VIRTUAL ACCESS

CRITICAL APPLICATION CONNECTIVITY

GW1000M Series General and Safety Information

GW1000M

GW1042M

Issue: Draft 2

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1 Introduction

IMPORTANT! Read this manual and gather all available information on the product. Make sure you understand it fully before connecting the product to a power supply. Check that your application does not exceed the safe operating specifications for this product.

1.1 Product information

License and Copyright for Virtual Access managed products include software developed by third parties. The specific license terms and copyright associated with the software are included in each software package respectively. Please visit the product web page for more information.

Upon request, the applicable source code will be provided. A nominal fee may be charged to cover shipping and media. Please direct any source code request to your normal sales or support channel.

1.2 GW1000M Series router overview and features

The GW1000M Series router can contain either a 3G or 4G wireless modem. The modem together with a SIM card establishes a WAN connection to the Internet or private network.

3G is the third generation of mobile phone standards and technology. It is based on the International Telecommunication Union (ITU) family of standards under the International Mobile Telecommunications programme, IMT-2000.

3G and 4G technologies enable network operators to offer users a wider range of more advanced services while achieving greater network capacity through improved spectral efficiency. Services include wide-area wireless voice telephony, video calls, and broadband wireless data, all in a mobile environment.

Data bearers are frame protocols that transport data streams. The GSM (3G) modem supports GPRS, EDGE, HSDPA, HSUPA, UMTS and CSD. The 4G modem supports 4G frequencies and fails over to 3G, GPRS and EDGE technologies.

1.2.1 GW1000M with standard locking DC power connector

Figure 1: GW1000M Series router front

Figure 2: GW1000M Series router back

GW1042M	Dual SIM sockets Dual antenna SMA connectors for LTE main and aux GPS antenna with 3.3V active power feed Two 10/100 Mbps Ethernet ports Dual WiFi internal antennas Dual WiFi SMA female connectors Concurrent Access Point and Station mode Metal casing Carrier bracket

1.2.2 GW1000M with isolated DC power connector

Figure 3: GW1000M Series router front

Figure 4: GW1000M Series router back

GW1042M	Dual SIM sockets Dual antenna SMA connectors for LTE main and aux GPS antenna with 3.3V active power feed Two 10/100 Mbps Ethernet ports Concurrent Access Point and Station mode Metal casing Carrier bracket

1.3 GW1000M Series router dimensions

Unit size:	114W 114D 38Hmm
Unit size with carrier:	120W 120D 42Hmm
Unit weight:	450g

1.4 GSM technology

- LTE
- HSPA+
- EDGE/GPRS
- GPS

1.5 Power supply

The GW1000M Series router has four power supply options:

- External standard 12V DC 0.5 A
- External standard 12V DC 0.5 A with extended temp (-20˚C to -70˚C)
- Internal isolated 18-36V DC input
- Power lead with 3 connectors for 12V permanent, 12V switched (ignition sense) and ground

1.6 Compliance

The GW1000M Series router is compliant and tested to the following standards:

Safety	EN60950-1: 2006
EMC	EN55022:1998 Class B and EN55024:1998 ETSI 301489-17
Environmental	ETSI 300 019-1-3 Sinusoidal Vibration and Shock ETSI 300 019-2-3 Random Vibration.
WiFi 2.4GHz	ETSI EN 300 328 V1.9 (2015-02)

2 Virtual Access product safety

2.1 Safety during installation

The product must be installed and operated by qualified service personnel and installed into an apparatus cabinet or similar, where access is restricted to service personnel only. Refer to the user guide regarding detailed installation requirements, such as cooling.

During installation, ensure a protective earthing conductor is first connected to the protective earthing terminal (only valid for metallic housings). Virtual Access recommends a cross- sectional area of at least 4 mm2.

If the product does not have a protective earthing terminal, then the DIN-rail must be connected to protective earth. Upon removal of the product, ensure that the protective earthing conductor, or the connection to earth via the DIN-rail, is disconnected last.

During installation:

- Do not try to open or repair the router yourself
- Do not place the router in a damp or humid place
- Do not stack the router

The router should be used in a sheltered area, within a temperature range of -20°C to 70°C.

Do not expose the router to direct sunlight.

2.2 Safety during during device operation

HIGH VOLTAGES

Under no circumstances is the router to be operated with the cover removed.

DANGEROUS SUBSTANCES

Semiconductor devices contain dangerous substances, such as beryllium and arsenic. Electronic devices must not be opened. If they become damaged, they must only be handled using protective gloves. If the substances inside the electronic devices come into contact with broken skin or wounds, hospital care must be sought immediately. Electronic components must be disposed of as hazardous toxic waste and must not be incinerated.

2.3 Warnings

WARNING - HAZARDOUS VOLTAGE

Do not open an energized product. Hazardous voltage may occur when connected to a power supply.

For RedFox models with a rated voltage above 48 VDC or 30 VAC: Apply the protective cap (delivered with the product) on the power cable. For additional information, refer to the user guide.

WARNING - PROTECTIVE FUSE

The power supply wiring must be sufficiently fused. Refer to the user guide for detailed information.

It must be possible to disconnect manually from the power supply. Ensure compliance to national installation regulations. Refer to the user guide for detailed information.

Replacing the internal fuse, if applicable, must only be performed by Westermo qualified personell. Viper and RFR products have no internal fuse.

WARNING - POWER SUPPLY CONNECTION

There are safety regulations on which power sources should be used in conjunction with the product. Refer to the user guide for detailed information.

WARNING - REDUCE THE RISK OF FIRE

To reduce the risk of fire, use only telecommunication line cords with a cable diameter of AWG 26 or larger. Regarding power cable dimensions, refer to the user guide for detailed information.

2.4 Wireless safety

Wireless routers incorporate a wireless radio module. Ensure the antenna is positioned at least one metre away from you and other people in normal operation.

If in a hospital or health care facility, do not use the router in areas where guidelines to switch off mobile phones are posted. Medical equipment may be sensitive to RF energy.

The operation of cardiac pacemakers, other implanted medical equipment and hearing aids can be affected by interference from wireless routers when placed close to the device. People with pacemakers are advised to keep the wireless router away from the pacemaker while it is on.

Do not operate your wireless router in the presence of flammable gases, fumes or potentially explosive atmospheres. Wireless routers should not be used anywhere that blasting operations are taking place.

Wireless routers operate using radio signals and cellular networks cannot be guaranteed to connect in all possible conditions. Therefore, you should not rely solely on any wireless device for life-critical communications.

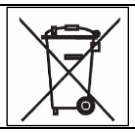
2.5 Product disposal

Virtual Access are registered as producers with WEEE.

Virtual Access Ireland WEEE registration number: 3414W

Virtual Access UK WEEE registration number WEE/CA2530XZ

All products carry the disposal icon.



This symbol means that the product shall not be treated as unsorted municipal waste when disposing of it. It needs to be handed over to an applicable collection point for recycling electrical and electronic equipment.

3 Getting started

3.1 GW1000M Series components

To enable and configure connections on your router, it must be correctly installed.

The routers contain an internal web server that you use for configurations. Before you can access the internal web server and start the configuration, ensure the components are correctly connected and that your PC has the correct networking setup.

3.1.1 Standard components

1 x GW1000M Series router	
1 x plastic carrier	
1 x lockable SIM cover	

Table 1: GW1000M Series router standard components

3.1.2 Optional components

Ethernet cable. RJ45 connector at both ends.		
Power supply unit.		
Right angle antenna for 3G or 4G network.		Virtual Access supplies a wide range of antennas for 3G or 4G networks. Please visit our website: www.virtualaccess.com or contact Virtual Access for more information.
Right angle or straight stubby antenna for WiFi connection		Virtual Access supplies a wide range of antennas for WiFi. Please visit our website: www.virtualaccess.com or contact Virtual Access for more information.
1 x automotive cable		
	Fused automotive cable	Non-fused automotive cable

Table 2: GW1000M Series router optional components

3.2 Serial number

When you receive your GW1000M Series router package retain the outer packaging. The label containing the model number, serial number (S/N) and part number (P/N) is located on the side of the packaging box.

Each GW1000M Series router is assigned a unique serial number. Record your device serial number on your warranty card or somewhere you can easily access it. You must reference your unique serial number (S/N) when you contact your distributor or Virtual Access support for installation and configuration confirmation or should you request service on the device.

Figure 5: Example of a GW1000 label showing the serial number

Unpack the contents. There is a matching label located on the bottom of the router.

3.3 Inserting the SIM card

Ensure the unit is powered off.

Hold the SIM card with the chip side facing down and the cut corner top left.

Gently push the SIM card into SIM slot 1 until it clicks in.

To remove the SIM card, gently push the SIM card. The card will click out.

3.4 Connecting the antenna

The GW1000M Series router is shipped with one antenna suitable for the model you ordered. If you require antenna diversity, contact your reseller.

Screw the antenna into the MAIN SMA connector located on the rear of the GW1000.

3.4.1 Antenna diversity

The GW1000M Series router has a MAIN connector and an AUX and GPS connector for connection of a second antenna to allow for antenna diversity. Antenna diversity helps improve the quality and reliability of a wireless link by mitigating problems associated with multipath distortion.

Multipath distortion is a form of RF interference that occurs when a radio signal has more than one path between the receiver and the transmitter. It commonly occurs when there is no clear line of sight between the transmitter and receiver and instead the signal is reflected off hard surfaces such as shelves, ceilings and walls.

3.5 Powering up

Connect the power cable to the power input.

The router takes approximately 2 minutes to boot up. During this time, the PWR/CONFIG LED flashes in a double flash pattern – 2 quick fashes followed by a pause.

Other LEDs display different diagnostic patterns during boot up.

Booting is complete when the PWR/CONFIG LED stops double flashing and stays solid or flashing steady, indicating the particular running configuration is loaded. Read the chapter 'GW1000 LED behaviour', for PWR/CONFIG LED states.

4 GW1000M Series LED behaviour

4.1 Main LED behaviour

There are five LEDs on the GW1000M Series router

Figure 6: LEDs on the GW1000M Series router

The possible LED states are:

- Off
- Flashing slowing (2 flashes per second)
- Flashing quickly (5 flashes per second)
- Double flash (2 quick flashes then a pause)
- On

The following table describes the possible LED behaviours and meanings on the GW1000M Series router.

Booting		The router takes approximately 2 minutes to boot up. During this time, the power LED flashes. Other LEDs display different diagnostic patterns during boot up. Booting is complete when the power LED stops flashing and stays on steady.
PWR/CONFIG LED	Off	No power/boot loader does not exist.
	Double flash	Unit is booting from power on.
	Flashing slowly	Unit is in recovery mode.
	Flashing quickly	Unit is in factory configuration.
	Solid on	Unit has completed booting up process and is in either config 1 or config2.
SIM LEDs	Off	Not selected or SIM not inserted.
	Flashing	SIM selected and data connection is being established.
	Solid on	SIM selected and registered on the network.
Signal LEDs	Both LEDs off	Not connected or signal strength <= -113dBm.
	Left LED on Right LED off	Connected and signal strength <= -89dBm.
	Left LED off Right LED on	Connected and signal strength between -89dBm and -69dBm.
	Both LEDs on	Connected and signal strength >-69dBm.

Table 3: LED behaviour and descriptions

Note: when a data connection does not exist, none of the signal LEDs will light regardless of signal strength.

4.2 GW1000M Series Ethernet port LED behaviour

The Ethernet port has two physical LEDs, one is green and one is amber. When looking at the port the green LED is on the left and is the only active LED.

Figure 7: Ethernet LED on the rear of the GW1000M Series router

Link LED (green)	Off	No physical Ethernet link detected
	On	Physical Ethernet link detected
	Flashing	Data is being transmitted/ received over the link

Table 4: The Ethernet LEDs activity descriptions

1 Accessing the GW1000M Series router

1. Ensure the SIM is inserted into SIM 1 slot and that the power is connected to the router.
2. To connect to the router's web page, either set your computer network interface card to point to 192.168.100.1/24 as a gateway or set the card to receive an IP via DHCP.
3. When the router has booted up, browse to 192.168.100.1 and enter the default user name and password.

User name: root

Password: admin

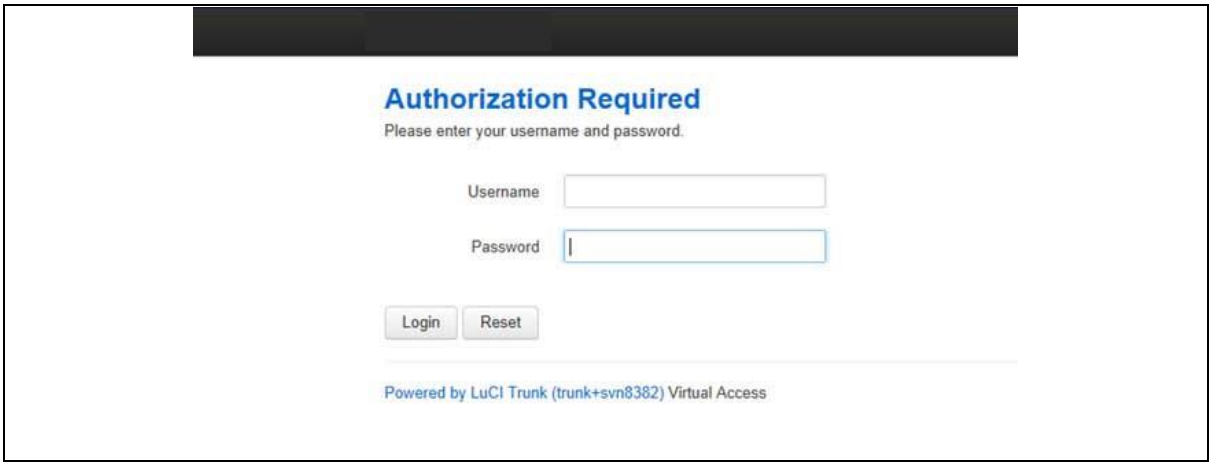


Figure 8: The GW1041 login page

1. Click **Login**.

If the router is operating in its factory configuration mode, a warning message appears explaining that after you have made changes, you must switch the router to config 1 for the changes to take effect.

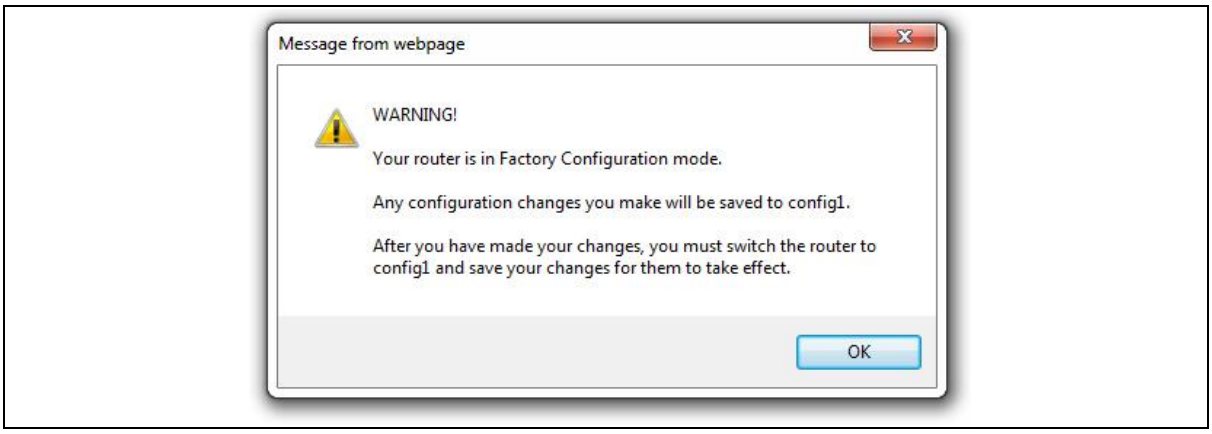


Figure 9: The router is operating in factory configuration mode

2. Read the message and click **OK**.

3. To configure any relevant interface, go to the top menu, select **Network -> Interfaces**.

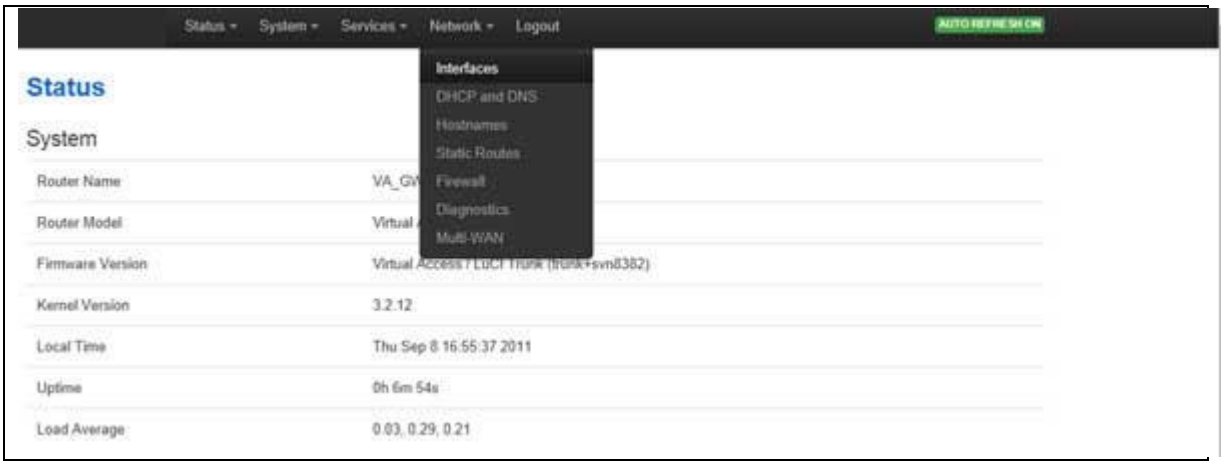


Figure 10: The GW1000M Series router interfaces menu

4. Click **Edit** on WAN or LAN to make your changes. For WAN connectivity, the Common Configuration page appears.

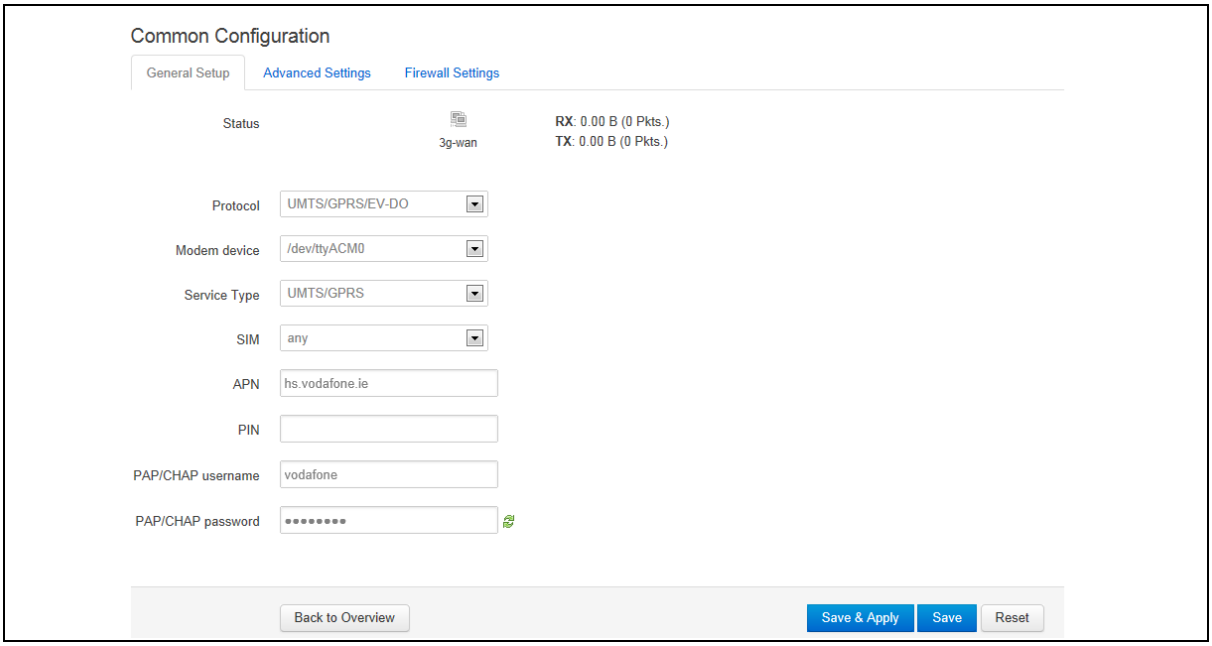


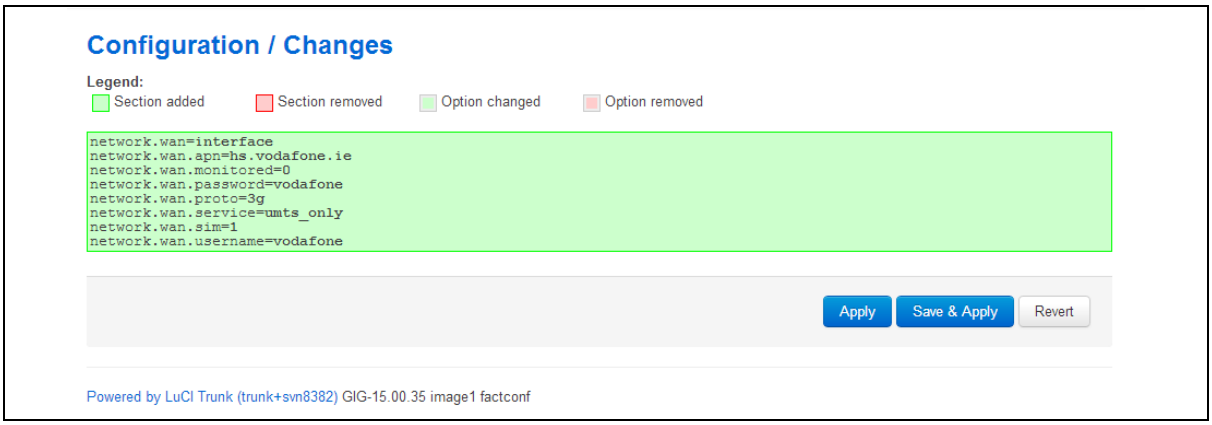
Figure 11: The common connectivity page

5. Ensure you have selected the General Setup tab.
6. For single SIM implementation, in the SIM drop down menu, select **SIM 1**.
7. Enter the APN information and the PAP/CHAP username and password.
8. Click **Save & Apply**.
9. To enable a 3G/4G connection to connect on boot up, select the **Advanced Settings** tab.
10. Select **Bring up on boot**.
11. Click **Save**.

12. When you have made all your changes, you can view a change summary by clicking **UNSAVED CHANGES** in the top menu.

Figure 12: The unsaved changes button in the top menu

A list of unsaved changes appears.



13. To save the changes, click **Save & Apply**.
14. When the changes have been saved, you can switch the router's configuration file to config1.
15. Click **System -> Backup/Flash Firmware**.

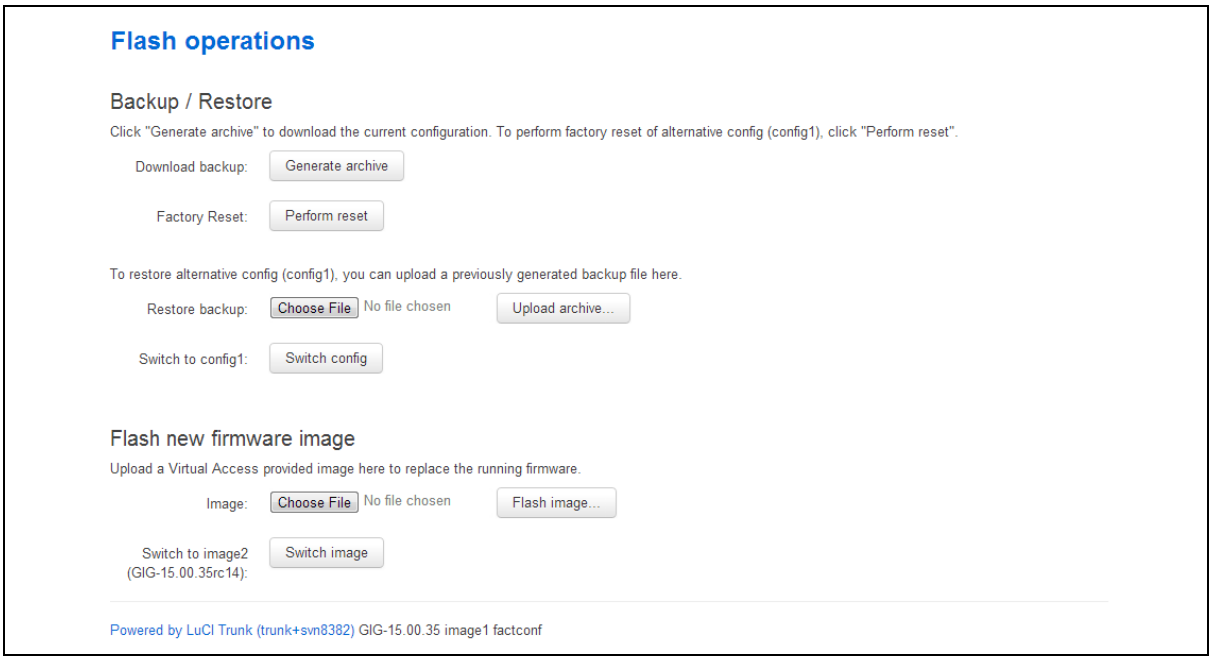


Figure 13: The flash operations page

16. In the Flash operations page, click **Switch config**. A rebooting message appears.

Figure 14: The rebooting message

The router will reboot into config1.

17. To check for connectivity, return to the top menu, and select **Network -> Interfaces**. The WAN interface will show receive and transmit packets and an IP address.

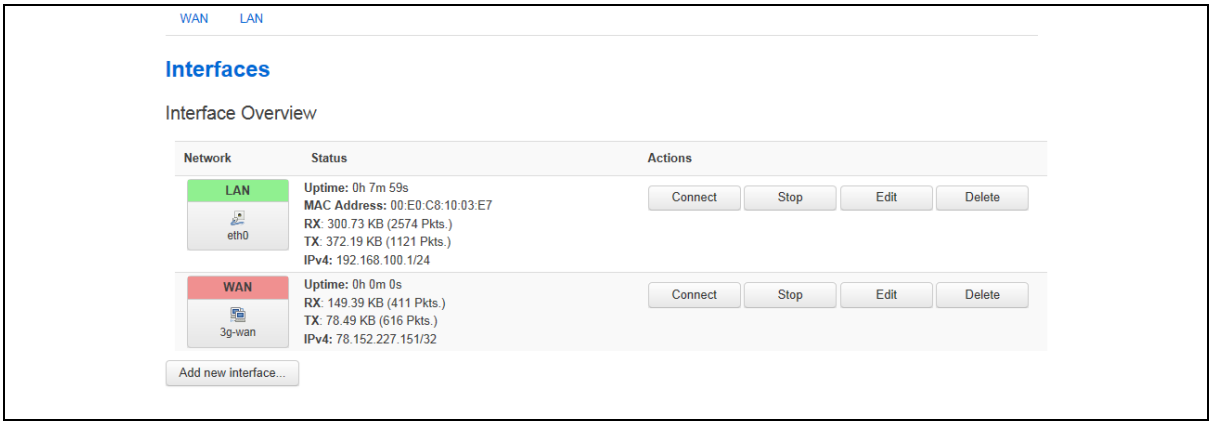


Figure 15: The interfaces overview page

18. To view 3G/4G connectivity information, select **Status -> Mobile Stats**. The Mobile/3G information page appears.

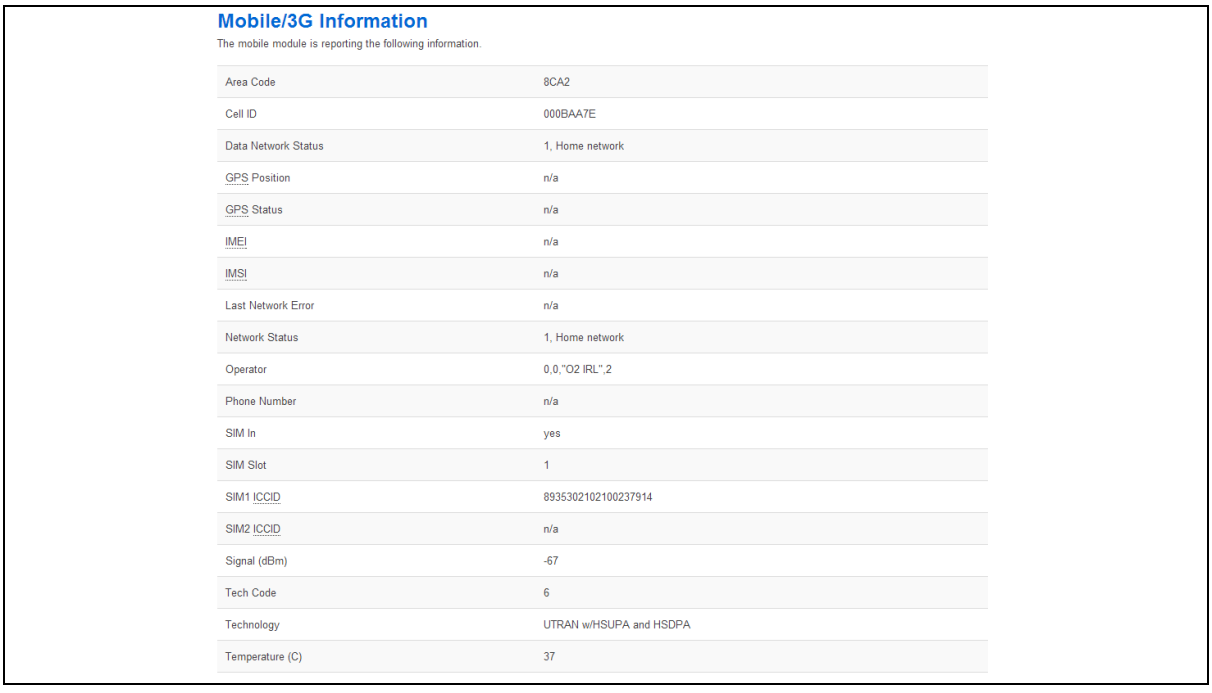


Figure 16: The mobile/3G information page

5 Upgrading router firmware

This chapter describes how to upgrade router firmware. The upgrade process is as follows:

- Firmware is transferred to the device.
- Firmware is checked to ensure there are no corruptions.
- Firmware is saved to persistent storage.
- Data in persistent storage is validated.

To avoid any unrecoverable errors during the process, you must follow several safety steps described in this chapter.

On successful completion of the process, you can restart the device running the new firmware.

5.1.1 Identify your software version

To check which software version your router is running, in the top menu, browse to **Status -> Overview**.

Figure 17: The status page showing a software version prior to 72.002

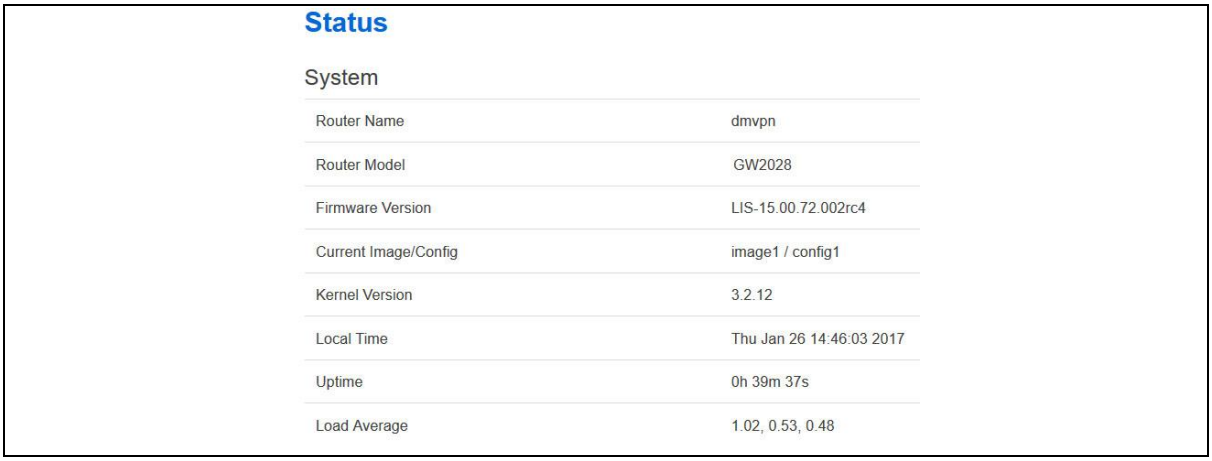


Figure 18: The status page showing software version 72.002

In the Firmware Version row, the first two digits of the firmware version identify the hardware platform, for example LIS-15; while the remaining digits: .00.72.002, show the software version.

5.1.2 Upgrading router firmware for software version 72.002 and above

Copy the new firmware issued by Virtual Access to a PC connected to the router.

In the top menu, select **System tab -> Flash operations**. The Flash operations page appears.

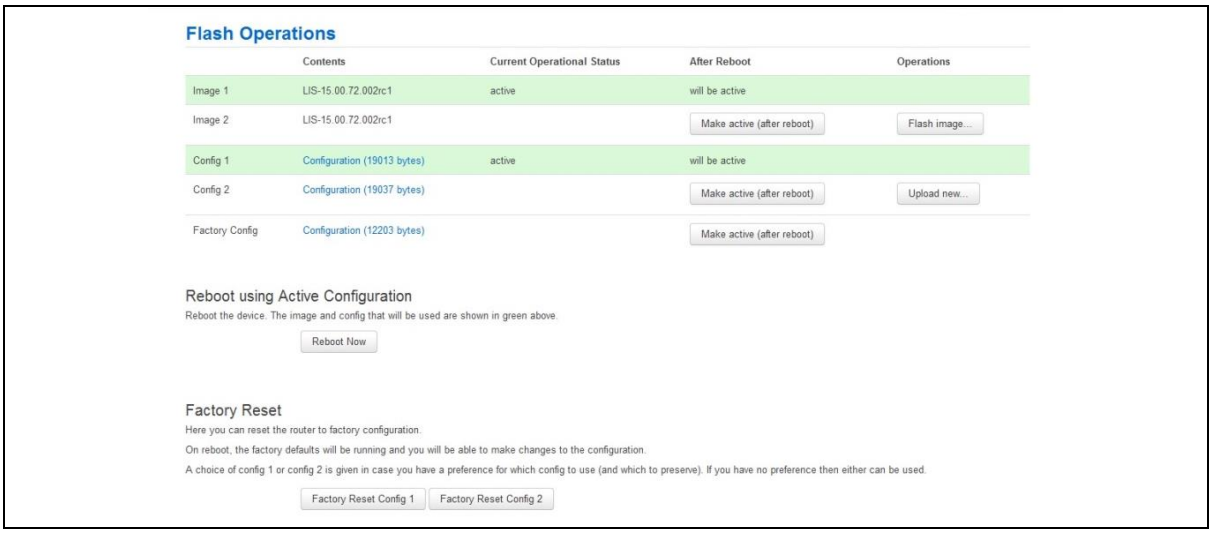


Figure 19: The flash operations page

Under Flash Operations, click **Flash Image**. Only the inactive image is available to flash.

Select the appropriate image and then wait until image has loaded.

Note: this process may take a while depending on the available connection speed.

When the image has loaded, the Update Firmware page appears.

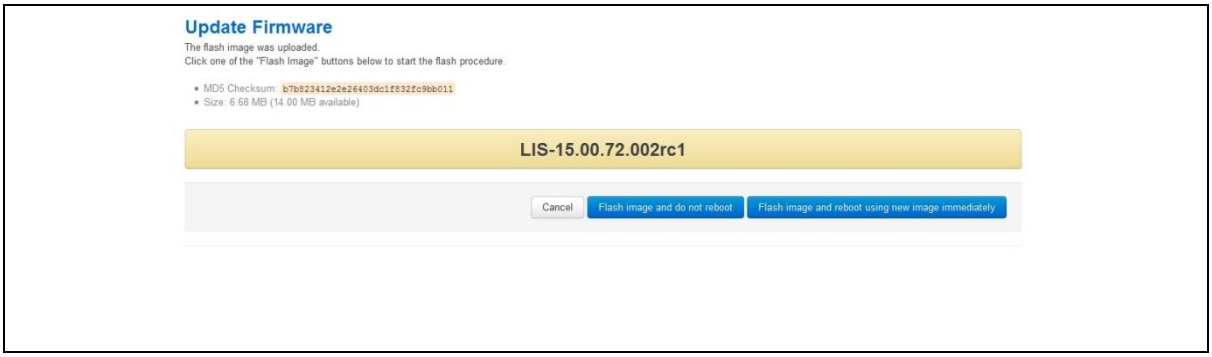


Figure 20: The flash firmware - verify page

Click either: **Flash image and do not reboot**, or **Flash image and reboot using new image immediately**. The 'Firmware update is being applied' message appears.

When the firmware update is complete, the Update Firmware page appears. There are various messages, depending on which option you selected, or if any corruptions have occurred.

5.1.3 Flash image and do not reboot option

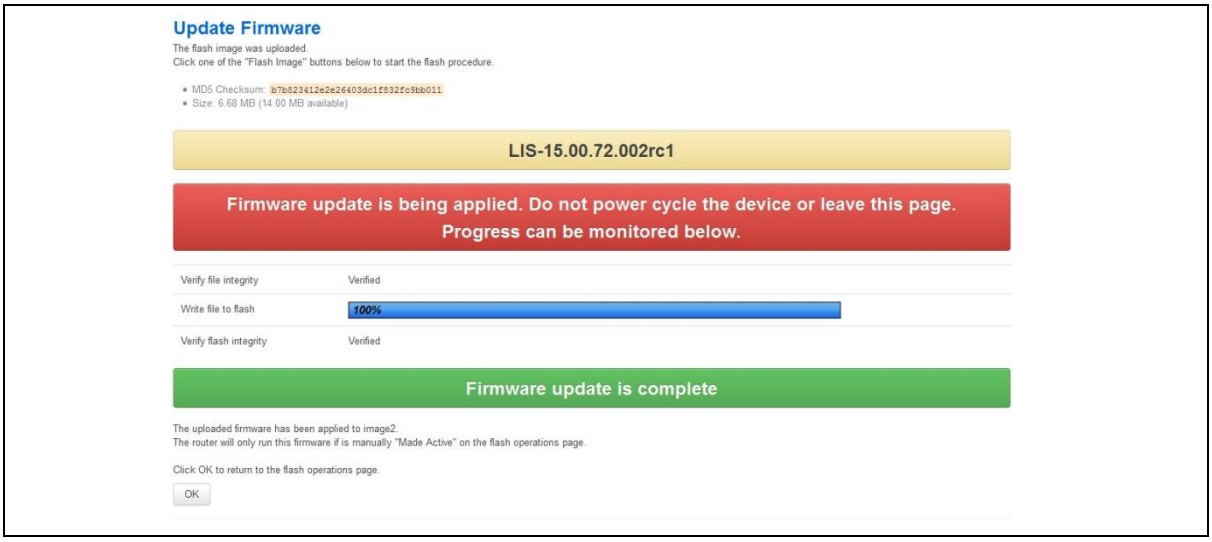


Figure 21: The firmware update page after '…do not reboot' option selected

If you select 'Flash image and do not reboot', the router will only run the firmware if you click **OK** to return to the Flash Operations page. There you can manually select **Made Active (after reboot)**. Then click **Reboot Now** in the 'Reboot using Active Configuration' section.

5.1.4 Update flash image and reboot using new image immediately option

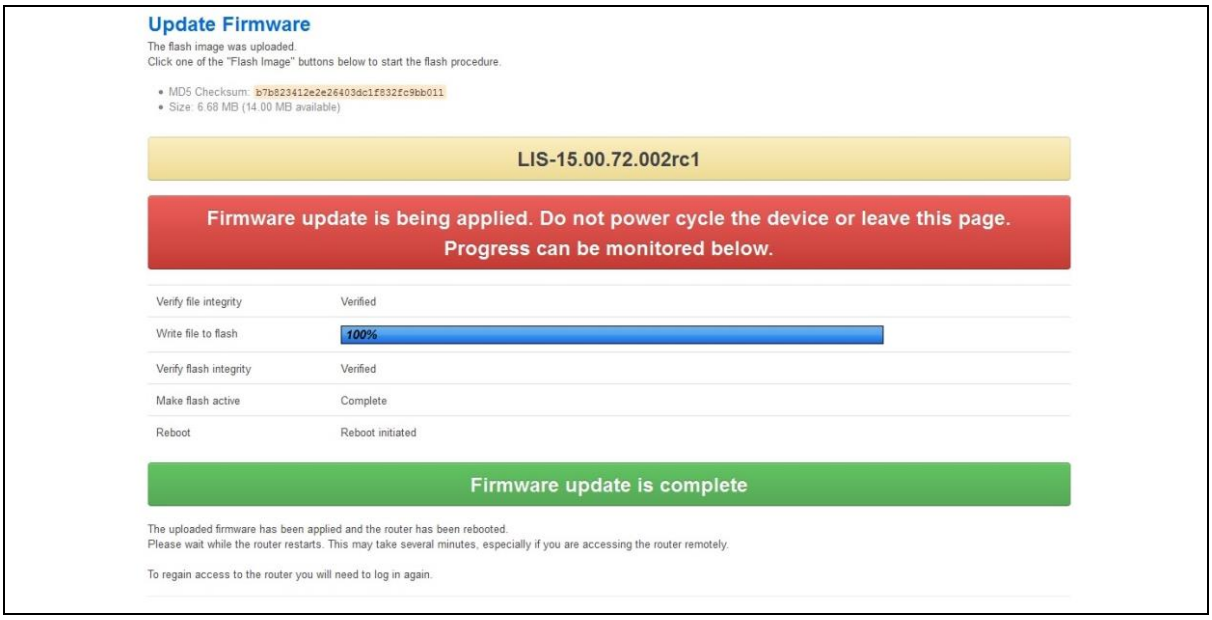


Figure 22: The firmware update page after 'update flash image and reboot…' option selected

If you select 'Update flash image and reboot using new image immediately' and the overall validation and flashing process has succeeded, the router will reboot immediately. To regain access to the router you must login again. If any part of the processes encounters an error the reboot does **not** occur and a report is given.

5.1.5 Possible file corruption

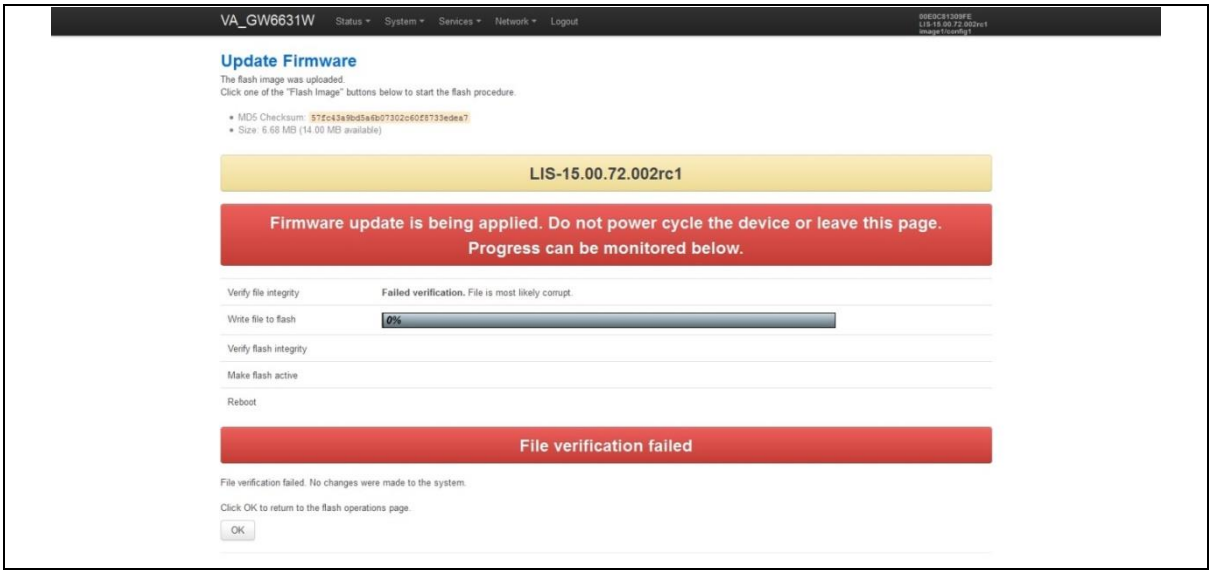


Figure 23: The firmware update failure page

In the unfortunate event that the firmware upgrade fails, the 'Failed verification File is most likely corrupt' or similar message will appear in the Verify file integrity row. No changes will be made to the system and the general message **File verification failed** appears.

5.1.6 Verify the firmware has been upgraded successfully

To check the firmware version, in the top menu, browse to **System -> Flash Operations**, or after router reboots, in the top menu, click **Status**. The Firmware Version shows in the system list and also in the right top corner of the menu bar.

Figure 24: The system status list showing current firmware version

5.2 Firmware recovery

The router has an automatic boot recovery feature that will

- revert the active firmware to the alternate firmware segment on three consecutive failed software restarts.
- Change the boot configuration to factory configuration after ten failed restarts

By design this feature is intended to allow recovery from firmware problems and therefore excludes restarts due to power loss.

6 Troubleshooting

Problem	Possible causes	Solution
I cannot access the GW1000	The configured IP address or subnet, or both on your PC is incorrect.	Change the IP on your PC to contact the GW1000 on 192.168.100.1/24
	The GW1000 is not running its factory configuration.	Check the config LED status. Flashing indicates its running its factory configuration. If it is solid, hold in the reset button for between 3 and 15 seconds and then release.
I cannot access the WAN network after manual configuration	The SIM is not inserted.	Power off the GW1000, insert the SIM card and then power on the GW1000.
	The APN is incorrect.	Check you have configured the correct APN.
	SIM username or password, or both are incorrect.	Check the correct SIM username and password settings.
	There is a connection failure.	Check the status of Connection Monitor. From the Start page, browse to **>Advanced > Connection monitor**.
The router performance is slow.	There is poor 4G/3G signal strength.	Check the signal strength. From the Start page, browse to **Status > Mobile Stats**. Move the GW1000 to a better location and recheck signal strength.