you have the essential information handy (Ip address of your server, username and password).



5.2.4.3 S/W Raid

Here you will find functions with which you can create software RAID units.

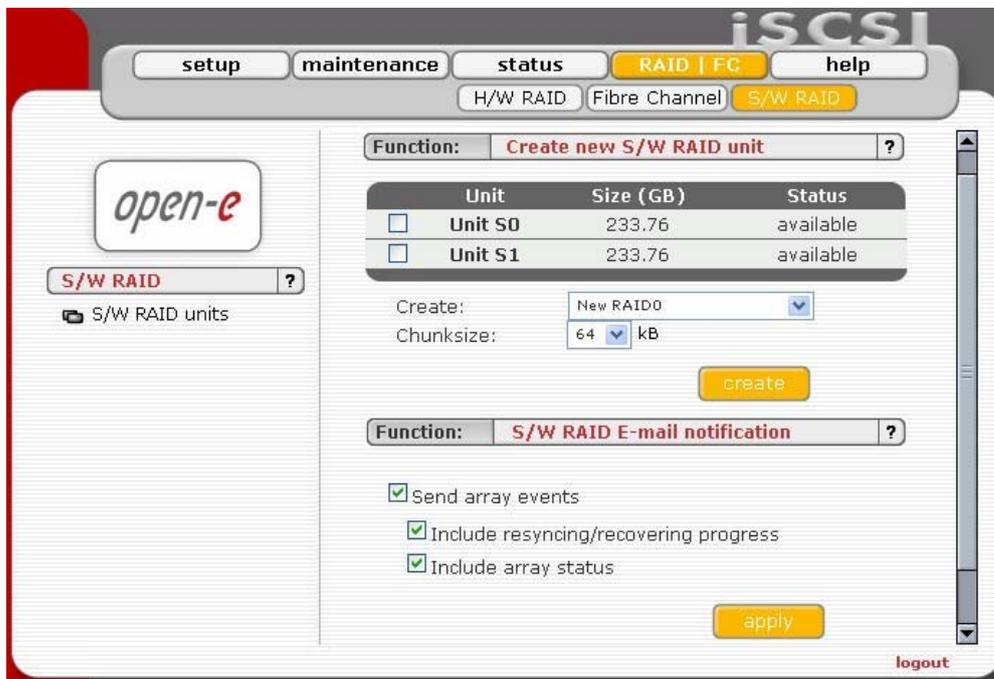
Function: Create new S/W RAID unit

In this function you can create software RAIDs from free (not used) units. If you want to create RAIDs from used units, you need first to Delete content of units in console, be aware this would ERASE all data from units.

To create a RAID select units, then from ListBox select what type of RAID it will be, then select desired Chunk size. After setting all demanded parameters press "create" button.

Allow to create degraded mode - it allows to create RAID1 with one unit, RAID5 with two units or RAID6 with three units, even if minimal number of units is not meet.

● **note** Chunk size - its a minimal portion of data that is written at a time.



Available RAIDS:

RAID 0: it is stripe array and requires, minimum 2 units. In RAID 0 You can set the Chunksize 4k - 256k. The destination size of the RAID Array will be sum of each drive size in array.

RAID 1: mirror array requires 2 units. Destination size will be equal: (SINGLE)UNIT_SIZE, where (SINGLE) UNIT_SIZE is the size of the smallest unit in array.

RAID 5: stripe + parity algorithm array (required, minimum 3 units - with the same capacity). You can choose from the ListBoxes: (layout)parity-algorithm [left/right] [symmetric/asymmetric]. DESTINATION SIZE: (NR_OF_UNITS-1)*(SINGLE)UNIT_SIZE, where (SINGLE) UNIT_SIZE is the size of the smallest unit in array.

RAID 6: stripe + parity algorithm array (required, minimum 4 units - with the same capacity). You can choose from the ListBoxes: (layout)parity-algorithm [left/right] [symmetric/asymmetric]. DESTINATION SIZE: (NR_OF_UNITS-2)*(SINGLE)UNIT_SIZE, where (SINGLE) UNIT_SIZE is the size of the smallest unit in array..

The (layout) parity-algorithm in RAID 5 and 6 is described below.

To remove RAID, if previously added to Volume Group please enter Console Tool and first delete Volume Group of the RAID. Then the Remove button will be enabled. Otherwise simply press Remove button.

● note You can add spare units to RAID1, RAID5 and RAID6 arrays.

Please remember that after creation of an RAID, in Function: 'Info' will be shown progress of Synchronization. Till end of this process all actions done on this array will be performed a bit slower.

RAID 5 (layout) parity-algorithm

It is possible to set one of four algorithms of placement data blocks and parity blocks in matrix. Our default option is left-symmetric, which is the best for large reads. Other recommended value is left-asymmetric.

Left-Asymmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
0	1	2	Parity
3	4	Parity	5
6	Parity	7	8
Parity	9	10	11
12	13	14	Parity

Left-Symmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
0	1	2	Parity
4	5	Parity	3
8	Parity	6	7
Parity	9	10	11
12	13	14	Parity

Right-Asymmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
Parity	0	1	2
3	Parity	4	5
6	7	Parity	8
9	10	11	Parity
Parity	12	13	14

Right-Symmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
Parity	0	1	2
5	Parity	3	4
7	8	Parity	6
9	10	11	Parity
Parity	12	13	14

RAID 6 (layout) parity-algorithm

It is possible to set one from four algorithms of placement data blocks and parity blocks in matrix. Our default option is left-symmetric which is the best for large reads. Other recommended value is left-asymmetric.

Left-Asymmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
0	1	Parity	Parity
2	Parity	Parity	3
Parity	Parity	4	5
Parity	6	7	Parity
8	9	Parity	Parity

Left-Symmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
0	1	Parity	Parity
3	Parity	Parity	2
Parity	Parity	4	5
Parity	6	7	Parity
8	9	Parity	Parity

Right-Asymmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
Parity	Parity	0	1
2	Parity	Parity	3
4	5	Parity	Parity
Parity	6	7	Parity
8	9	Parity	Parity

Right-Symmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
Parity	Parity	0	1
3	Parity	Parity	2
4	5	Parity	Parity
Parity	6	7	Parity
Parity	Parity	8	9

Function: “S/W RAID E-mail notification “

It is possible to send notification by e-mail about events on software RAID arrays (e.g. rebuild started, rebuild finished, span is active). In order to do so please check Send array events.

● **note** In order to “Send array events” you must enable E-mail notification in “setup” → “administrator”.

- If you check "Include resyncing/recovering progress" - you will be informed about progress of resync/rebuild if it is currently running. An e-mail will be send for every 20 % completed.
- If you check "Include array status" - to every event will be added the status of event-related array.

After choice Raid Levels and by clicking “apply” button appear in field “Status” “in use” (see below)

Function: **Create new S/W RAID unit** ?

Unit	Size (GB)	Status
<input type="checkbox"/> Unit S0	233.76	in use, Unit MD0
<input type="checkbox"/> Unit S1	233.76	in use, Unit MD0

create

By clicking on the branch “MD0” appears new page, with Functions Manager, Info and Software RAID unit remove.

Unit MD0 (RAID1)

Function: **Manager** ?

Unit	PR	F	R	ST	Size (GB)
Unit S0	0	<input type="checkbox"/>	<input type="checkbox"/>	A *	233.76
Unit S1	1	<input type="checkbox"/>	<input type="checkbox"/>	A *	233.76

apply

Function: **Info** ?

attribute name	value
RAID LEVEL	RAID1
Creation Time	Mon Mar 27 21:54:02 2006
Update Time	Mon Mar 27 23:26:50 2006
Array Size	233.76 GB
Device Size	233.76 GB
State	clean

Function: **Software RAID unit remove** ?

Press "Remove" button to remove software RAID unit

remove

logout

Function: „Manager“

In this function you can manage RAID array

Available operations:

RAID 0:

Construction of this RAID does not allowed to manage it anyway. Every unit must not be Failed. If any would be the whole array would be destroyed.

RAID 1:

- To set unit as a Faulty one mark proper checkbox (in the column F) and click on Apply button.
- To delete any unit form an array mark proper checkbox (in the column R) and click on Remove button.

RAID 5:

- To set unit as a Faulty one mark proper checkbox (in the column F) and click on Apply button.
- To delete any unit form an array mark proper checkbox (in the column R) and click on Remove button.

RAID 6:

- To set unit as a Faulty one mark proper checkbox (in the column F) and click on Apply button.
- To delete any unit form an array mark proper checkbox (in the column R) and click on Remove button.

RAIDs notation:

- PR - priority in array - describes priority of unit that will be added to array if another is set to Faulty.
- F - faulty - unit can be turned off from array
- R - hot remove - unit can be removed form array without shutting down the system.
- ST - describes state of unit in array, which can be:
 - A - This means that Unit is active in array
 - * - Number of Unit that belongs to the array
 - S - Spare or spare rebuilding - this means that unit is free and can be added to the array or is free and currently is rebuilding.

Limitations:

- There is no possibility to set any unit as faulty if the matrix is degraded or during resync/rebuild.
- While using RAID 1 and RAID 5 there is possibility to set only one disk from active as faulty. This regulation is not valid for Spare units in array.

● **note** Only one disk form Active in Array can be set as Faulty or Removed

Function: „Info“

From this function you can obtain information like Creation Time, RAID Level, Array and Device Size, Update Time and state

- **note** During syncing or rebuilding of array it is recommended to perform as few disk operations as possible. Status of syncing/rebuilding will be showed "live" - without need to refresh page manually.

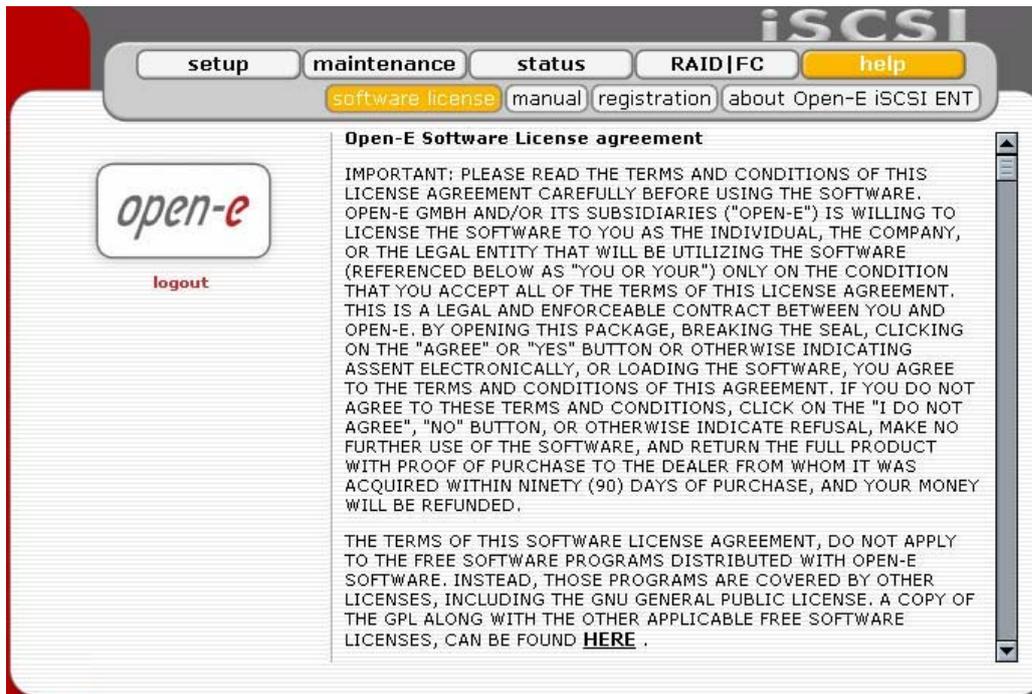
Function: „Software RAID unit remove“

This function allows you to remove Software RAID unit (MD[nr]).

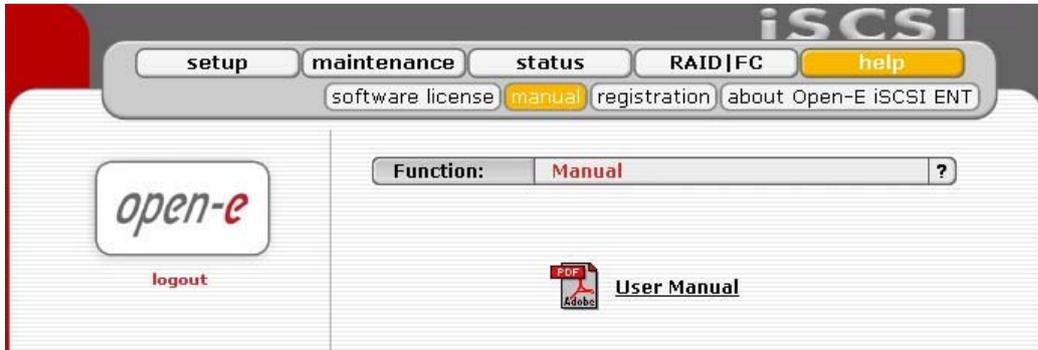
- **note** This function is available only when no Logical Volume is created on appropriate MD[nr] and unit is not resyncing. If you want to remove software RAID unit with Logical Volume please use console Extended tools (*press F1 on console to find out keyboard shortcuts*) and remove Logical Volume first.

5.2.5 Help

When accessing Help - "Software License" you can read the license for software included in Open-E iSCSI ENTERPRISE.



You can download a PDF version of this manual. In order to read the manual, you need a PDF viewer such as the Acrobat Reader (<http://www.adobe.com>).



By clicking on “Registration” in the “Help” menu you can register yourself at <http://www.open-e.com>.



“About Open-E iSCSI ENTERPRISE” indicates which system version you are currently working with. In addition you find contact information regarding Open-E iSCSI Target; for instance how you can reach Open-E’s technical hotline if you should have problems or questions.



You log out by closing the browser window.

6 Troubleshooting Guide

Here is a list of common error messages and their meanings as well as corresponding tips on how to resolve the underlying problem. If your error message is not listed here please contact Open-E's support and service team (see section "help" above). Our staff will help you find a solution.

Open-E iSCSI does not boot, keyboard LEDs are flashing

This problem arises when you installed Open-E iSCSI into the secondary IDE slot by mistake. Open-E iSCSI is configured for and will only run in the primary IDE connector. Shut down the computer, remove Open-E iSCSI from secondary and place it into primary IDE slot. That should solve the problem.

Error: values are not valid

You have entered an invalid parameter. IP addresses have the form aaa.bbb.ccc.ddd: All four parameters range between 0 and 255 and are always separated by periods.

Error: passwords do not match

Make sure that you type the same password in each entry field. For safety reasons, the passwords are not displayed. Type slowly. Check the status of the Shift, Caps Lock, Control, and Alt-keys.

Error: No pendrive detected

You instructed Open-E iSCSI to perform a systems update, but did not supply a valid Open-E iSCSI update file. Download the latest Open-E iSCSI update file from the www.open-e.com Web site. Next, copy the upgrade file into pendrive and connect them to USB port. Please spell upgrade lower case. Finally, press update button.

Error: invalid administrator password

Administrator password cannot begin or end with a space. Spaces are not legitimate characters at the beginning and end of a password. Maybe you inadvertently hit the space bar during password entry. Reenter your password.

7 Appendix A

Open-E Software License agreement

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8 Appendix B

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Version 2, June 1991

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Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6.

Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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- b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.
- c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
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