

FRECOM FSG-3 STORAGE GATEWAY



Rev. 536

Congratulations

Congratulations on your purchase of the Freecom™ Storage Gateway (FSG-3). The FSG-3 provides central network storage or Network Attached Storage (NAS) and a secure connection for multiple personal computers (PCs) to the Internet through an external modem.

If you are unfamiliar with networking and routing basics, refer to Appendix B, "Networks and Routing Basics", to become more familiar with the terminology and procedures used in this manual.

Freecom Technologies • Germany
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Warning !

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Warning! This device is equipment complying with EN55022 class B.

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General Information

Contents of the box

Please check the contents of the box; the following items should be included:

- Freecom FSG-3 drive
- Power adapter
- Network cable (UTP)
- Footstand
- Wall mount
- CD-ROM with manual, driver and application software
- Quick Install Guide
- Warranty card + envelope
- Safety manual

Technical Support

For help with any technical issues, visit us on the Web at www.freecom.com or at www.openfsg.com, a site dedicated to this product. The Web sites include an extensive knowledge base, answers to frequently asked questions, firmware and manual downloads and a means for submitting technical questions or bugs online. You can also contact Freecom support for more help.

Freecom on the net

The FSG-3 and other Freecom products including documentation, drivers, and other information can be found on a World Wide Web home page that you can access at the universal resource locator (URL) <http://www.freecom.com>. A connection to the Internet and a Web browser such as Internet Explorer or Firefox are required.

Related Publications

There is a lot of information available on the internet that can help you achieve what you want. In this document, you may be directed to various RFC documents for further information. An RFC is a Request For Comment (RFC) published by the Internet Engineering Task Force (IETF), an open organization that defines the architecture and operation of the Internet. The RFC documents outline and define the standard protocols and procedures for the Internet. The documents are listed on the World Wide Web at www.ietf.org and are mirrored and indexed at many other sites worldwide.

For more information about address assignment, refer to the IETF documents RFC 1597, Address Allocation for Private Internets, and RFC 1466, Guidelines for Management of IP Address Space.

For more information about IP address translation, refer to RFC 1631, The IP Network Address Translator (NAT).

Statement of Conditions

In the interest of improving internal design, operational function, and/or reliability, Freecom reserves the right to make changes to the products described in this document without notice. Freecom does not assume any liability that may occur due to the use or application of the product(s) or circuit layout(s) described herein.

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System Requirements

The following hardware and software requirements must be fulfilled to ensure trouble-free operation.

Hardware Requirements

In order to use the Freecom FSG-3, following components are needed:

- Intel Pentium II 233MHz or higher
- 64MB RAM or higher
- CD-ROM drive for installing drivers and/or software
- LAN
- Internet connection for online warranty registration and driver/software updates and downloads

Software Requirements

- Windows 98 SE
- Windows Me
- Windows 2000
- Windows XP
- Windows NT

- MacOS 8.6 or 9.x
- MacOS X

- Linux Kernel 2.2 or higher

Precautionary measures

To ensure that your Freecom FSG-3 functions properly, please take note of the following precautions. If these are not followed, you may void your warranty and damage the FSG-3.

- Do not drop the Freecom FSG-3 or expose it to other kinds of sudden mechanical shocks as this may result in data loss and damage to the hard drive.
- Do not use the Freecom FSG-3 when the ambient temperature is below 10°C or above 45°C.
- If the Freecom FSG-3 is moved from a cool environment to a warmer environment, please allow the drive to acclimatize to the ambient temperature before operating the device. Failing to do so may lead to condensation within the drive enclosure, which in turn may cause the drive to malfunction.
- Do not place liquids or drinks on the FSG-3. When liquids are spilled and get in contact with the electronics within the drive enclosure, it will damage the drive and will cause the drive to malfunction.
- Do not use the FSG-3 in a dusty environment. Dust inside the enclosure may damage the internal electronics and result in drive malfunction.
- Only use the power adapter that was supplied with the FSG-3.
- Opening the FSG-3 will void the warranty.

Chapter 1: Getting to know your FSG-3

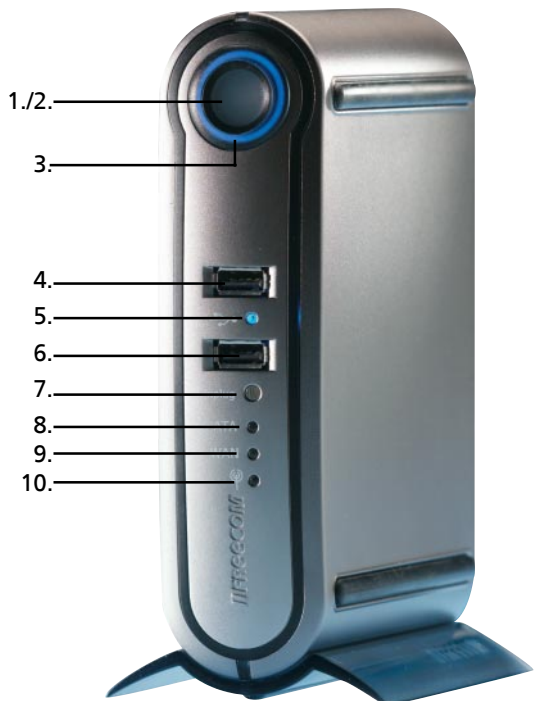
This chapter describes the lights and mechanical layout of the FSG-3.

1.1 FSG-3 connectors, LEDs and buttons

The FSG-3 Front panel

The front panel consists of:

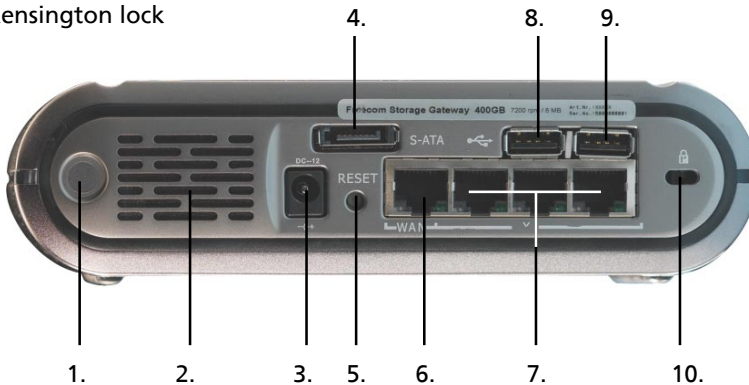
1. Power on
2. Power on LED
3. LED ring
4. USB host port type A front 1
5. USB LED
6. USB host port type A front 2
7. USB unplug button
8. SATA LED
9. WAN LED
10. WLAN LED



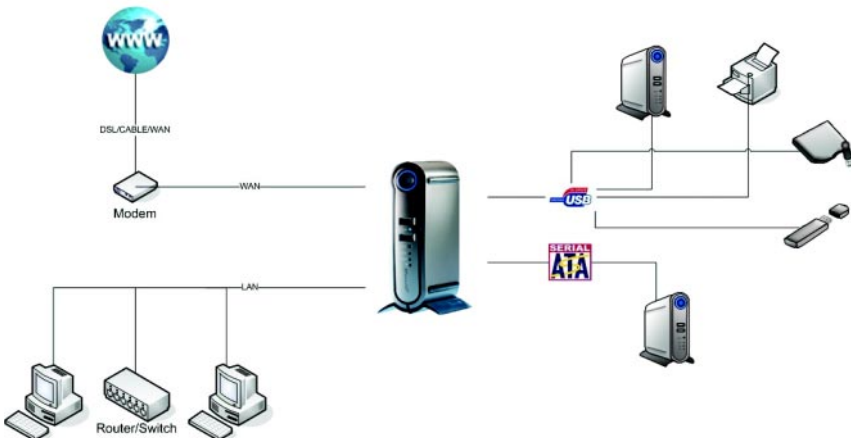
The FSG-3 Back panel

The back panel consists of:

1. WLAN antenna connector
2. Fan inlet
3. 12 V DC power jack
4. eSATA connector
5. Hardware reset button
6. WAN port
7. LAN ports 1, 2 and 3
8. USB host port type A back 1
9. USB host port type A back 2
10. Kensington lock



1.2 Possible Connections with your FSG-3



1.3 LED configuration

Booting

Redboot: Power LED on
Linux boot: Power LED blinking
Linux finished booting: Power LED OFF / EL Ring ON

1.4 Front Panel LEDs

Power LED (POWER) (Sync Button LED)

Steady blue: System boot-up OK
Ritmic or erratic Flashing blue: System is under boot-up
OFF: No Activity

EL Ring LED

On: Normal operation
Erratic flashing blue: HD activity
OFF: No power / activity

S-ATA LED

Steady blue: S-ATA device connected
OFF: No connection / Error

WAN LED

Steady blue: WAN connected
OFF: No connection / Error

WLAN LED (For WLAN versions)

Steady blue: Link is active

OFF: Inactive

1.5 Back Panel LEDs**Green LAN LED: (LAN 1,2,3)**

Steady green: Link is active

Erratic flashing: Transmit or receive data

OFF: No connection / error

Yellow LAN LED: (LAN 1,2,3)

Steady yellow: Fast Ethernet (100 MB/s)

Erratic flashing: Possible collisions and the network

OFF: 10 MB/s Ethernet

Green WAN LED:

Steady green: Link is active

Erratic flashing: Transmit or receive data

OFF: No connection / error

Yellow WAN LED:

Steady yellow: Fast Ethernet (100 MB/s)

Erratic flashing: Possible collisions and the network

OFF: 10 MB/s Ethernet

Chapter 2: Before you begin

This chapter describes how to prepare your computer network to connect to the FSG-3 and to the internet.

2.1 Preparing Your Computers to connect to the FSG-3

To connect to the FSG-3, each computer on your network must have TCP/IP (Transmission Control Protocol/Internet Protocol) installed and selected as its networking protocol. If a Network Interface Card (NIC) is already installed in your PC, then TCP/IP is probably already installed as well.

2.2 Configuring Windows 98 SE, and Me to work with the FSG-3

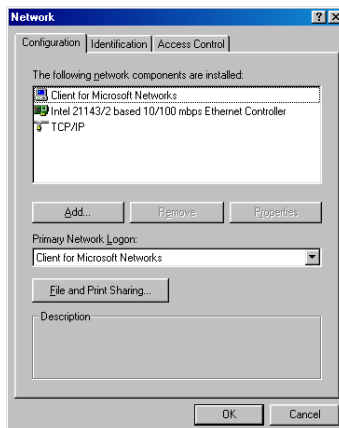
To be able to use your network and your FSG-3, you will need to install TCP/IP manually and configure TCP/IP on each networked computer. Before starting, locate your Windows CD; you may need to insert it during the TCP/IP installation process.

2.2.1 Installing the required Network Components

To install or verify the necessary components for IP networking:

1. On the Windows taskbar, click the Start button, Settings, Control Panel.
2. Double-click the Network icon.

The Network window will show you a list of installed components:



You must have an Ethernet adapter (NIC), the TCP/IP protocol and the Client for Microsoft Networks installed. You do not have to remove any other network components shown in the Network components window.

To install an Ethernet adapter (NIC):

- a. Click the Add button.
- b. Select Adapter, and then click Add.
- c. Select the manufacturer and model of your Ethernet adapter, and then click OK.

To install TCP/IP:

- a. Click the Add button.
- b. Select Protocol, and then click Add.
- c. Select Microsoft.
- d. Select TCP/IP, and then click OK.

To install the Client for Microsoft Networks:

- a. Click the Add button.
- b. Select Client, and then click Add.
- c. Select Microsoft.
- d. Select Client for Microsoft Networks, and then click OK.

Restart your PC for the changes to take effect.

2.2.2 Assign your TCP/IP configuration by DHCP

After the TCP/IP protocol is installed, each computer must be assigned specific information to be able to contact other devices on the network. The FSG-3 is pre-configured to give this information automatically to all computers attached to its LAN ports. The computers can obtain this information from the internal DHCP server of the FSG-3. To use DHCP with the recommended default addresses, follow these steps:

1. Start the FSG-3 and wait for it to boot. The EL ring will be on when booting is finished. This can take up to 30 seconds. Connect all computers to the LAN ports of the FSG-3.
2. On each attached computer, open the Network control panel (refer to the previous section) and select the Configuration tab.
3. From the network components list, select TCP/IP->(your Ethernet adapter) and click Properties.
4. In the IP Address tab, select "Obtain an IP address automatically".
5. Select the Gateway tab.

6. If any gateways are shown, remove them.
7. Click OK.
8. Restart the PC.

Repeat steps 2 through 8 for each computer on your network.

2.2.3 Selecting Internet Access Method

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Internet Options icon.
3. Select "I want to set up my Internet connection manually" or "I want to connect through a Local Area Network" and click Next.
4. Select "I want to connect through a Local Area Network" and click Next.
5. Uncheck all boxes in the LAN Internet Configuration screen and click Next.
6. Proceed to the end of the Wizard.

2.2.4 Verifying TCP/IP Properties

After your PC is configured and has rebooted, you can check the TCP/IP configuration using the utility winipcfg.exe:

1. On the Windows taskbar, click the Start button, and then click Run.
2. Type "winipcfg", and then click OK.
The winipcfg program lists (among other things), your IP address, subnet mask, and default gateway.
3. From the drop-down box, select your Ethernet adapter.
The window is updated to show your settings, which should match the values below if you are using the default TCP/IP settings that FREECOM recommends:
 - The IP address is between 192.168.1.2 and 192.168.1.254
 - The subnet mask is 255.255.255.0
 - The default gateway is 192.168.1.1

2.3 Configuring Windows XP, NT or 2000 to work with the FSG-3

To be able to use your network and your FSG-3, you might need to install TCP/IP manually and configure TCP/IP on each networked computer. Before starting, locate your Windows CD; you may need to insert it during the TCP/IP installation process.

2.3.1 Installing or Verifying Windows Networking Components

You must have an Ethernet adapter (NIC), the TCP/IP protocol and the Client for Microsoft Networks installed. You do not have to remove any other network components shown in the Network components window.

If you need to install the adapter, please look at the instruction supplied with your adapter how to install the device.

To install or verify the other components:

1. On the Windows taskbar, click the Start button, point to Settings (not always required), and then click Control Panel.
2. Double-click the Network and Dialup Connections icon. (Can also be called the Network Connections or Connect To icon)
3. If an Ethernet adapter is present in your PC, you should see an entry for a Local Area Connection. Double-click that entry.
4. Select the general tab
5. Verify that 'Client for Microsoft Networks' and 'Internet Protocol (TCP/IP)' are present. If not, select Install and add them.
6. Select 'Internet Protocol (TCP/IP)', click Properties, and verify that "Obtain an IP address automatically" is selected.
7. Click OK and close all Network and Dialup Connections windows.
8. Make sure your computer is connected to the FSG-3 and verify the TCP/IP properties. (See below). If you are experiencing problems, you can restart your computer.

2.3.2 Verifying TCP/IP Properties

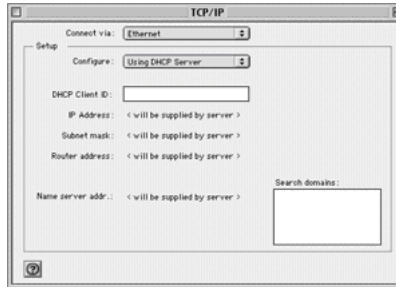
To check your PC's TCP/IP configuration:

1. On the Windows taskbar, click the Start button, and then click Run. The Run window opens.
2. Type cmd and then click OK.
A command window opens
3. Type ipconfig /all
Your IP Configuration information will be listed, and should match the values below if you are using the default TCP/IP settings that FREECOM recommends:
 - The IP address is between 192.168.1.2 and 192.168.1.254
 - The subnet mask is 255.255.255.0
 - The default gateway is 192.168.1.1
4. Type exit

2.4 MacOS 8.6 or 9.x

Beginning with Macintosh Operating System 7, TCP/IP is already installed on the Macintosh. On each networked Macintosh, you will need to configure TCP/IP to use DHCP.

1. From the Apple menu, select Control Panels, then TCP/IP.
The TCP/IP Control Panel opens:



2. From the "Connect via" box, select your Macintosh's Ethernet interface.
3. From the "Configure" box, select Using DHCP Server. You can leave the DHCP Client ID box empty.
4. Close the TCP/IP Control Panel.
5. Repeat this for each Macintosh on your network.

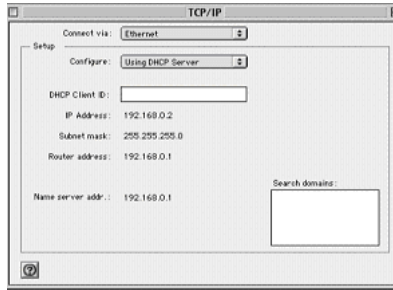
2.5 MacOS X

Beginning with Macintosh Operating System 7, TCP/IP is already installed on the Macintosh. On each networked Macintosh, you will need to configure TCP/IP to use DHCP.

1. From the Apple menu, choose System Preferences, then Network.
2. If not already selected, select Built-in Ethernet in the Configure list.
3. If not already selected, Select Using DHCP in the TCP/IP tab.
4. Click Save.

2.5.1 Verifying TCP/IP Properties (Macintosh)

After your Macintosh is configured and has rebooted, you can check the TCP/IP configuration by returning to the TCP/IP Control Panel. From the Apple menu, select Control Panels, then TCP/IP.



The panel is updated to show your settings, which should match the values below if you are using the default TCP/IP settings that FREECOM recommends:

- The IP Address is between 192.168.1.2 and 192.168.1.254
- The Subnet mask is 255.255.255.0
- The Router address is 192.168.1.1

If you see different values, restart your Macintosh or you may need to switch the "Configure" setting to a different option, then back again to "Using DHCP Server".

2.6 Getting on the internet

If you do not have an internet account yet, but you require access to the internet, you will need to contract with an Internet service provider (ISP) for a single-user Internet access account. You can use both DSL or cable connections. You will require a separate modem for your type of Internet access. These modems are usually gotten with your internet connection from your ISP. You can then connect the WAN port of the FSG-3 directly to the modem. To install the FSG-3 you will need some information from your ISP. Please make sure you have this information on hand. How to setup your internet account in your FSG-3 is described in more detail further in this manual.

2.7 Internet configuration information

For a single-user Internet account, your ISP supplies TCP/IP configuration information (such as IP address, subnet mask and default gateway) and VPI and VCI multiplexing information. Your ISP may also provide other login information, such as User Name and Password, in the case where the PPPoE or PPPoA protocol is required. With a typical account, much of the configuration information is dynamically assigned when your PC is first booted up while connected to the ISP, and you do not need to know that dynamic information.

In order to share the Internet connection among several computers, your FSG-3 takes the place of the single computer, and you need to configure it with the TCP/IP information that the single computer would normally use. When the FSG's WAN port is connected to the modem, the FSG-3 appears to be a single computer to the ISP. The gateway then allows the computers on the local network to use a single user account to access the Internet through the broadband modem. The method used by the FSG-3 to accomplish this is called Network Address Translation (NAT) or IP masquerading.

2.7.1 Login Protocols

Some ISPs require a special login protocol, in which you must enter a login name and password in order to access the Internet. If you already log in to your Internet account by running a program such as WinPOET or EnterNet, then your account uses PPP over Ethernet (PPPoE).

When you configure your FSG-3, you will need to enter your login name and password in the FSG's configuration menus. After your network and FSG-3 are configured, the FSG-3 will perform the login task when needed, and you will no longer need to run the login program from your PC. It is not necessary to uninstall the login program.

2.7.2 Account Information

Unless these items are dynamically assigned by the ISP, your ISP should give you the following basic information for your account:

- An IP address and subnet mask
- A gateway IP address, which is the address of the ISP's router
- One or more domain name server (DNS) IP addresses
- Host name and domain suffix

For example, your account's full server names may look like this:

mail.xxx.yyy.com

In this example, the domain suffix is xxx . yyy . com.

If any of these items are dynamically supplied by the ISP, your gateway automatically acquires them. If an ISP technician configured your computer during the installation of the broadband modem, or if you configured it using instructions provided by your ISP, you need to copy configuration information from your computer's Network TCP/IP Properties window (or Macintosh TCP/IP Control Panel) before reconfiguring your computer for use with the FSG-3. These procedures are described next.

2.7.3 Obtaining ISP Configuration Information (Windows)

If you were using your computer directly attached to your modem to access the internet, you may need to collect configuration information from your computer so that you can use this information when you configure the FSG-3. If your ISP provided this information to you on paper or provides the configuration data dynamically, you do not require this information.

To get the information you need to configure the FSG-3 for Internet access:

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Network icon. The Network window opens, which displays a list of installed components.
3. Select TCP/IP, and then click Properties. The TCP/IP Properties dialog box opens.
4. Select the IP Address tab. If an IP address and subnet mask are shown, write down the information. Now click on "Obtain an IP address automatically". If no address is present, your account uses a dynamically-assigned IP address and you do not need any more information. Please close the dialog and continue installing your computer and FSG-3.
5. Select the Gateway tab. If an IP address appears under Installed Gateways, write down the address. This is the ISP's gateway address. Select the address and then click Remove to remove the gateway address.
6. Select the DNS Configuration tab. If any DNS server addresses are shown, write down the addresses. If any information appears in the Host or Domain information box, write it down. Click Disable DNS.
7. Click OK to save your changes and close the TCP/IP Properties dialog box. You are returned to the Network window.
8. Click OK.
9. Reboot your PC at the prompt. You may also be prompted to insert your Windows CD.

2.7.4 Obtaining ISP Configuration Information (Macintosh)

If you were using your computer directly attached to your modem to access the internet, you may need to collect configuration information from your computer so that you can use this information when you configure the FSG-3. If your ISP provided this information to you on paper or provides the configuration data dynamically, you do not require this information. To get the information you need to configure the gateway for Internet access:

1. From the Apple menu, select Control Panels, then TCP/IP. The TCP/IP Control Panel opens, which displays a list of configuration settings. If the "Configure" setting is "Using DHCP Server", your account uses a dynamically-assigned IP address and you do not need any more information. Please close the dialog and continue installing your computer and FSG-3.
2. If an IP address and subnet mask are shown, write down the information.
3. If an IP address appears under Router address, write down the address. This is the ISP's gateway address.
4. If any Name Server addresses are shown, write down the addresses. These are your ISP's DNS addresses.
5. If any information appears in the Search domains information box, write it down.
6. Change the "Configure" setting to "Using DHCP Server".
7. Close the TCP/IP Control Panel.

2.8 Restarting the Network

Once you've setup your computers to work with the FSG-3, you must reset the network for the devices to be able to communicate correctly.

1. Turn off the FSG-3 if it was on, and then turn it on again and wait for the FSG-3 to restart (This can take up to 30 seconds).
2. Restart any computer connected to the FSG-3.

2.9 Ready for Configuration

After configuring all of your PCs for TCP/IP networking and connecting them to the local network of your FSG-3, you are ready to access and configure the FSG-3.

Chapter 3: How to Install

3.1 Hardware Installation

Setup of the FSG-3 is performed using the following steps:

1. Plug the FSG's power cord into a power outlet.
2. Switch on DHCP on the PC, a DHCP server is automatically on on the FSG-3
3. Connect the included Ethernet Cable into the Ethernet port on the rear of FSG-3 into one of the LAN ports (1,2 or 3).
4. Connect the other end of the cable directly to the PC.
5. Check the LINK/ACT light on the UTP port you have connected on the FSG-3. If it is lit, then your FSG-3 is connected properly.

3.2 Install from the Application CD

1. Insert the Manual & Application CD into your CD drive. The Freecom start menu opens:



In case the software does not open automatically, please click on "Start" in the main directory of the CD.

2. Click on **"Install Software"** and select **"FSG Assistant"** to begin the installation.
3. Please run FSG Assistant or use an internet browser and browse to <http://fsg/> for further configuration or immediate use
4. The guest account is open to anyone and can immediately be used or setup from the FSG Assistant.
5. The admin account can be used to configure the FSG-3. Username **"admin"** Password **"admin"**

Chapter 4: Freecom Storage Gateway Assistant

Please make sure you have you have setup your network as described in the "Before you begin" chapter.

The Freecom Storage Gateway Assistant helps you to find any FSG-3 in your network. When run, it shows you all the FSGs available in your network and helps you to install them as print servers or network folders. You can also configure basic settings with the FSG Assistant and easily find the configuration website. The FSG Assistant works on Windows OS only. All functions of the FSG Assistant can also be done manually. Please look at the "Configuration" chapter for more information.

4.1 How to start the FSG Assistant

Please insert the CD you found in the box of the FSG-3. It contains much valuable software including the FSG Assistant. Once inserted, the CD should start a menu automatically. If this is not the case, please run through the following steps:

1. Open Windows Explorer.
2. The left view should show you folders. If not please click on the folder button located in the button bar.
3. Select "My Computer" and click on the CD player you placed the CD in.
4. Click on "Install Software -> FSG Assistant".

4.2 FSG Assistant functions



The default password and login for the FSG-3 is "admin". With the Freecom Storage Gateway Assistant you can:

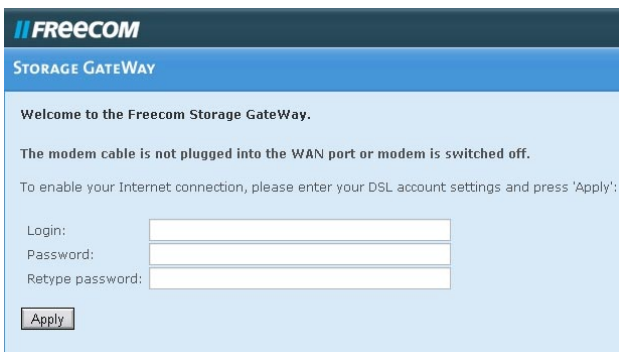
4.2.1 Configure basic settings of your Freecom Storage Gateway

Assign IP address, subnet mask, FSG-3 device name and workgroup name. You have to enter your admin password to apply changes.



4.2.2 Setup the DSL account on your Freecom Storage Gateway

A browser window will open where you can enter the login data for your DSL connection (admin login required).



4.2.3 Browse available folders on your Freecom Storage Gateway

After logging in as a user or the admin, an Explorer window will open showing all available folders on the FSG-3. When logging in as a user, only folders with permission for this user will be shown. The administrator has permissions for all folders on the FSG-3.

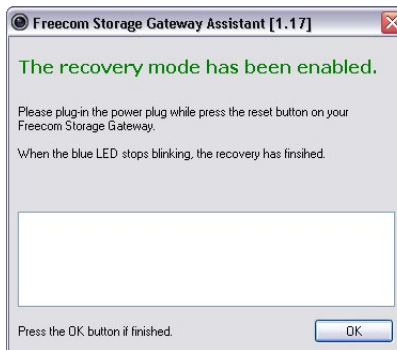
4.2.4 Add a new printer

A USB printer connected to the FSG-3 will be configured on the PC connected to FSG-3.

Attention: Each PC must be configured separately to get printer access!

4.2.5 Start recovery procedure

This procedure can reset and repair an FSG-3 to factory default settings if you cannot access your FSG-3 anymore. Your user data will not be deleted!



Follow these steps to perform the recovery:

- Enable recovery mode by clicking on "Start recovery procedure" in the Freecom Storage Gateway Assistant.
- Shutdown the FSG-3 by using the "Shutdown" option in the configuration.
- Disconnect the AC adapter from the FSG-3.
- Use a bent paper-clip to press the "Reset" button. The "Reset" button can be found below the connector for the AC adapter.
- While keeping the "Reset" button pressed, connect the AC adapter again.
- Release the "Reset" button.
- PWR button LED is on which indicates that the recovery mode is enabled. During recovery, the LEDs on the device will be blinking.
- The recovery is finished when the LEDs stop blinking and the PWR button LED is off.
- In the Freecom Storage Gateway Assistant, click on OK when the recovery is finished.

Note: After recovery, all user data is still available on the FSG-3. To avoid problems, the administrator should backup all user data and format the hard disk. If an old configuration file was saved before, the administrator should load this configuration and afterwards copy the individual user data back to its folders.

4.2.6 Search again for available Freecom Storage Gateway devices

Click here to search again for your FSG-3 if it was not detected. Make sure you have setup your network as described in the "Before you begin" chapter and make sure all the cables are properly attached.

Chapter 5: Configuration

This chapter explains all the configuration settings of the FSG-3. For most the default settings should work.

To configure the FSG-3, your computer needs to be connected directly to a LAN port of the FSG-3. DHCP must be enabled in the TCP/IP settings of the PC! For more information, you can read the "Before you begin" chapter. Use this PC to login to the FSG-3 configuration menu.

5.1 How to reach the configuration menu

There are several methods of reaching the configuration screen. First, as described in the "Freecom Storage Gateway Assistant" chapter, you can easily find and configure the machine using the Freecom Storage Gateway Assistant. Second, you can use a browser to go to the online configuration pages. Please make sure your PC is set to DHCP and connected to one of the three LAN ports. You can use a standard web browser such as Firefox or Internet Explorer to go to the FSG-3 configuration pages. The FSG-3 is located on

http://192.168.1.1

Please type the above IP address into the browser address window and press enter. You can also type

//FSG_NAME

(Factory default is //FSG)

in the browser address window and you will be brought to the FSG-3 frontpage as well. Click on the configuration button and you will be asked for a username and password. The standard administrator is:

Administrator username:

admin

Administrator password:

admin

Be carefull, the username and password are CaSe SeNsAtIvE. This means "Admin" is someone else then "admin". Please change the factory default password as soon as possible!

5.2 First steps

Even though you can start using the FSG-3 with no setup at all, you might want to configure some of the items of the FSG-3 to benefit from the full potential of the product. To start using the full potential of the FSG-3, several items will have to be configured.

1. Changing the administrator password
2. WAN or internet connection (If available).
3. Date and time.
4. Users, groups and folders.
5. Connection methods.

It is also wise to go on the internet to the Freecom site or OpenFSG site and see there if you are using the latest firmware update. Firmware updates solve problems and many new features are being added with each new release!

5.3 Changing the administrator password

For security reasons it is highly recommended you change the admin password. To do this:

- Go to the configuration website of your FSG-3.
- Log in with "admin" and the old password
- Click on the Security section in the left menu.
- Click on the Administrator section in the left menu.
- Type in the old password and then enter the new password twice.
- Press "Change password"

5.4 WAN or internet connection setup

Next to using the FSG-3 as a standalone router and NAS and connecting computers and switches and routers to the LAN ports, there is also the option of connecting the FSG-3 WAN port to an existing router or straight to an internet modem.

5.4.1 The FSG-3 WAN port connected to a router

To first set up the FSG-3, your computer will have to be connected to a LAN port of the FSG-3. This can be changed in a later stage in the services / SMB section.

Connecting the hardware

1. Connect a RJ45 cable to a LAN port of your router.
2. Connect the other side of the cable with the WAN port of the Freecom Storage Gateway.
3. After setting up the FSG-3, network PCs can be connected to the FSG-3 and your router.

Setting up the FSG-3

1. Login to the configuration menu of your FSG-3
2. Go to Connections -> LAN and select an IP address for the FSG-3.

To avoid IP address conflicts in your network, make sure that the LAN IP address of your FSG-3 and the LAN IP address of your router are different.

3. Go to Connections -> WAN and select "Use fixed IP address". This will allow you to easily set up access to your FSG-3 from other locations such as the internet. Use the following settings:

IP address: Enter an IP address which is in the address range of your router, e.g. if your router IP address 192.168.2.1, enter 192.168.2.2 for your FSG-3.

This IP address can be used to access the FSG-3 from anywhere in your local network.

Subnet Mask: Enter the subnet mask of your router, e.g. 255.255.255.0.

Default Gateway: IP address of your router, e.g. 192.168.2.1.

FreeCOM
STORAGE GATEWAY

- Welcome
- Information
- Hardware
- Services
- Security
- Connections
 - LAN
 - WAN
 - WAN Options
 - VPN
- Shutdown
- Logout

WAN Connection

run DHCP client
 run DSL client
 Login:
 Password:
 Retype password:
 dial on demand
 Idle time: sec
 use fixed IP address
 IP address:
 Subnet mask:
 Default gateway:

4. Go to Connections -> WAN Options and activate "Open SMB/CIFS on WAN port"

FreeCOM
STORAGE GATEWAY

- Welcome
- Information
- Hardware
- Services
- Security
- Connections
 - LAN
 - WAN
 - WAN Options
 - VPN
- Shutdown
- Logout

WAN Options

These are options for experts. Only change them if you know what you are doing!

MTU (for DSL only): Bytes

answer ICMP packets (ping etc)
 enable exposed host
 IP address:
Attention: An exposed host is computer that virtually has a direct connection to the internet. This is a big security risk, not only to this computer but to the whole LAN!
 enable hardware address cloning
 MAC address:
 open SMB/CIFS on WAN port

5. To have HTTP and FTP access from outside to the FSG-3, you have to forward port 80 (HTTP) and port 21 (FTP) to the FSG-3 IP address. This is the fixed WAN IP address assigned in step 3 (e.g. 192.168.2.2).

See the manual of your router for detailed information how to forward ports.

Make sure to activate the options "Open HTTP server for the outside" / "Open FTP server for the outside" under Services in the FSG-3 configuration menu.

Remark: DynDNS options of the FSG-3 will not work. Please use the DynDNS options of your router.

5.4.2 The FSG-3 WAN port connected to a modem

To use the internet through your FSG-3, you will need to setup the FSG-3 with the configuration information provided by your ISP. This information is described in detail in the "Getting on the internet" section of the "Before you begin" chapter.

To configure your FSG-3 with this information, you should:

- Go to the configuration website of your FSG-3.
- Log in with "admin" and the password
- Click on Connections section in the left menu
- Click on WAN in the left menu
- If the IP information is gotten dynamically, check that the DHCP client is set, all should be done now otherwise:
- Click on the "Run DSL client" radio button
- Fill in the information you have received from your ISP (See the "WAN Connection" and "WAN Options" section for more details)
- Press Apply.
- Save your configuration.
- You can test the connection by starting your internet browser and seeing if you can reach your favorite internet page or by looking at the info menu and the WAN item in the FSG-3 configuration website.

Remark: Establishing a DSL connection with ISP might take some time.

5.5 Set the Date and Time

To set the date and time on the FSG-3, you should:

- Go to the configuration website of your FSG-3.
- Log in with "admin" and the password
- Click on Hardware section in the left menu
- Click on Date & Time in the left menu
- Set the date and time
- Press apply

5.6 Setting up users, groups and folders

Your FSG-3 is setup with 2 standard accounts. The admin account and the guest account.

5.6.1 The admin account

The admin account has access to all parts of the FSG-3 including the configuration. Because it has no limits, it can be dangerous to use this account in day to day use. There are no limitations on what you can delete for instance. You might accidentally delete something that is required for the FSG-3 to run. Of course you can still recover your FSG-3 using the FSG Assistant, but we recommend for this reason to create a normal user account (or use the guest account) for the day to day business.

5.6.2 The guest account

The guest account is setup to be accessible by anyone. It has its own folder where it has all rights. If you are the only one working on the FSG-3, or you do not mind sharing your files with any other users of the FSG-3, you can use this account.

If you are working in an environment where some of your files are private, we suggest you create an account per user. All users will still have access to the guest account, even if they log in with their own user name (the shared folder) but they will now also have their own private storage space. The admin account always has rights to all folders.

If you want to have folders where some have rights and some not, you can use the groups and folders settings described later in this chapter.

Since the guest account is open to anyone, it can also be a security risk if you open any services (FTP, SMB, SSH, HTML) to the internet or even for your internal network.

5.6.3 Creating a new account

How to create a new account is described in the "Users" section of the "Configuration options explained" chapter.

When you create an account, a folder with the same name is automatically created. Only the user with that name can access that folder. You can give others rights to these folders by

- Adding users to the folders in the folder dialog
- Creating groups with rights to these folders and adding several users to these groups.

You cannot create accounts with the same login name. You can create as many accounts as you like, but remember the storage capacity of the FSG-3 will eventually run out.

5.6.4 Creating a new group

If you have a large amount of folders and users, and some folders should be accessible to some users but not to others, it can be easy to group the users who have access to a certain folder. You will only have to add or remove a user once from a group to give or remove access rights to all the folders the group has access to for that user.

How to create a new group is described in the "User Groups" section of the "Configuration options explained" chapter.

5.6.5 Creating a new folder

Even though all users get their own private folder, you may want to create other folders shared by more than one user.

How to create a new folder is described in the "Folders" section of the "Configuration options explained" chapter.

Once you have created a folder, you can add users or groups to that folder to give users access rights.

5.7 Setting up multiple connection methods

The default setup of the FSG-3 only allows windows file sharing (SMB) and HTML access through a LAN port. In the case you want to have more services available (such as FTP), or when you connect the FSG-3 to an existing router, or even to the internet, you will need to configure the services to be available. Remember, each service you turn on or open to the outside is a potential security risk. We are not aware of any security threats at the moment, but we cannot predict what will be found in the future. You should only turn on services or open them to the outside when you really need them.

Please look at the "Configuration options explained" chapter and especially at the sections about opening these services to the outside (All in the Services menu):

- The HTTP server
- The FTP server
- The SSH server

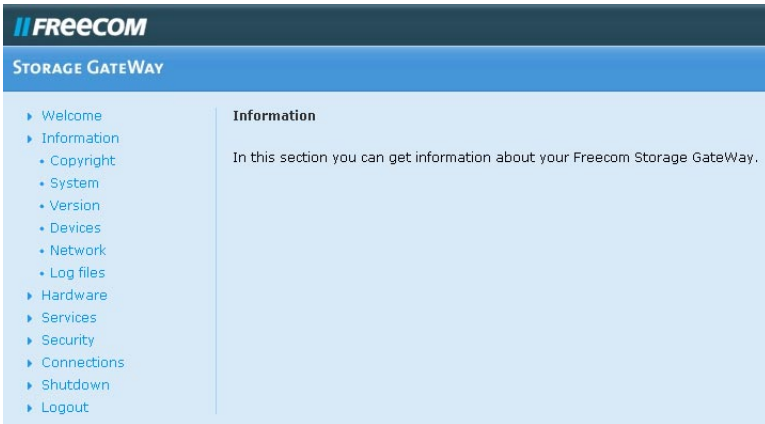
5.8 The full potential

These are some of the most common examples of configuration options for the FSG-3, but there are many more. Take a look at the "Configuration options explained" chapter for all the options and the full potential of the FSG-3.

Chapter 6: Configuration options explained

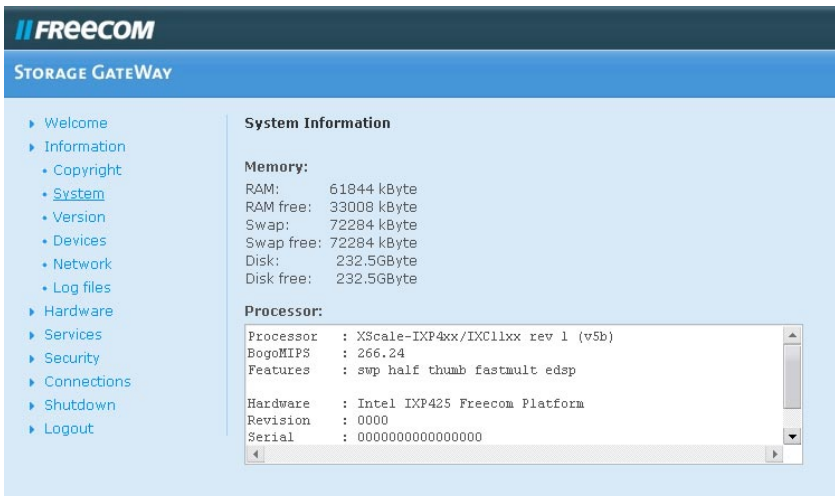
6.1 Information

This is the information menu. Here you can find diagnostic and general information.



6.1.1 System Information

Here you can find general system information, such as free disk space, processor information etc.



6.1.2 Version Information

This menu item shows the OS version of your FSG-3:

FRECOM
STORAGE GATEWAY

- Welcome
- Information
 - Copyright
 - System
 - Version
 - Devices
 - Network
 - Log files
- Hardware
- Services
- Security
- Connections
- Shutdown
- Logout

Version Information

Firmware version:

Operating system:

```
Linux version 2.4.27-uc1 (root@lindev) (gcc version 3.3.2) #878 Do
Aug 4 08:30:10 CEST 2005
```

6.1.3 Device Information

All attached devices show up in this dialog. Please press refresh if the dialog does not show a device you have just plugged in.

FRECOM
STORAGE GATEWAY

- Welcome
- Information
 - Copyright
 - System
 - Version
 - Devices
 - Network
 - Log files
- Hardware
- Services
- Security
- Connections
- Shutdown
- Logout

Device Information

USB Mass Storage Devices:

Manufacturer	Product	Size	Free	Type
Freecom Technologies	FHD-2pro	111.8GBytes	111.7GBytes	ntfs

Printer Devices:

Manufacturer	Product	Port
EPSON	USB Printer	9100

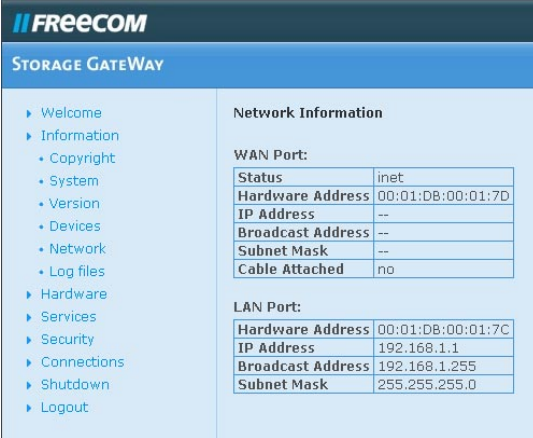
SATA Device:

Partition	Size	Free	Type
No device attached.			

Remark: For S-ATA devices to be recognized by the FSG-3, the FSG-3 needs to be shut down when connecting the S-ATA device. After booting the FSG-3, the S-ATA device will then be recognized.

6.1.4 Network Information

Both LAN and WAN (internet) Network information is found here for the FSG-3. If you need the IP address of the FSG-3, please look for it here.



The screenshot shows the 'FREECOM STORAGE GATEWAY' interface. On the left is a navigation menu with items like Welcome, Information, System, Version, Devices, Network, Log files, Hardware, Services, Security, Connections, Shutdown, and Logout. The main content area is titled 'Network Information' and contains two sections: 'WAN Port:' and 'LAN Port:'. Each section has a table with fields for Status, Hardware Address, IP Address, Broadcast Address, Subnet Mask, and Cable Attached.

WAN Port:	
Status	inet
Hardware Address	00:01:DB:00:01:7D
IP Address	--
Broadcast Address	--
Subnet Mask	--
Cable Attached	no

LAN Port:	
Hardware Address	00:01:DB:00:01:7C
IP Address	192.168.1.1
Broadcast Address	192.168.1.255
Subnet Mask	255.255.255.0

WAN Port:

Status	Shows the active status
Hardware Address	Shows the MAC address or physical address of the port
IP Address	Your outside FSG-3 (WAN) internet IP address assigned by your ISP
Broadcast Address	This address is used to ask all computers on a subnet at once
Subnet Mask	This is the subnet mask gotten from your ISP
Cable Attached	This shows if the cable is attached or not

LAN Port:

Hardware Address	Shows the MAC address or physical address of the port
IP Address	Your inside FSG-3 (LAN) internet IP address
Broadcast Address	This address is used to ask all computers on a subnet at once
Subnet Mask	This is the subnet mask you setup for your network

6.1.5 Log files

If you encounter problems with you FSG-3, you can use the log file recording option to locate the issue.

The FSG-3 offers several log files for different software components, e.g. Kernel, DSL Connection, DHCP Server etc.:

Freecom
STORAGE GATEWAY

- Welcome
- Information
 - Copyright
 - System
 - Version
 - Devices
 - Network
 - Log files
- Hardware
- Services
- Security
- Connections
- Shutdown
- Logout

Log Files

Start log file recording
Note: Do only switch on if you encounter problems. This will sometimes prevent the harddrive to spin down.

Kernel:

```
Aug 10 10:10:41 kernel: klogd started: Burg@ox v1.00 (2005.03.29-09:22+0000)
Aug 10 10:10:41 kernel: Linux version 2.4.27-uc1 (root@lindev) (gcc version 3.3.2)
Aug 10 10:10:41 kernel: CPU: XScale-EX40x/EX10x revision 1
Aug 10 10:10:41 kernel: Machine: Intel IXP425 Freecom Platform
Aug 10 10:10:41 kernel: allow_bootmem_low
Aug 10 10:10:41 kernel: acornable_init
```

DSL Connection:

DHCP Server:

6.2 Hardware menu

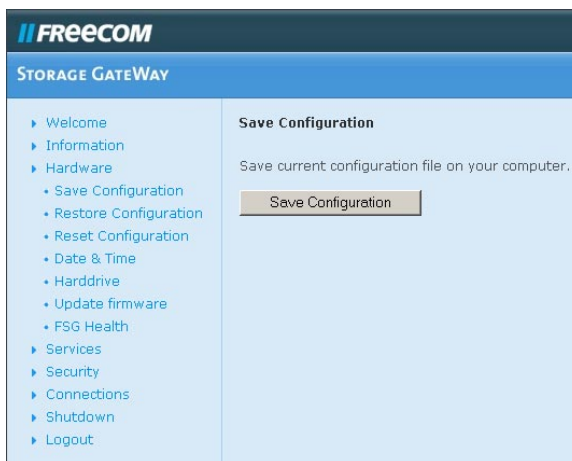
In this menu all hardware related software can be saved and restored. You can set the FSG-3 time here as well.

It is possible to save and restore all user settings of the FSG-3. Please backup your user settings to a different storage location than the FSG-3 after installing the FSG-3.



6.2.1 Save Configuration

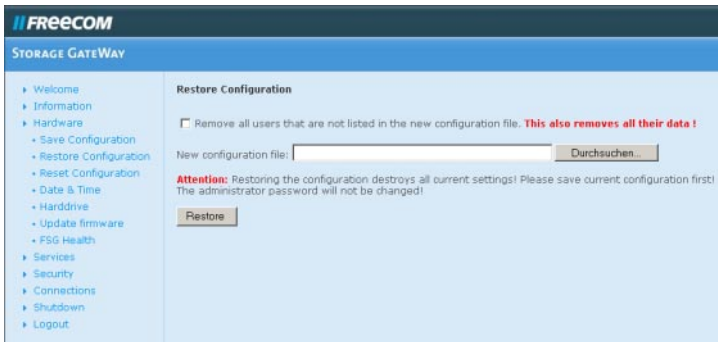
In this menu you can save the current configuration file on your computer.



After pressing the button, you will be asked where you want to backup the configuration file. Please select a location and press save.

6.2.2 Restore Configuration

This menu lets you restore a previously saved configuration file.



Use the browse button to select a previous backup of your configuration file. Then press the Restore button to start the restore. Do not switch off the FSG-3 during restoring. This can lead to corrupt configuration files.

You can select the button to delete all users that were created after the configuration file was backed up. All data in the users home directories will be deleted! If you do not select this button, the user data and logins will be maintained.

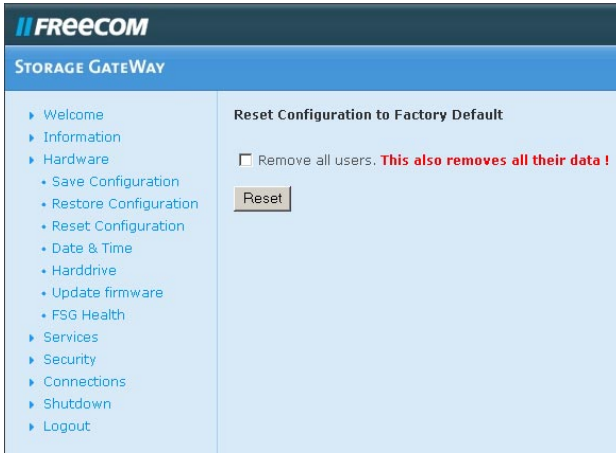
Attention: Please be aware that this removes any changes done to the configuration after the backup was done!

Attention: Restoring the configuration destroys all current settings! Please save the current configuration first! The administrator password will not be changed!

6.2.3 Reset Configuration

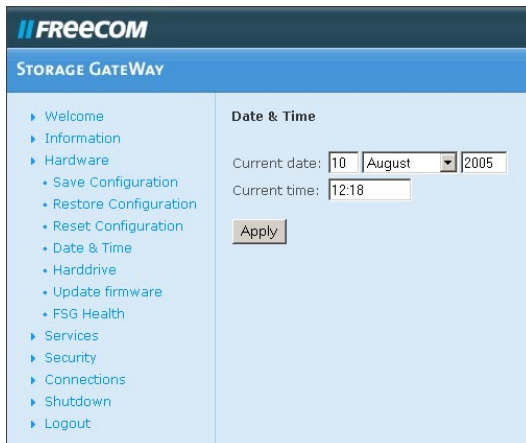
Please press the Reset button if you want to restore the Factory Default configuration script. This will not alter the firmware version. You can select to remove all users.

Attention: Removing all users also removes all their data!



6.2.4 Date & Time

Please set the appropriate date and time and press apply.



6.2.5 Hard drive menu

The hard drive menu allows you to alter all the settings involving the hard drive.

6.2.6 Spin down time

Hard drives are devices that spin round creating noise and heat and using energy. If the FSG-3 is not used for a long time, it is more beneficial to spin down the hard drive. This uses less power and creates less noise and heat. It also prolongs the lifetime of the hard disk. After the disk has been spun down, the first access will take longer, since the hard disk will have to start spinning again.

You can set the time it takes for the hard drive to spin down after last use. If you do not want the disk to spin down, please set this to 0.

After setting the time, please press Apply.

6.2.7 Hard disk format

If you wish to format the internal FSG-3 hard disk, read the warnings carefully first. All data will be lost after formatting! After you have read the warnings, please re-affirm you wish to format the drive by selecting the appropriate radio button and press the Format Hard drive button.

Attention: Pressing the button below will destroy all data on the hard drive! Please make a backup first!

Attention: Please remove all USB Mass Storage devices before formatting the drive! Otherwise all attached USB mass storage devices will be formatted as well.

Attention: Prevent all device activity during formatting!



6.2.8 Update Firmware

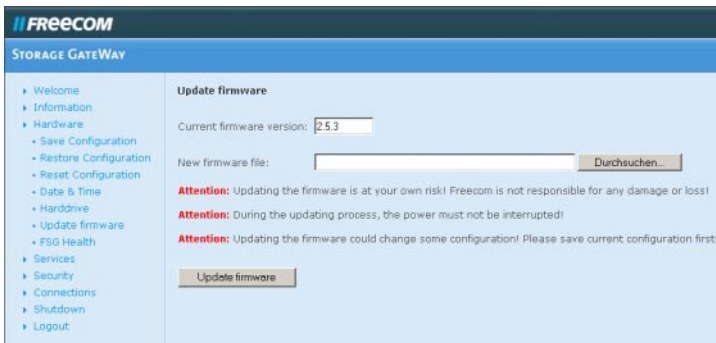
Here you can update the firmware. New firmware usually fixes bugs and adds additional features to your FSG-3. Check on www.freecom.com if new firmware updates are available for the Freecom Storage Gateway.

Freecom will release new and updated firmware on a regular basis. It is also possible to obtain the source code and create your own firmware.

Attention: Changing the source code of the firmware is at your own risk!

Download the firmware file and click on "Browse" to select the file. Click on "Update firmware" to start the update.

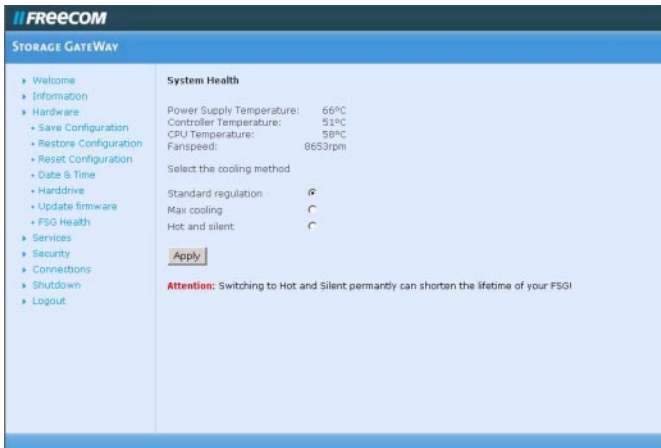
Attention: Updating the firmware is at your own risk! Make sure to make a backup of your current configuration before updating the firmware.



6.2.9 FSG Health

This option allows you to change the fan speed. Reducing the fan speed means less noise but higher device temperatures. When operating the device in high ambient temperatures or the device is always in use, it is recommended to increase the fan speed in order to achieve a better cooling effect.

Attention: Do not permanently switch off the fan as this can lead to excessive heat which might cause damage to your device!



6.3 Services

Every service of your FSG-3 has its own configuration page here.

6.3.1 DHCP Server

The DHCP server is responsible for giving dynamic IP addresses to the computers on the LAN. For more information, please read Networks and Router Basics.

Options

Start DHCP server

Subnet mask

Gateway

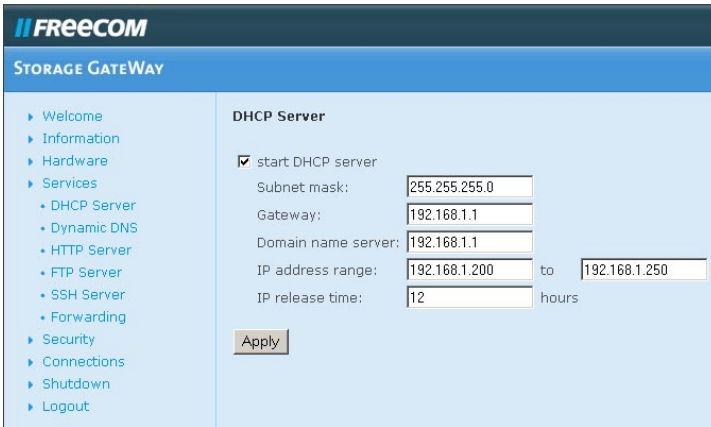
Description

Check this if you want to run the DHCP server. Do not run the DHCP server if you use fixed IP addresses.

The subnet mask in use for the DHCP server.

The IP address of the gateway the DHCP clients should be automatically forwarded to if they want to reach external sites. This address should usually be the FSG-3 itself, unless a different gateway is running.

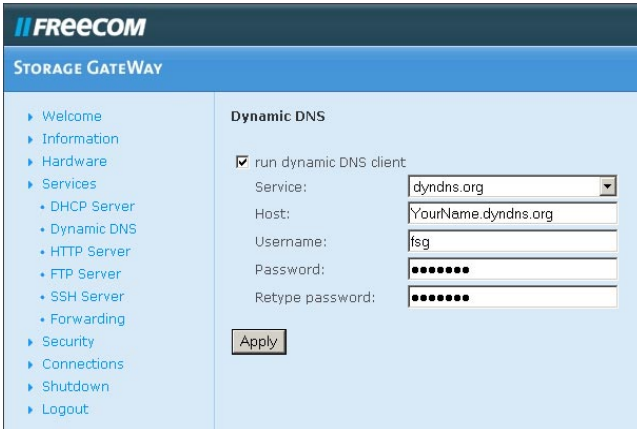
- Domain name server** The IP address of the DNS server the clients should query. This should be the FSG-3 IP address or an other DNS system.
- IP address range** The range of IP addresses the DHCP server can use.
- IP release time** The time between refreshing IP addresses given to DHCP clients.



6.3.2 Dynamic DNS

Dynamic Domain Name System gives the ability to provide an official DNS name such as `www.yourname.com` to the dynamic IP address you have gotten from your ISP. You will need to register at one of the listed providers. Please see their websites for further details.

Options	Description
Run dynamic DNS client Service	Check this if you want to enable the Dynamic DNS client. Several different Service providers are supported. These are <code>dyndns.org</code> , <code>dtdns.com</code> , <code>no-ip.com</code> . Register at the website of one of the service providers and fill in the required information.
Host	This is the domain name you registered at the DDNS service provider.
Username	This is the username you registered at the DDNS service provider.
Password	This is the password you registered at the DDNS service provider.
Retype password	This is the password you registered at the DDNS service provider again.



6.3.3 HTTP Server

These settings adjust the web server. The web server used is a version of Apache.

Options

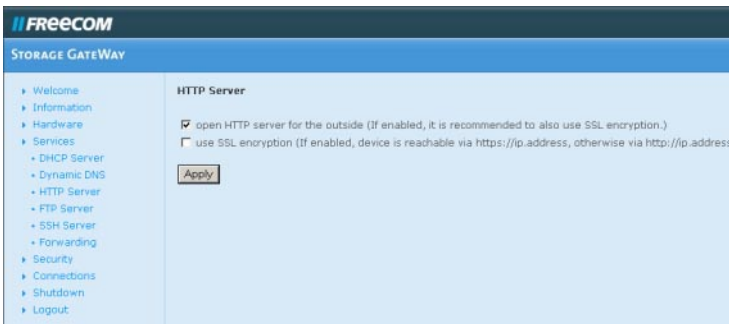
Open HTTP server to the outside

Description

This allows the http server to be reached from IP addresses whose source address is located somewhere on the internet (if enabled, it is recommended to use SSL encryption as well).

Use SSL encryption

This will allow SSL encrypted pages (https) This is a security feature (If enabled, device is reachable via https://ip.address, otherwise via http://ip.address).



6.3.4 FTP Server

This server is a file server based on the File Transfer Protocol (FTP).

Options

Run FTP server

Open FTP server for the outside

Use SSL encryption

Description

Switch the FTP server on

This will allow users to access the FTP server from the internet (If enabled, it is recommended to also use SSL encryption!)

This switches on SSL encryption for FTP. This is not supported by all browsers!



6.3.5 SSH Server

The SSH server is a secure terminal client. It can be used to do advanced configuration. Please do not use it unless you need it. It is a security risk! All users with an account will be able to access the FSG-3.

Options

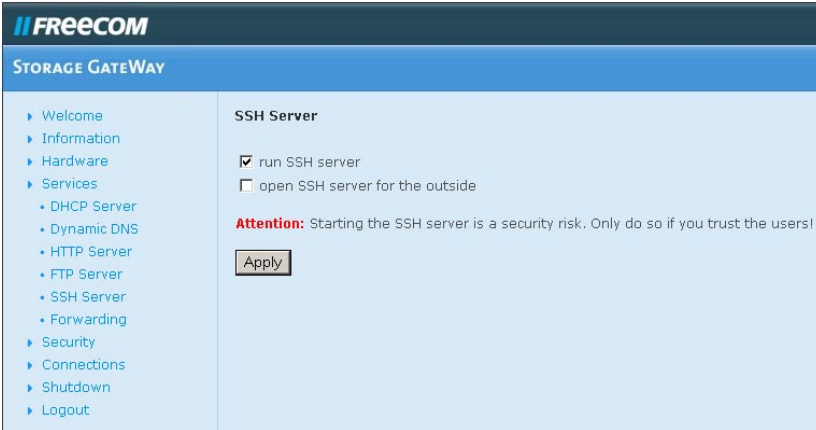
Run SSH server

Open SSH server for the outside

Description

Start/stop the server

This will allow users to access the SSH server from the internet

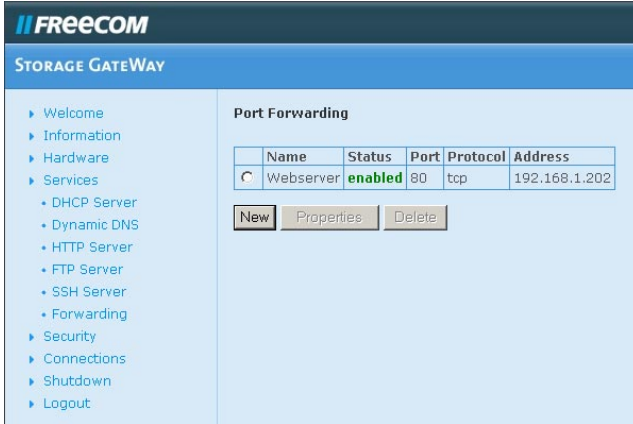


Attention: Starting the SSH server is a security risk. Only do so if you trust the users!

6.3.6 Port Forwarding

Port forwarding is a form of NAT (Network Address Translation). It allows certain ports from the internet to access certain PCs on the inside. The firewall can be circumvented this way. The first list shows the active port forwarding. Pressing New will allow you to create a new port forwarding.

Options	Description
Name	This can be an arbitrary name.
Status	Shows status of port forwarding for the selected port (enabled or disabled).
Port	Here you can enter the port or ports you want forwarded to the PC with IP address as noted below. You can enter several ports comma separated (e.g. 21,23,80). A port range is entered with a colon (e.g. 2600:2700) Protocol Displays the selected protocol for the forwarded port (TCP or UDP).
IP address	Shows the internal IP address of the PC to the port is forwarded to.



6.4 Security

Here you can adjust the security settings of the FSG-3. To change the Administrator password, user settings, group settings or folder settings, click the corresponding page.

6.4.1 Users

The access control for all file retrieval systems (FTP, HTTP and SMB) is based on either group or user access rights. Access permissions can be set or removed using these menus.

- Pressing the New button gives you a dialogue to add new users.
- Selecting a user and pressing the Properties button will allow you to edit the user settings.
- Selecting a user and pressing the Delete button will delete the user.



Adding a new user

Options

User name

Password

Retype password

Description

Place the login name here

Please enter the user password here. The password is case-sensitive! That means "word" is something different from "Word"

Please retype your password to be sure you typed it correct the first time

The screenshot shows the 'Add New User' interface in the FRECOM STORAGE GATEWAY. On the left is a navigation menu with items like Welcome, Information, Hardware, Services, Security (with sub-items Users, Groups, Folders, Administrator), Connections, Shutdown, and Logout. The main content area is titled 'Add New User' and contains three input fields: 'User name:' (containing 'Walter'), 'Password:' (masked with dots), and 'Retype password:' (masked with dots). An 'Apply' button is located below the password fields.

6.4.2 User Groups

The access control for all file retrieval systems (FTP, HTTP and SMB) is based on either group or user access rights. Access permissions can be set or removed using these menus. If rights are given or removed from a group, all users from that group will get that right removed or added.

- Pressing the New button gives you a dialogue to add a new group.
- Selecting a group and pressing the Properties button will allow you to edit the group settings and add users.
- Selecting a group and pressing the Delete button will delete the group, but all users will be left intact. Users will not be able to access folders or files they are not authorized to!



Adding a new group

Please write the group name here and select some users to populate the group. Folder rights can be given in the Folder dialogue.

6.4.3 Folders

The access control for all file retrieval systems (FTP, HTTP and SMB) is based on either group or user access rights. Access permissions can be set or removed using these menus. Folder permissions can be given either to a group or a user or both.

- Pressing the Add button gives you a dialog to add new folders. These folders will be created.
- Selecting a folder and pressing the properties button will allow you to edit the folder settings and add groups or users.
- Selecting a folder and pressing the delete button will delete the folder.



Adding a new folder

Pressing the new button will allow you to add a new folder. Please enter the new folder name and populate it with users and groups that have access.

6.4.4 Administrator

Here you can alter the administrator password. Please enter the old password, the new password and a retype of the new password.

If you have completely lost your administrator password, please do a reset to default values as described in Reset.

The screenshot shows the 'FREECOM STORAGE GATEWAY' web interface. On the left is a navigation menu with options: Welcome, Information, Hardware, Services, Security, Users (with sub-items Groups, Folders, Administrator), Connections, Shutdown, and Logout. The 'Administrator' option is selected. The main content area is titled 'Administrator' and contains three password input fields: 'Old password:', 'New password:', and 'Retype new password:'. Below these fields is a 'Change password' button.

6.5 Connections

The connections can be configured in this menu.

6.5.1 LAN connection

Here you can setup your connection to the local network.

Options

IP address

IP subnet mask

Workgroup

Router name

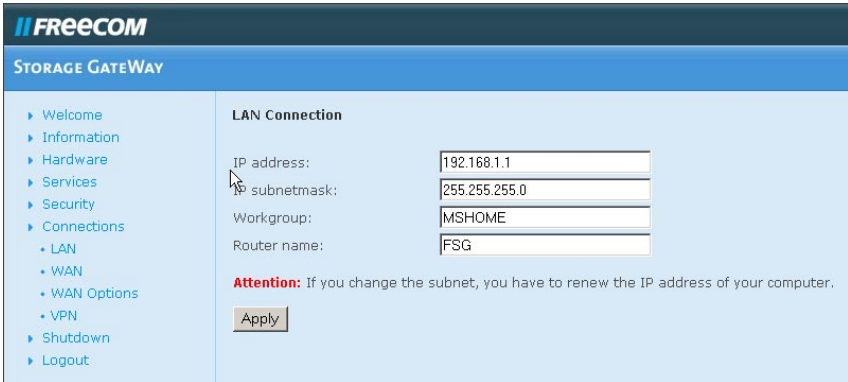
Description

This is the IP address your FSG-3 uses in your LAN

This is your subnet mask

This is the name of the workgroup where your FSG-3 is located.

Name of the FSG-3 in the LAN. This name can be used to access the web configuration (e.g. <http://FSG>) instead of using the IP address. This makes it easier for the user to access the web interface.



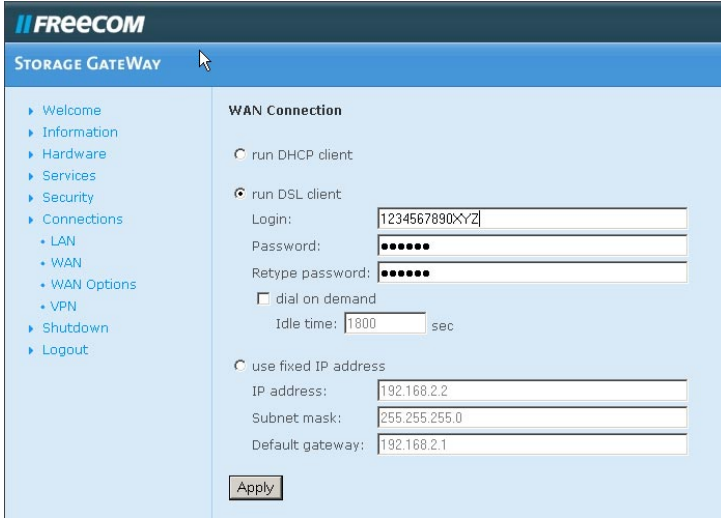
6.5.2 WAN Connection

Here you can setup your connection to the internet or different network.

Options

Description

Run DHCP client	Run the DHCP client. If the WAN port is connected to a DHCP server (for instance to another router) you will need to setup the WAN connection with this option.
Run DSL client	If the WAN port is connected to a DSL or cable modem directly, you often need to specify data given to you by your provider. This option lets you run PPPoE and other types of DSL and cable connections.
Login	This is the username you got from your ISP.
Password	This is the password you got from your ISP.
Retype password	This is the password you got from your ISP.
Dial on demand	A DSL connection will only be established if requested by a PC in the network.
Idle time (in seconds).	Use this option if you have a time-limited internet access. The DSL connection will be disconnected if no data traffic is detected within a certain range of time the user can specify (in seconds).
Use fixed IP address	This allows you to manually enter you network information IP address. This is your fixed IP address, please ask your ISP or network manager for the information.
Subnet mask	This is your subnet mask, please ask your ISP or network manager for the information.
Default gateway	This is your fixed default gateway address, please ask your ISP or network manager for the information.



6.5.3 WAN Options

These are options for experts. Only change them if you know what you are doing!

Options

Description

MTU (for DSL only)
(In Bytes)

MTU settings (MTU = Maximum Transfer Unit)

Answer ICMP packets
(ping etc)

This will allow others to ping the host. It is good for debugging but it can be a security hazard!

Enable exposed host

Enabling this will allow one PC on the LAN to act as if it bypasses the firewall completely and has a direct connection to the internet (Attention: An exposed host is a computer that virtually has a direct connection to the internet. This is a big security risk, not only to this computer but to the whole LAN!).

IP address

Exposed host IP address.

Enable hardware
address cloning

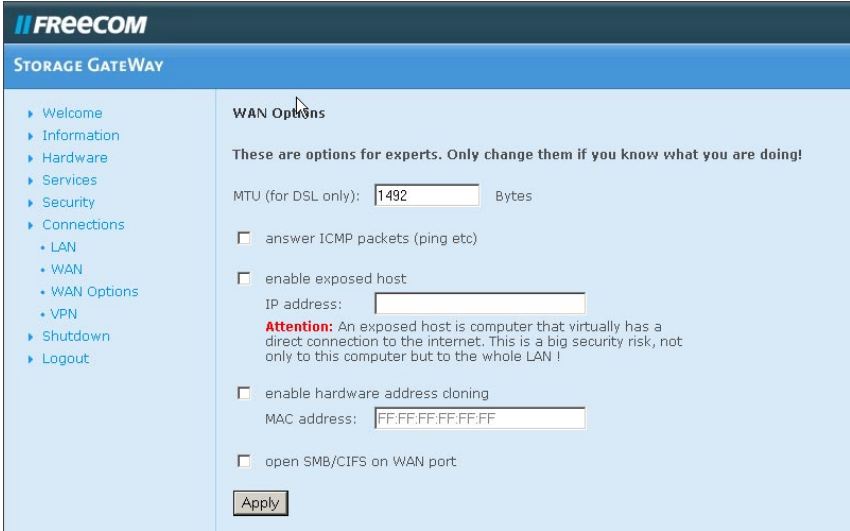
This will enable you to set the MAC address of the WAN connection so it matches the address your ISP authenticates by.

MAC address

This is the MAC address your WAN port will be cloned to.

Open SBM/CIFS on
WAN port

This will open SMB/CIFS for the WAN port. Only needs to be enabled when the FSG-3 is used behind a router.



6.5.4 Virtual Private Networks

The listed VPN connections are shown with Name, Status, Action, Remote Host and Remote Net.

- If you want to add a permanent new connection, please press Add Connection.
- If you want to see and edit the properties of an existing connection, select the connection and press Properties.
- If you want to delete a connection, press Delete Connection.
- If you wish to see the status of all the connections, press Show status of all connections.

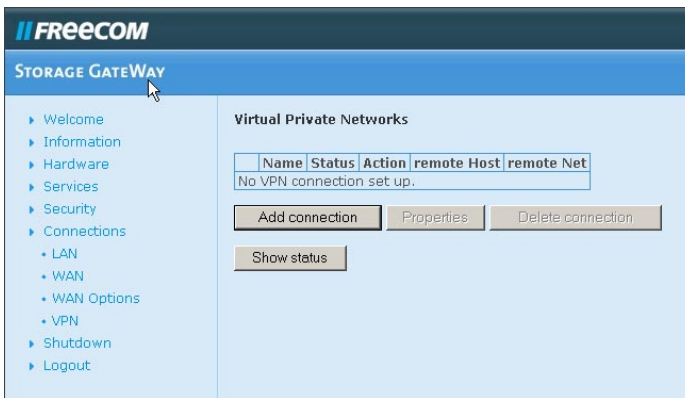
6.5.5 Add a connection

To add a VPN connection, press the add button.

Options	Description
Status	You can choose to enable or disable the connection.
Name*	This is the name which will refer to the VPN connection. It is used for internal use only.

* Fields with an asterisk (*) need to be filled out. All the rest is for experts and can be left as is.

- Remote Host IP* This is the IP address of the remote host you wish to reach. If you wish to allow any IP (Road Warrior) type enter: 0.0.0.0.
- Remote Network* This is the remote network you wish to reach. Example: 192.168.20.0/24
- ESP encryption ESP encryption options
- IKE encryption IKE encryption options
- Pre-Shared Key Fill in your pre-shared key here. Please ask your network administrator for more info
- Action You can specify if you want a listening only connection or a full connection.



* Fields with an asterisk (*) need to be filled out. All the rest is for experts and can be left as is.

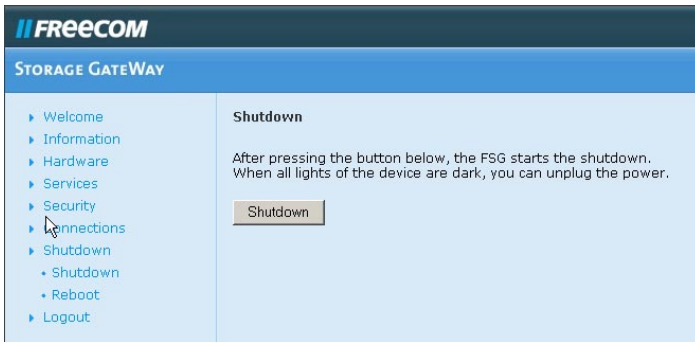
6.6 Shutdown and reboot menu

Here you can reboot or shutdown the FSG-3 (for safe power unplugging).

Attention: Always shutdown the FSG-3 properly before disconnecting the power. Failing to do so can result in a corrupted hard drive and a broken system.

6.6.1 Shutdown

After pressing the Shutdown button, the FSG-3 will start shutting down. When all lights on the device are dark, you can unplug the power. This may take several seconds.



6.6.2 Reboot

If you are experiencing problems with the FSG-3, it can be helpful to reboot the FSG-3.

Attention: Please make a backup of your configuration file first!

Pressing the Reboot button will reboot the FSG-3.



6.6.3 Logout

If you wish to leave the configuration menu, please press logout.

Attention: Always press logout if you are working on a computer used by other persons than you as well. Also close your browser and empty the browser cache.

Chapter 7: Accessing the FSG-3 from Windows

There are several ways to access the FSG-3 from Windows:

7.1 Freecom Storage Gateway Assistant

It is possible to map network drives using the Freecom Storage Gateway Assistant. Please see the Freecom Storage Gateway Assistant chapter for more information.

7.2 Manual mapping

Accessing data is performed using the following steps:

1. Press the 'Start' menu, select the 'Run...' option. When the 'Run' dialog opens, type \\FSG_Name (where FSG_Name is name of the FSG-3 set in the LAN section of the Connection menu of the configuration). Press the 'OK' button to continue. Login as user or administrator.
2. FSG's root directory will appear. You will see all of the configured shares. A user can read and write to his specific folder, the administrator has read/write access to all folders. To setup security and password protection, please refer to the "Configuration" section of this manual.

To setup a printer see the 'External USB devices' section. FSG-3 can be accessed by multiple PCs simultaneously by following this step. A drive letter can also be mapped to FSG-3. See point 3.

3. From the previous step's 'Root Directory' screen or the windows explorer, use the pull down menu and click 'Tools' and then select 'Map Network Drive'. The 'Map Network Drive' program will run. Select the drive letter you would like FSG-3 to assume from the 'Drive:' pull down menu.

Enter the '\\FSG_Name\share_name' in the 'Folder:' field (where FSG_Name is the 'FSG-3 Name' set in the configuration section and share_name is the 'Shared Folder Name' set). You can also browse for the shared folder by pressing the 'Browse' button and searching through the 'Entire Network' and then the 'Microsoft Windows Network'. Once complete, press the 'Finish' button. FSG-3 is now mapped to a drive letter.

Chapter 8: Accessing FSG-3 Data from Mac OS X

Mac OS X v10.3.x and higher

In the Menu bar, select "Go" -> "Connect to Server". The FSG-3 address is **smb://192.168.1.1**

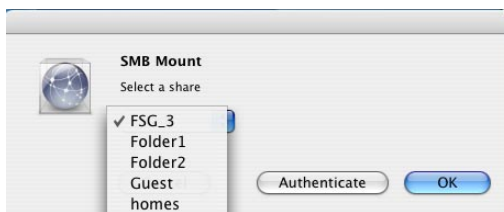
You can also type

smb://FSG_NAME

(Factory default is smb://FSG).



Click on "Connect". In the next window you have to select a shared folder. Continue by clicking on OK.



In the next window your authentication is required. When logging in as administrator, you have access to all folders on the FSG-3.



After clicking on OK, the FSG-3 will be mounted and an icon will be shown on your desktop.



Chapter 9: Attaching external USB devices

9.1 USB external device information

Information on attached external USB mass storage devices can be found in the information section of the FSG-3 configuration pages. The USB information is located under the Devices heading:

The screenshot shows the FREECOM STORAGE GATEWAY interface. On the left is a navigation menu with options like Welcome, Information, Copyright, System, Version, Devices, Network, Log files, Hardware, Services, Security, Connections, Shutdown, and Logout. The main content area is titled 'Device Information' and contains three sections:

- USB Mass Storage Devices:** A table with columns for Manufacturer, Product, Size, Free, and Type. One device is listed: Freecom Technologies, FHD-2pro, 111.8GBytes, 111.7GBytes, ntfs.
- Printer Devices:** A table with columns for Manufacturer, Product, and Port. One device is listed: EPSON, USB Printer, 9100.
- SATA Device:** A table with columns for Partition, Size, Free, and Type. The entry is 'No device attached.'

9.2 USB Mass storage installation

To add additional storage to the FSG-3, please plug a USB mass storage device (either flash disk (by using a card reader), hard disk or optical drive) to one of the USB host ports. Then switch on the external USB device. The storage on the USB device should show up as a shared folder. If you are using SMB (windows file sharing) this can take up to several minutes before your windows computer is aware there is a new folder. If you are using a browser (HTML) to see your files, you can press refresh.

This shared folder can be reached via FTP, HTML and SMB (Windows file sharing). The folder will be mounted with read and write rights for all in the root directory (/). You can set more restrictive rights after the device is connected. Please read the chapter on user and group creation and setting folder rights.

Attention: Optical drives (e.g. DVD writers) can only be used as read-only devices!

Attention: when connecting a card reader, the flash disk has to be inserted in the card reader before connecting the card reader to the FSG-3!

9.2.1 Power

All host ports can deliver the USB specified power output of 500 mA. If more power is required, please use the AC adapter delivered with the external USB device for extra power.

9.2.2 File systems

The attached USB device must be formatted in a file system supported by the FSG-3. The supported file systems are:

FAT32

NTFS (read-only)

ext2

ext3

reiserfs

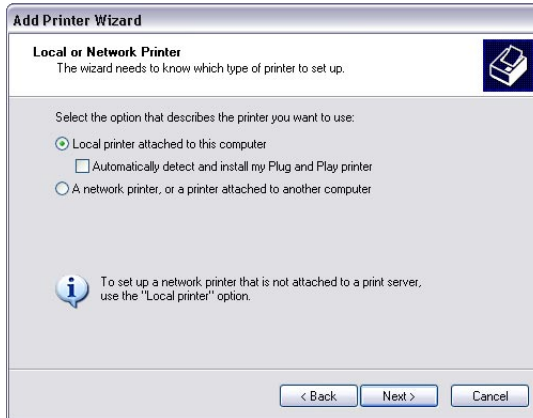
HFS(+) (read-only)

Remark: To have read/write access on the external disk, we recommend formatting the disk in FAT32 format.

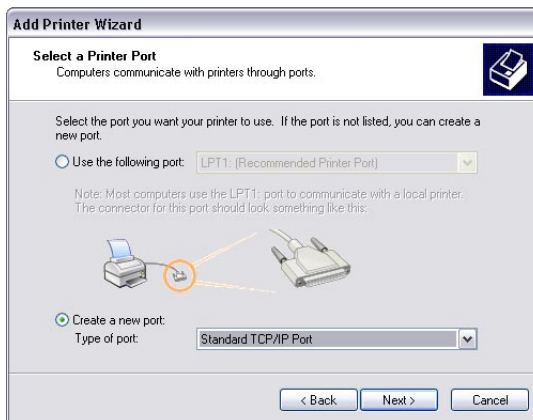
9.3 USB Printer Installation

To install a USB printer please connect the printer to one of the USB host ports on the FSG-3. Make sure the FSG-3 is turned on! Turn the printer on afterwards.

1. Connect a USB printer to the FSG-3.
2. Go to the FSG-3 configuration and check under Information -> USB if your printer is recognized.
3. Go to Start -> Settings -> Printers and Faxes -> Add a printer.
4. The printer wizard opens. Click on "Next".
5. Select "Local printer attached to this computer" and uncheck the box "Automatically detect and install my plug and play printer". Click on "Next".



6. In the next window a printer port must be selected. Choose "Create a new port" and select "Standard TCP/IP port". Click on "Next".



7. The "Add Standard TCP/IP Printer Port Wizard" opens. Click "Next" to continue.
8. The "Add port" window opens. Use the following settings:
 Printer name or IP address: "FSG-3-Name"
 or IP address of the FSG-3 Port Name: 9100.
 Click on "Next".
9. Additional port information is now required. Select "Device Type: Standard (Generic Network Card)" and click on "Next". In the next screen a summary of your settings is displayed. Click on "Finish".

10. To finish the installation, the printer software needs to be installed now. Select the software for your printer. If your printer is not listed, select "Have Disk" and have the driver disk or CD for your printer ready.

9.3.1 Clear Printer Job Queue

If the printer queue on the FSG-3 becomes corrupt, the print queue should be cleared. All submitted print jobs will need to be re-sent to the printer.

Chapter 10: Attaching external S-ATA devices

To install a S-ATA external storage device, you must first shutdown the FSG-3. Go to the web interface and log in to the administration site. Go to the shutdown item of the Hardware menu and press shutdown. Wait till the FSG-3 is shutdown and plug in the eS-ATA connector of the external device into the FSG-3 eS-ATA port. Make sure the eS-ATA device is powered on and turn the FSG-3 back on. The storage on the eS-ATA device should show up as a shared folder. This shared folder can be reached via FTP, HTML and SMB (Windows file sharing). The folder will be mounted with read and write rights for all in the root folder (/).

Filesystems

An attached S-ATA Disk must be formatted in a file system supported by the FSG-3. The supported file systems are:

FAT32

NTFS (read-only)

ext2

ext3

reiserfs

HFS(+) (read-only)

Remark: To have read/write access on the external disk, we recommend formatting the disk in FAT32 format.

Chapter 11: Troubleshooting

This chapter gives information about troubleshooting your Freecom Storage Gateway. After each problem description, instructions are provided to help you diagnose and solve the problem.

Basic Functioning

If you are experiencing problems, please check if

- Both the FSG-3 and the PC are powered on.
- The Ethernet Cable is securely fastened to both devices.
- The Ethernet Cable is not damaged, to verify this try using another Ethernet Cable.

After you turn on the power of the FSG-3, the following sequence of events should occur:

1. When power is first applied, verify that the Power LED is on.
2. Verify that the Power LED starts blinking within a few seconds, indicating that the self-test procedure is running.
3. After approximately 20 seconds, verify that:
 - a. The Power LED is OFF and the EL Ring is ON.
 - b. The LAN port LEDs are lit for any local ports that are connected.

If a port's LED is lit, a link has been established to the connected device. If a LAN port is connected to a 100 Mbps device, verify that the port's LED is green. If the port is 10 Mbps, the LED will be amber.

If any of these conditions does not occur, refer to the appropriate following section.

PWR LED Not On

If the PWR and other LEDs are off when your FSG-3 is turned on:

- Make sure that the power cord is properly connected to your gateway and that the power supply adapter is properly connected to a functioning power outlet.
- Check that you are using the 12 V AC power adapter supplied by Freecom for this product.
- Try pressing the power button longer
- If the error persists, you have a hardware problem and should contact technical support.

Troubleshooting the Web Configuration Interface

If you are unable to access your FSG's Web Configuration interface from a PC on your local network, check the following:

- Check the Ethernet connection between your PC and the FSG-3 using the ping utility as described in this chapter.
- Test the Ethernet cable by using a different cable.
- Make sure your PC's IP address is on the same subnet as the FSG-3. If you are using the recommended addressing scheme, your PC's address should be in the range of 192.168.1.2 to 192.168.1.254. Refer to "Verifying TCP/IP Properties (Windows)" or "Verifying TCP/IP Properties (Macintosh)" to find your PC's IP address. Follow the instructions to configure your PC.

Attention: If your PC's IP address is shown as 169.254.x.x: Recent versions of Windows and MacOS will generate and assign an IP address if the computer cannot reach a DHCP server. These auto-generated addresses are in the range of 169.254.x.x. If your IP address is in this range, check the connection from the PC to the FSG-3 and reboot your PC.

- If your FSG's IP address has been changed and you don't know the current IP address, clear the FSG's configuration to factory defaults. This will set the FSG's IP address to 192.168.1.1.

This procedure is explained in "Restoring the Default Configuration and Password" in this chapter.

- Make sure your browser has JavaScript enabled.
- Try quitting the browser and launching it again.
- Make sure you are using the correct login information. The factory default login name is admin and the password is admin. Make sure that CAPS LOCK is off when entering this information. Both the username and password are case sensitive!

If the FSG-3 does not save changes you have made in the Web Configuration Interface, check the following:

- When entering configuration settings, be sure to click the APPLY button before moving to another menu or tab, or your changes are lost.
Click the Refresh or Reload button in the Web browser. The changes may have occurred, but the Web browser may be caching the old configuration.

Troubleshooting the ISP Connection

If your FSG-3 is unable to access the Internet, you should first determine whether you have an ADSL link with the service provider. The state of this connection is indicated with the WAN LED on the modem you were provided with your ADSL account.

If disconnecting telephones does not result in a green WAN LED the problem may be one of the following:

- Check that the telephone company has made the connection to your line and tested it.
- Verify that you are connected to the correct telephone line. If you have more than one phone line, be sure that you are connected to the line with the ADSL service.

Obtaining a WAN IP Address

If your FSG-3 is unable to access the internet, and your WAN LED is off or blinking blue, you should determine whether the FSG-3 is able to obtain a WAN IP address from the ISP. Unless you have been assigned a static IP address, your FSG-3 must request an IP address from the ISP. You can determine whether the request was successful using the browser interface.

To check the WAN IP address from the browser interface:

1. Launch your browser and select an external site such as www.freecom.com
 2. Access the Main Menu of the FSG-3 at <http://192.168.1.1> and click on the configuration icon.
 3. Login using the "admin" account and your admin password.
 4. Under the WAN section in the information menu check that an IP address is shown for the WAN Port. If 0.0.0.0 is shown, your FSG-3 has not obtained an IP address from your ISP. If your FSG-3 is unable to obtain an IP address from the ISP, the problem may be one of the following:
- Your ISP may require a login program. Ask your ISP whether they require PPP over Ethernet (PPPoE) login.
 - If you have selected a login program, you may have incorrectly set the Service Name, User Name and Password. See "Troubleshooting PPPoE", below.
 - Your ISP may check for your PC's host name. Assign the PC Host Name of your ISP account to the FSG-3 in the WAN section of the Connections menu.
 - Your ISP only allows one MAC address to connect to Internet, and may check for your PC's MAC address. In this case, inform your ISP that you have bought a new network device, and ask them to use the FSG's MAC address. You can also use the MAC addresses cloning section in WAN options in the connections configuration screen to masquerade as the MAC address of your PC.

Troubleshooting PPPoE

The PPPoE connection can be debugged as follows:

1. Access the Main Menu of the FSG-3 configuration at <http://192.168.1.1>.
2. Click on the configuration icon.
3. Under the log files section of the information menu, look at all the logs.
4. If all of the steps indicate "OK" then your PPPoE connection is up and working.

If any of the steps indicates "Failed", you can attempt to reconnect by clicking "Connect". The FSG-3 will continue to attempt to connect indefinitely.

If you cannot connect after several minutes, you may be using an incorrect Service Name, User Name or Password. There also may be a provisioning problem with your ISP.

Attention: Unless you connect manually, the FSG-3 will not authenticate using PPPoE until data is transmitted to the network.

Troubleshooting Internet Browsing

If your computer can obtain an IP address but you are unable to load any web pages from the Internet, your PC may not recognize any DNS server addresses. A DNS server is a machine on the Internet that translates Internet names (such as www addresses) to numeric IP addresses that computers can work with. Typically your ISP provides the addresses of one or two DNS servers for your use. You can verify the DNS address of your computer as described in "Verifying TCP/IP Properties". If you are using the default, it should be the same as your gateway address, which is your FSG-3. You can check what DNS names your FSG-3 is using in the Information menu.

You can also configure your PC manually with DNS addresses. Your operating system documentation should describe how to do this.

Does your PC have the FSG-3 configured as its TCP/IP gateway?

If your PC obtains its information from the FSG-3 by DHCP, reboot the PC and verify the gateway address as described in "Verifying TCP/IP Properties".

Troubleshooting a TCP/IP Network Using a Ping Utility

Most TCP/IP devices such as computers contain a ping utility that sends an echo request packet to the designated device. The device then responds with an echo reply. Troubleshooting a TCP/IP network is made very easy by using the ping utility in your PC or workstation.

Testing the LAN Path to Your Gateway

You can ping the FSG-3 from your PC to verify that the LAN path to your FSG-3 is set up correctly.

To ping the FSG-3 from a PC running Windows 98 SE or later:

1. From the Windows toolbar, click the Start button and select Run.
2. In the field provided, type Ping followed by the IP address of the gateway, as in this example: ping 192.168.1.1
3. Click OK. You should see a message like this one:
Pinging <IP address> with 32 bytes of data

If the path is working, you see this message:

Reply from < IP address >: bytes=32 time=NN ms TTL=xxx

If the path is not working, you see this message:

Request timed out.

If the path is not functioning correctly, you could have one of the following problems:

Wrong physical connections

- Make sure the LAN LNK/ACT LED is on. If the LNK/ACT LED is off, follow the instructions in Troubleshooting the Web Configuration Interface.
- Check if your Ethernet cable is broken by using a different one.

Wrong network configuration

- Verify that the Ethernet card driver software and TCP/IP software are both installed and configured on your PC or workstation.
- Verify that the IP address for your FSG-3 and your workstation are correct and that the addresses are on the same subnet. In the IP addresses of your PC and your FSG-3, A.B.C.x, A, B and C should be the same for both the PC and FSG-3.

Testing the Path from Your PC to a Remote Device

After verifying that the LAN path works correctly, test the path from your PC to a remote device.

- Go to start
- Click on the run menu
- Type: PING -n 10 <IP address> where <IP address> is the IP address of a remote device such as your ISP's DNS server.

If the path is functioning correctly, replies as in the previous section are displayed. If you do not receive replies:

- Check that your PC has the IP address of your gateway listed as the default gateway. If the IP configuration of your PC is assigned by DHCP, this information will not be visible in your PC's Network Control Panel. Go to the Run... window and run winipcfg. Verify that the IP address of the FSG-3 is listed as the default gateway as described in Verifying TCP/IP Properties.
- Check to see that the network address of your PC (the portion of the IP address specified by the netmask) is different from the network address of the remote device.

Restoring the Default Configuration and Password

Resetting the FSG-3 to its factory defaults changes the FSG's administration password to "admin" and the IP address to 192.168.1.1. You can erase the current configuration and restore factory defaults in two ways:

- Use the Erase function of the Web Configuration as described in the "Reset Configuration" part of the "Hardware menu" section of the "Configuration options explained" chapter.
- Press the Reset button on the rear panel of the gateway with a long object for several seconds. Use this method for cases when the administration password or IP address is not known.

Using the Default Reset button

To reset the factory default configuration settings, you can use the reset button on the rear of the FSG-3.

1. Press and hold the Reset button (about 10 seconds).
2. Release the Reset button and wait for the FSG-3 to reboot.

Problems with Date and Time

The log menu in the information section displays the current date and time of day. The FSG-3 has a battery powered real time clock that you initially tell the date and time. Each entry in the log files is stamped with the date and time of day. Problems with the date and time function can include:

- Date shown is January 1, 2000
Cause: The FSG-3 has not yet successfully been set up. Please set the date and time in the Hardware / Date&Time section. If you have just completed configuring the FSG-3, wait at least five minutes and check the date and time again.

- Time is off by one hour
Cause: The FSG-3 does not automatically sense Daylight Savings Time. Please change the time in the Hardware / Date&Time section.

Persistent problems

If problems still persist and you have read and tried all the answers in this manual, please try the website www.freecom.com or www.openfsg.com for more support and additional contact numbers.

Support

Freecom Technology offers technical support for all Freecom products. You can find the support number of your country on <http://www.freecom.com>.

We welcome your support call, but there are often better ways of getting your question answered. Although we do our utmost to give you the best support humanly possible, it is true we are only human. You can often get answers much quicker if you follow some recommendations. To allow for a faster resolution of your problem, first try the following:

- Please install the latest firmware! Support will always ask you to install the latest firmware when you call. You can find the latest firmware from the www.freecom.com or www.openfsg.com sites.
- Try to find an answer by reading the manual and make sure you have checked the problem could not be solved with the information contained therein.
- Google is your friend. Please search the internet with your favorite search engine and see if others have suffered your problem as well and already describe the solution.
- Please check the www.freecom.com or www.openfsg.com sites for FAQs, new manuals and other information that can help you solve your problem. Use the forum, luke! Our www.openfsg.com site has a forum where users like you can ask questions and get quick answers! Maybe your question has already been answered?
Do a search, it is for sure the fastest solution.
- Try to find an answer by inspection or experimentation.
- Try to find an answer by asking a skilled friend.

A good (and funny) read on how to solve technical problems and ask question in general is <http://www.catb.org/~esr/faqs/smart-questions.html>. If you intend to use public forums or other public sites for problem solving, make sure you use the methods the site describes as much as possible for the fastest resolution.

Appendix

CE, FCC and other certification

CE

EN 55 022 Declaration of Conformance. This is to certify that the Freecom Storage Gateway is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022 Class B (CISPR 22).

FCC

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, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice

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/TV technician for help.

Certificate of the Manufacturer/Importer

It is hereby certified that the Freecom Storage Gateway has been suppressed in accordance with the conditions set out in the BMPT-AmtsblVfg 243/1991 and Vfg 46/1992. The operation of some equipment (for example, test transmitters) in accordance with the regulations may, however, be subject to certain restrictions. Please refer to the notes in the operating instructions.

VCCI

Federal Office for Telecommunications Approvals has been notified of the placing of this equipment on the market and has been granted the right to test the series for compliance with the regulations.

Voluntary Control Council for Interference (VCCI) Statement

This equipment is in the second category (information equipment to be used in a residential area or an adjacent area thereto) and conforms to the standards set by the Voluntary Control Council for Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in such residential areas.

When used near a radio or TV receiver, it may become the cause of radio interference. Read instructions for correct handling.

The firmware source code

As described in the GPL, the firmware source code is available for download and alteration via our www.openfsg.com website for free. If you wish to obtain the source code on a CD, please contact our support via <http://www.freecom.com> or directly with the support number of your country. You will be charged • 10 for CD and shipping cost.

GPL Statement

This product uses GPL/LGPL software. Please see the GNU LICENSE document on the CD-ROM for more information concerning the terms of the license. To obtain a copy of our open source software, please visit www.openfsg.com to inquire about obtaining a package.

Networks and Routing Basics

This chapter provides an overview of IP networks, routing, and firewalls. This is by no means a complete overview! If you are looking for more information, you can use your favorite search engine to find information on the internet about the internet. Suffice to say, there is plenty.

Basic Router Concepts

Even though the amount of bandwidth in your local area network (LAN) can be provided easily and relatively inexpensively, the price of the connection to the internet is much higher. Because of this expense, Internet access is usually provided by a slower-speed wide-area network (WAN) link such as a cable or DSL modem. To use this WAN link efficiently, a mechanism must be in place for selecting and transmitting only the data traffic meant for the Internet. The function of selecting and forwarding this data is performed by a router.

What is a Router?

A router splits the information meant for your network and meant for other networks, so the available bandwidth is used efficiently. The router sends data based on network layer information in the data and on routing tables maintained by the router. The routing tables are built by gathering and exchanging information with other routers in the network. The router builds up a logical picture of the overall network. Using this information, the router chooses the best path for forwarding network traffic. Routers vary in performance and scale, number of routing protocols supported, and types of physical WAN connection they support.

Routing Information Protocol

One of the protocols used by a router to build and maintain a picture of the network is the Routing Information Protocol (RIP). Using RIP, routers periodically update one another and check for changes to add to the routing table.

IP Addresses and the Internet

For a computer to communicate with other computers and Web servers on the Internet, it must have a unique IP address. An IP address (IP stands for Internet Protocol) is a unique number that identifies the location of your computer on a network.

Basically, it works like your street address — as a way to find out exactly where you are and deliver information to you. The IP address is written as 4 numbers between 0 and 256, such as "192.168.0.12".

Domain Name Server

Since this computer address is not very easy to read, there is a second system on the internet called DNS (Domain Name System) which translates human readable names such as "www.sharemydisk.com" to computer readable names such as "82.161.11.206". Everyone on the internet must have an IP address. You don't need the human readable name, but it helps tremendously if you want others to find you, such as the case when you have a web server running or want to show the pictures on your computer to your friends.

Many large organizations, such as ISPs, maintain their own DNS servers and allow their customers to use the servers to look up addresses.

The internet address classes

Blocks of addresses are assigned to organizations by the Internet Assigned Numbers Authority (IANA). Individual users and small organizations may obtain their addresses either from the IANA or from an Internet service provider (ISP). You can contact IANA at www.iana.org.

The IANA gives out ranges of IP addresses based on classes. There are five standard classes of IP addresses. The five address classes are:

Class A

Class A addresses can have up to 16,777,214 hosts on a single network. They use an eight-bit network number and a 24-bit node number. Class A addresses are in this range: 1.x.x.x to 126.x.x.x.

Class B

Class B addresses can have up to 65,354 hosts on a network. A Class B address uses a 16-bit network number and a 16-bit node number. Class B addresses are in this range: 128.1.x.x to 191.254.x.x.

Class C

Class C addresses can have 254 hosts on a network. Class C addresses use 24 bits for the network address and eight bits for the node. They are in this range: 192.0.1.x to 223.255.254.x.

Class D

Class D addresses are used for multicasts (messages sent to many hosts). Class D addresses are in this range: 224.0.0.0 to 239.255.255.255.

Class E

Class E addresses are for experimental use.

For each unique value of the network portion of the address, the base address of the range (host address of all zeros) is known as the network address and is not usually assigned to a host. Also, the top address of the range (host address of all ones) is not assigned, but is used as the broadcast address for simultaneously sending a packet to all hosts with the same network address.

Netmask

The partitioning scheme separating the different address classes can be expressed by a netmask associated with the IP address. A netmask is a 32-bit quantity that, when logically combined (using an AND operator) with an IP address, yields the network address. For instance, the netmasks for Class A, B, and C addresses are 255.0.0.0, 255.255.0.0, and 255.255.255.0, respectively.

For example, the address 192.168.170.237 is a Class C IP address whose network portion is 192.168.170. When combined (using an AND operator) with the Class C netmask, as shown here, only the network portion of the address remains:

```
11000000 10101000 10101010 11101101 (192.168.170.237)
```

combined with:

```
11111111 11111111 11111111 00000000 (255.255.255.0)
```

Equals:

```
11000000 10101000 10101010 00000000 (192.168.170.0)
```

As a shorter alternative to dotted-decimal notation, the netmask may also be expressed in terms of the number of ones from the left. This number is appended to the IP address, following a backward slash (/), as "/n." In the example, the address could be written as 192.168.170.237/24, indicating that the netmask is 24 ones followed by 8 zeros.

Subnet Addressing

You can see that even with a Class C address, there are a large number of hosts per network. It would be a very inefficient use of the amount of IP addresses to supply every LAN with so many IP addresses. A smaller office LANs does not have that many devices. A more efficient technique is known as subnet addressing.

Subnet addressing allows us to split one IP network address into smaller multiple physical networks known as subnetworks. Some of the node numbers are used as a subnet number instead. A Class B address gives us 16 bits of node numbers translating to 64,000 nodes. Most organizations do not use 64,000 nodes, so there are free bits that can be reassigned. Subnet addressing makes use of those bits that are free.

A Class B address can be effectively translated into multiple Class C addresses. For example, the IP address of 172.16.97.235 would be interpreted as IP network address 172.16, subnet number 97, and node number 235. In addition to extending the number of addresses available, subnet addressing provides other benefits. Subnet addressing allows a network manager to construct an address scheme for the network by using different subnets for other geographical locations in the network or for other departments in the organization.

Although the preceding example uses the entire third octet for a subnet address, note that you are not restricted to octet boundaries in subnetting. To create more network numbers, you only need to shift some bits from the host address to the network address. For instance, to partition a Class C network number (192.68.135.0) into two, you shift one bit from the host address to the network address. The new netmask (or subnet mask) is 255.255.255.128. The first subnet has network number 192.68.135.0 with hosts 192.68.135.1 to 192.68.135.126, and the second subnet has network number 192.68.135.128 with hosts 192.68.135.129 to 192.68.135.254.

Attention: The number 192.68.135.127 is not assigned because it is the broadcast address of the first subnet. The number 192.68.135.128 is not assigned because it is the network address of the second subnet.

Freecom strongly recommends that you configure all hosts on a LAN segment to use the same netmask for the following reasons:

- So that hosts recognize local IP broadcast packets
When a device broadcasts to its segment neighbors, it uses a destination address of the local network address with all ones for the host address. In order for this scheme to work, all devices on the segment must agree on which bits comprise the host address.
- So that a local router or bridge recognizes which addresses are local and which are remote Private IP Addresses

If your local network is not connected to the Internet (for example, when using NAT), you can assign any IP addresses to your computers without problems. But to prevent problems and ease configuration, the IANA has reserved the following three blocks of IP addresses specifically for private networks:

10.0.0.0 - 10.255.255.255

172.16.0.0 - 172.31.255.255

192.168.0.0 - 192.168.255.255

We recommend that you choose your private network number from this range. The DHCP server of the FSG-3 is preconfigured to automatically assign private addresses.

For more information about address assignment, refer to RFC 1597, Address Allocation for Private Internets, and RFC 1466, Guidelines for Management of IP Address Space. The Internet Engineering Task Force (IETF) publishes RFCs on its Web site at www.ietf.org.

The IP address shortage

The Internet has grown larger than anyone ever imagined it could be. Although the exact size is unknown, the current estimate is that there are about 100 million hosts and more than 350 million users actively on the Internet. In fact, the rate of growth has been such that the Internet is effectively doubling in size each year.

When IP addressing first came out, everyone thought that there were plenty of addresses to cover any need. Theoretically, you could have 4,294,967,296 unique addresses (2³²). The actual number of available addresses is smaller (somewhere between 3.2 and 3.3 billion) because of the way that the addresses are separated into classes, and because some addresses are set aside for multicasting, testing or other special uses.

With the explosion of the Internet and the increase in home networks and business networks, the number of available IP addresses is simply not enough. The obvious solution is to redesign the address format to allow for more possible addresses. This is being developed (called IPv6), but will take many years to implement because it requires modification of the entire infrastructure of the Internet.

There are 2 systems in place now to help bring down the shortage of IP addresses.

DHCP

First, most users today have a dynamically given IP address or DHCP address from their provider. This means that the IP address given to you can change over time. This allows the provider to use the IP address for more than one person or device, since people are often online at different times. Optimal usage of IP addresses is guaranteed.

Your FSG-3 gives its internal addresses to your computers in the same way. For the DNS (Domain Name System) it is difficult to translate your domain name "www.yourname.sharemydisk.com" to your IP address if your IP address keeps changing.

The system needs to be updated each time your IP address changes. Hence Dynamic DNS (DDNS) programs. These programs check the latest IP address and update the DNS system accordingly.

Multiple internal but only one external IP address

A second way to overcome this is to have a single device act on behalf of several other devices. Routers are typical examples. You have several PCs connect to the router, but only the router to the Internet. From an internet perspective, there is only one address. This scheme offers the additional benefit of simple firewall-like protection because the internal LAN addresses are not available to the Internet through the translated connection. All incoming inquiries are filtered out by the router. This filtering can prevent intruders from probing your system. However, using port forwarding, you can allow one PC (for example, a Web server) on your local network to be accessible to outside users.

This works like a receptionist at a large office. Nobody knows your number; they all call the main number of the office and are then forwarded by the receptionist to you.

So how does the receptionist know what number to forward the call too? The caller tells the receptionist what name to look for and the receptionist has a list of names and numbers at her disposal so she can translate the name to the phone extension she needs.

On the Internet, it works exactly the same. NAT (RFC 1631) or Network Address Translation allows a single device, such as a router, to act as an agent between the Internet (or "public network") and a local (or "private") network. This means that only a single, unique IP address is required to represent an entire group of computers.

Network Address Translation

When you visit a website via your computer, your router, or more specifically your NAT, remembers which computer on the internal network asked for the information. When the information (in this case the website you asked for) comes back, the router knows which computer on the internal network to send the information to. This is Network Address Translation or NAT.

Developed by Cisco, Network Address Translation is used by a device (firewall, router or computer) that sits between an internal network and the rest of the world. For more information about IP address translation, refer to RFC 1631, The IP Network Address Translator (NAT).

Hosting a server

What If I want to host a server?

For others to be able to view your pictures on your computer, you need to run some type of service or server. A web server such as apache will allow others to securely watch the pictures or files on your site. But how does the NAT of your router know this time to which computer to forward the information?

Since the request comes from the internet, most routers are setup to disallow any traffic going into the internal network. (Firewall protection) In this case, since we want people to be able to see our pictures, we want the router to forward this information. We have to tell the router to do this.

Someone calling from the internet asks your router for a certain "port". This is the same as someone calling the receptionist and requesting a certain person by name. Ports are displayed as numbers but invariably map to pre described services. For instance, when someone requests a web page, they always ask for the service on port 80, the web server. Through NAT, it is possible to "map" a certain request for a service (a request for a port) to a certain PC on the internal network.

MAC Addresses and Address Resolution Protocol

An IP address alone cannot be used to deliver data from one LAN device to another. To send data between LAN devices, you must convert the IP address of the destination device to its media access control (MAC) address. Each device on an Ethernet network has a unique MAC address, which is a 48-bit number assigned to each device by the manufacturer. The technique that associates the IP address with a MAC address is known as address resolution. Internet Protocol uses the Address Resolution Protocol (ARP) to resolve MAC addresses. If a device sends data to another station on the network and the destination MAC address is not yet recorded, ARP is used. An ARP request is broadcast onto the network. All stations on the network receive and read the request. The destination IP address for the chosen station is included as part of the message so that only the station with this IP address responds to the ARP request. All other stations discard the request.

The station with the correct IP address responds with its own MAC address directly to the sending device. The receiving station provides the transmitting station with the required destination MAC address. The IP address data and MAC address data for each station are held in an ARP table. The next time data is sent, the address can be obtained from the address information in the table.

Ethernet Cabling

There are two different types of cabling for Ethernet networks. Originally they used thick or thin coaxial cable, but most installations currently use unshielded twisted pair (UTP) cabling. The UTP cable contains eight conductors, arranged in four twisted pairs, and terminated with an RJ45 type connector. There are 2 types of RJ-45 cables available today, the Media Dependent Interface (MDI) cable and the Media Dependent Interface - Crossover (MDI-X) cable. The first cable is used to connect routers to PCs and the second to connect PCs directly to PCs. The sent and receive wires are switched from beginning to end in the crossover cables. Some Ethernet switch products, such as the FSG-3, are able to sense the polarity of a connection and automatically adapt to the proper cabling type.

Cable Quality

A twisted pair Ethernet network operating at 10 Mbits/second (10BASE-T) will often tolerate low quality cables, but at 100 Mbits/second (10BASE-Tx) the cable must be rated as Category 5, or "Cat 5", by the Electronic Industry Association (EIA). This rating will be printed on the cable jacket. A Category 5 cable will meet specified requirements regarding loss and crosstalk. In addition, there are restrictions on maximum cable length for both 10 and 100 Mbits/second networks.

Technical specifications

Technical specifications

LAN/WAN Standards	IEEE 802.3u 100BASE-TX; IEEE 802.3 10BASE-T
Transmission Types	100Mbps/10Mbps; 100BASE-TX 4B/5B, MLT-3;10BASE-T, Manchester Coding
Access Media	CSMA/CD RJ-45
Media Interface	USB 2.0, e-SATA
USB Standard	Hi-Speed (HS) Full-Speed (FS) Low-Speed (LS)
USB Connector	USB type A female Connector (4)
Data Transmission Speed	
USB Max:	480 Mbps (HS Mode) Max: 12 Mbps (FS Mode)
eSATA:	SATA I, 1.5 Gbps
AC adapter	100-240 V input, 12V, 4A output
Power Consumption:	48 W Maximum
Dimensions	L x W x H 17.5 x 14 x 4.4 cm / 6.9 x 5.5 x 1.7 inch
Weight	950 gr
Operating Temperature:	5-35 C; 20-80% non-condensing

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