Flashing the MK01K21 to ROOter

A number of steps must be taken in order to flash the MK01K21 router to ROOter. These include replacing the bootloader with one that has a recovery GUI. This has the potential to brick the router so care must be taken when doing these steps.

Under no circumstances should any of this be done using the Wifi. The computer must be connected to the router using an Ethernet cable. Failure to do this will cause a brick.

The steps that needed doing are in this order.

1. Enable SSH access on the router.
2. Replace the factory bootloader with one that has a recovery GUI.
3. Boot into recovery mode and use the GUI to flash to a ROOter image.

Each one of these steps will be covered in detail. It is important to follow these directions exactly as the process will fail if this is not done.

When flashing the bootloader any deviation in the procedure will cause a brick and ruin the router.

Information about the MK01K21

- SOC – MT7621A
- Wifi – MT7915E
- Flash – 16 meg
- RAM – 256 meg
- M.2 Modem Interface
- Nano SIM holder
- 2 x Gigabit Lan
- 1 x Gigabit Wan
- Serial header
- 2 x GPIO buttons
- 5 x GPIO LED
- GPIO controlled 3 color top light
- GPIO controlled modem power

GPIO Keys

- GPIO 10 – wps
- GPIO 12 – rfkill

GPIO Leds

- GPIO 14 – top light blue
- GPIO 15 – top light red
- GPIO 0 – wifi
- GPIO 9 – 5G blue

- GPIO 11 – 4G blue
- GPIO 13 – 5G orange
- GPIO 17 – 4G orange

GPIO Power

- GPIO 6 – modem power

Changing the Router's IP Address

Connect the router to your computer using an Ethernet cable and power it on. Wait until it has booted up and given your computer an IP Address.

The default IP Address of the router is 192.168.100.1 but this can be changed by using the router's GUI. This is done since other parts of the flashing process use 192.168.1.1 as the IP Address.

Enable SSH on the M01K21 Router

Extract the **factools.exe** and **huawen.ttf** files from the archive and place them in a folder. With the router running and connected to the computer execute **factools.exe** by double clicking on it.

You may receive several memory error dialog boxes after this. Just click on **OK** to dismiss them. It may also be checked as a suspicious program. It will pass that test.

When it starts you will be able to enter the password and router IP Address and enable Telnet on the router.

The password is **hqf2020go** and the IP Address is what ever you set using the router's GUI. Click on the **Telnet** button. You will see a dialog box appear. Click on **Yes**.

Telnet is now enabled on the router for as long as it is running and not been rebooted.

There are two ways to access the router by Telnet. The first is to enable telnet on your computer. The other is to use the Putty Terminal program.

Windows Telnet

To enable Windows Telnet you go to **Control Panel >> Programs and Features** and click on **Turn Windows Features On and Off**.
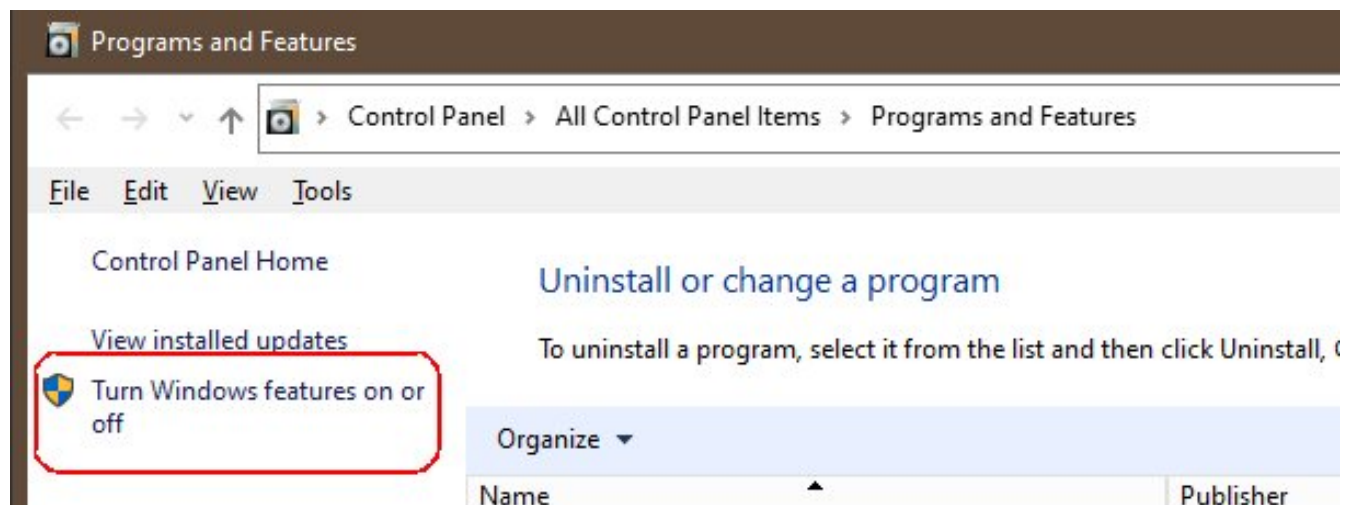
Then scroll down and enable Telnet Client.
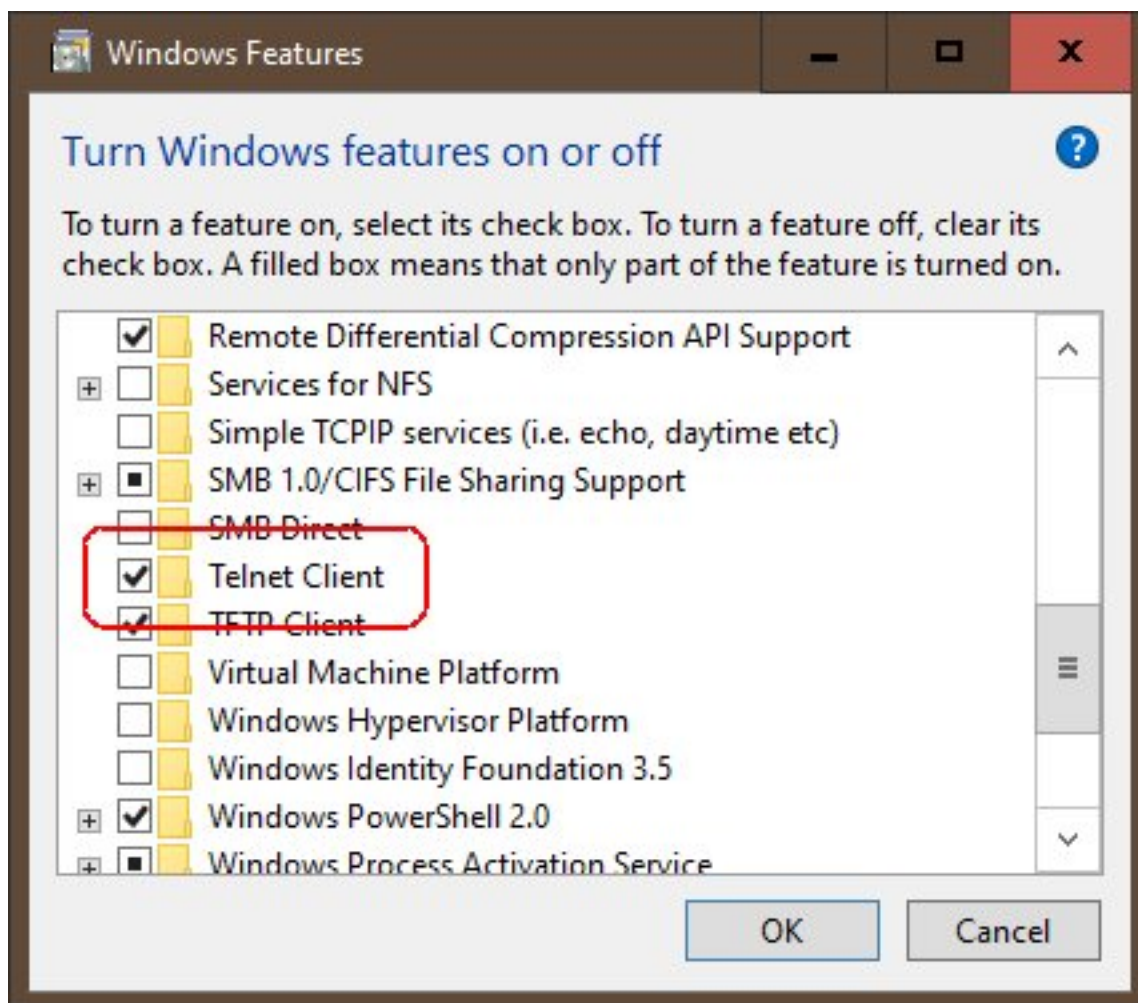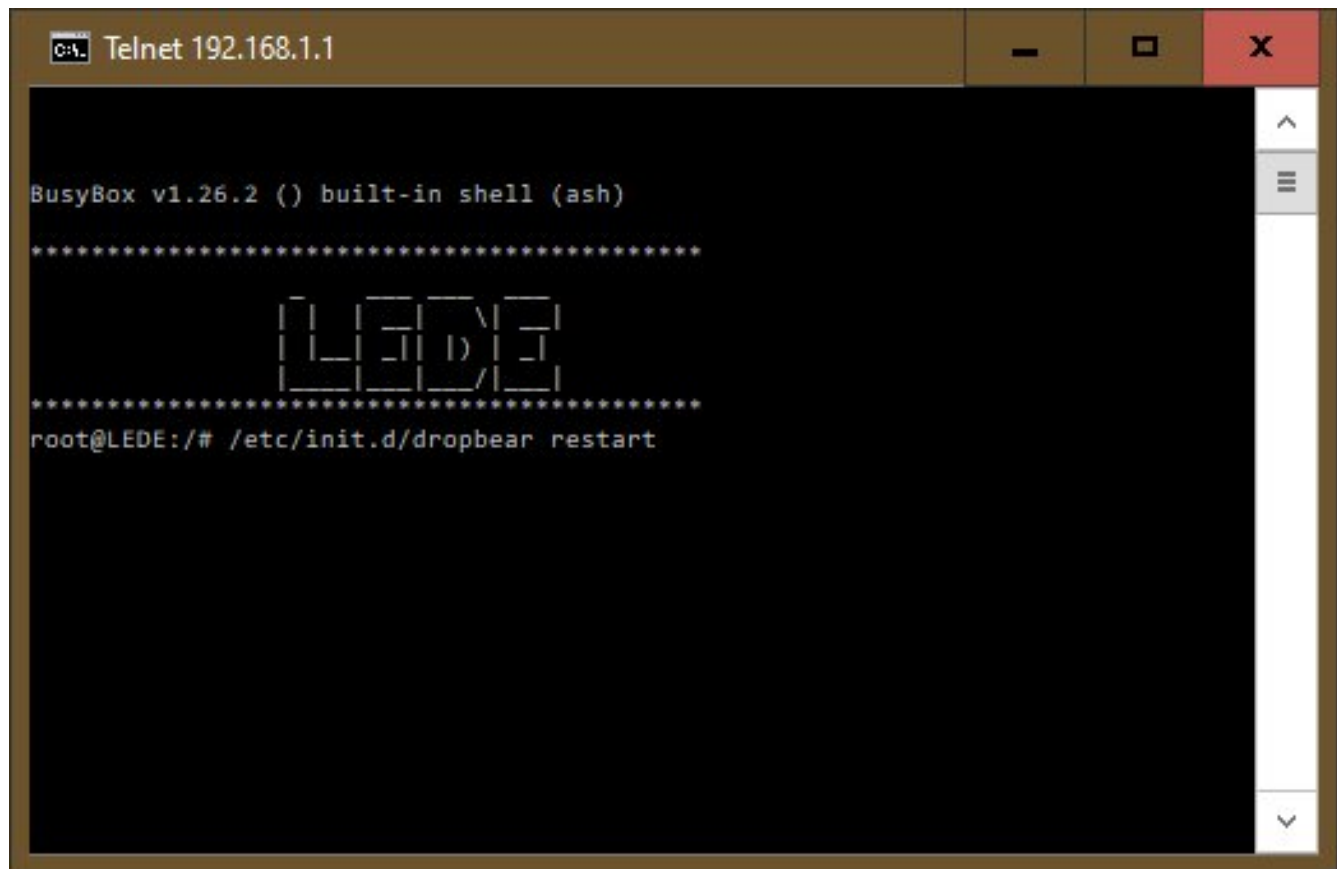
Then go to **Start Menu >> Run** and enter **cmd** to open a command line dialog. At the command line enter

telnet 192.168.1.1

or whatever the router's IP Address is.
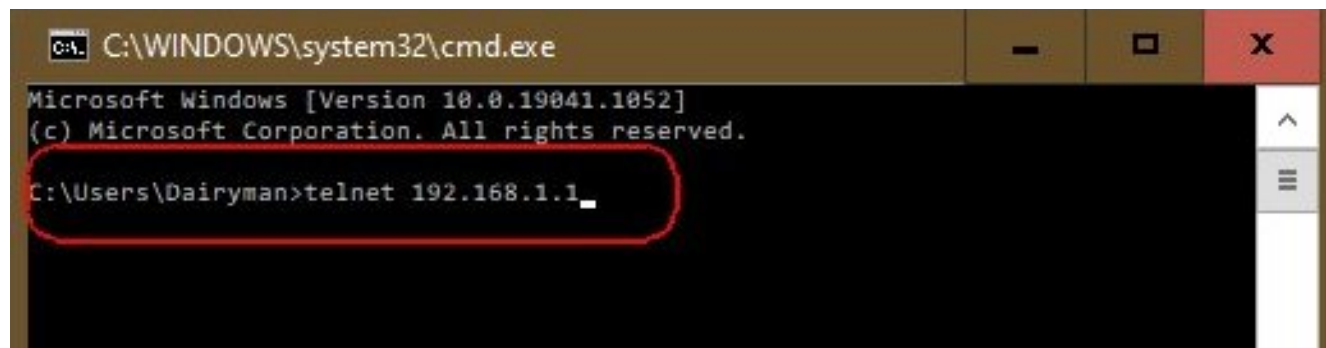
You will then be at the routers command line. Enter **/etc/init.d/dropbear restart** to enable SSH on the router.

Putty Terminal

If you have the Putty Terminal program installed then you can use that to Telnet into the router instead of enabling Windows Telnet. Start a session with these parameters. Use your router's IP Address in the **Host Name** line.

When you **Open** the session you will be at the router's command line. Enter **/etc/init.d/dropbear restart** to enable SSH on the router.

```
  192.168.1.1 - PuTTY

BusyBox v1.26.2 () built-in shell (ash)

********************************************

            _   _ ___  ___  ___
           | | | | __|| \| __|
           | |_| | _|| |) | _|
           |_____|___|__/|___|
********************************************
root@LEDE:/# /etc/init.d/dropbear restart
```
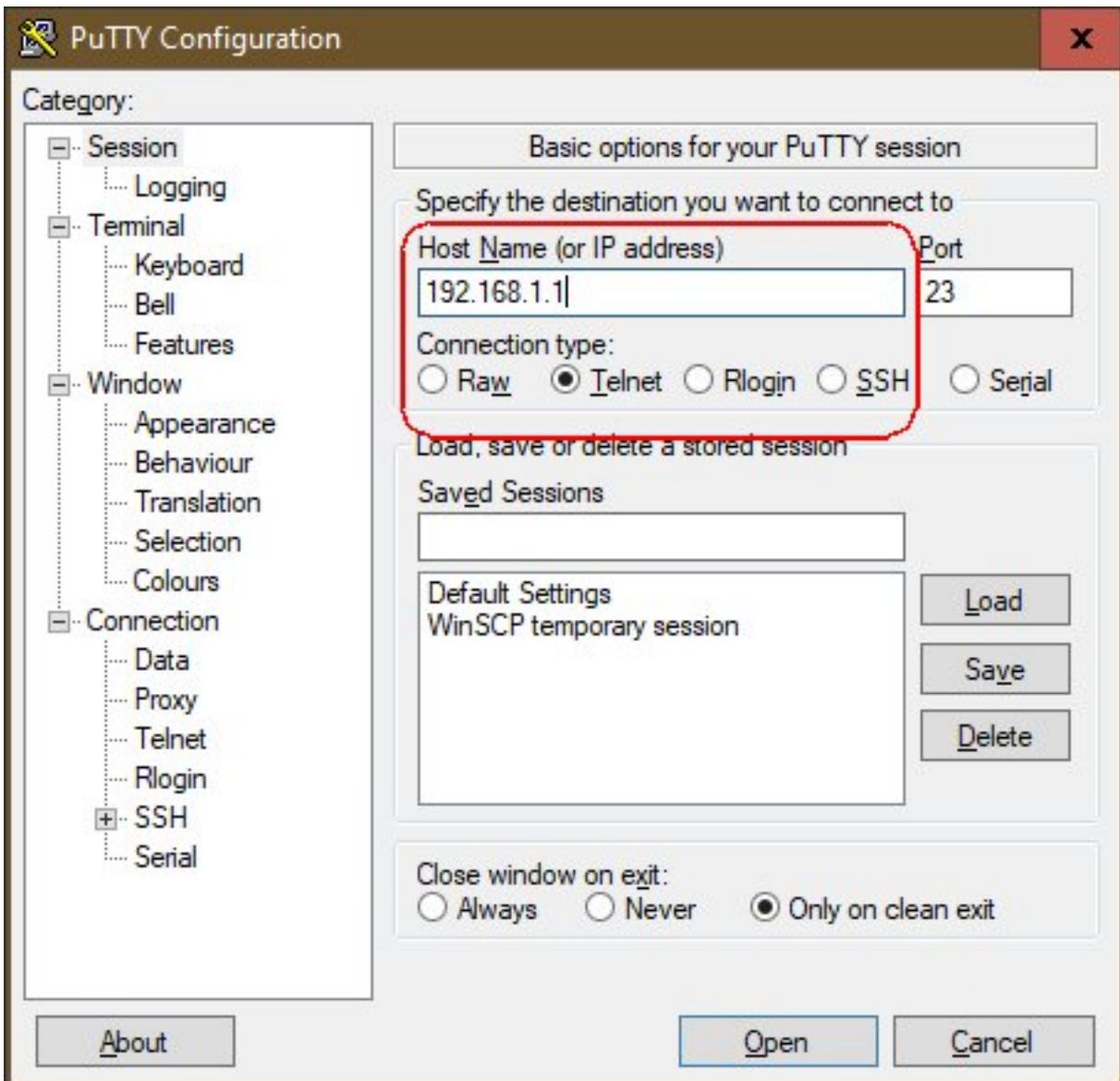
SSH Access

Once you have activated SSH Access you can use WinSCP to access the files on the router and transfer between the router and the computer.

This access will only last as long as the router is not rebooted.

If a password is requested use the password you set to access the router's GUI.

Flashing the Bootloader

Once you have SSH access to the router it is time to change the bootloader to one that has a recovery GUI which will allow us to flash the router's firmware to ROOter since the factory firmware will not allow updating to ROOter using the router's GUI.

This is the most dangerous step when working on this router and everything must be followed exactly.

Using WinSCP copy the **uboot.bin** file into the **/tmp** folder on the router. WinSCP can be closed at this point.

Using the Terminal of your choice, either Windows Telnet or Putty, execute the following at the command line.

`mtd unlock u-boot`
mtd write /tmp/uboot.bin u-boot

When they are completed you can close the Terminal.

The bootloader has been replaced by one from PandoraBox which has a recovery GUI.

The factory firmware will no longer boot after doing this so power down the router and proceed to flashing the ROOter image.

Flashing the ROOter Image

The router must be forced into recovery mode in order to flash the ROOter image. The following steps show how to do this.

- Unplug the router's power cord.
- Hold in the Reset button the bottom of the router using a small object like a dull pencil or a paper clip. Take care as the button is plastic so don't use sharp objects.
- With the reset button held in, plug in the router's power and hold the button for at least 10 seconds.
- Release the Reset button.
- Use your browser to go to **http://192.168.1.1/index.html** and you will see the recovery GUI.

The GUI is in Chinese but is easy to understand.

固件恢复模式

恢复 备份

恢复

Click to Select Image File

Click on the button and a selection dialog will appear so you can select the ROOter image file.
When you select that another dialog box will open. Press **OK** on that one.

The image you want to use here is the one labeled "**-uboot.bin**"

固件恢复模式

恢复　　　　　　　　备份

⊕ 192.168.1.1

是否进行恢复?

OK　　　Cancel
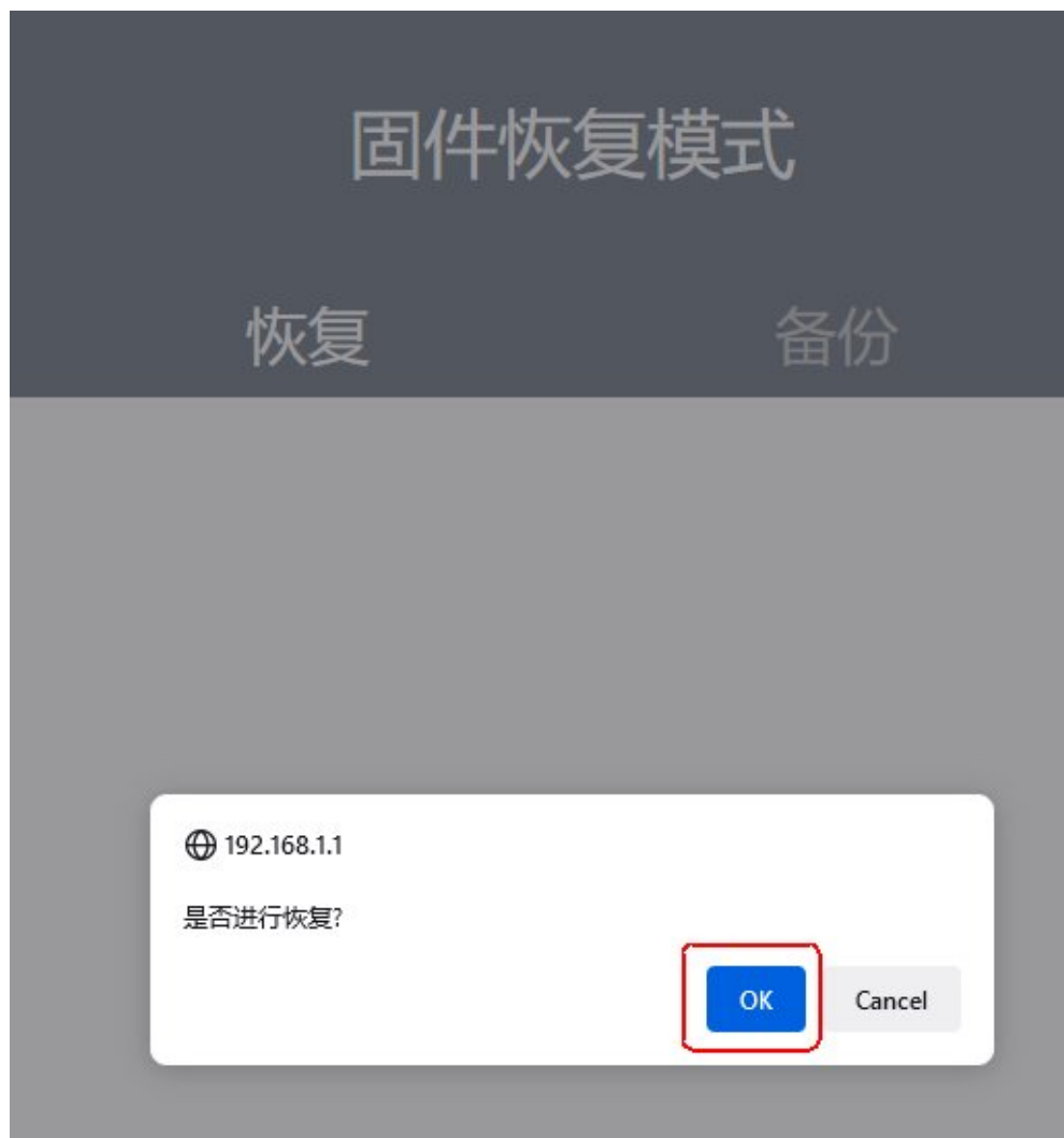
After a few seconds another page will appear telling you that the **u-boot** is being overwritten. At this point the image is being flashed to the router.

请耐心等待!

新的U-Boot已上传

更新完毕后路由器将自动重启

This process will take some time to complete. When the router has flashed the image, which takes several minutes, and is rebooting the 5G light on the top of the router will flash **blue**. When it goes out use your browser to go to **192.168.1.1** and you will see the ROOter GUI.

That this point you have a ROOter but any changes you make to it will not survive a reboot. Go to **System→Backup/Flash Firmware** and press the **Flash Image** button. Select the ROOter image that is labeled "**-upgrade.bin**" and flash the router with that.

When it is finished you will have a working ROOter.

In order to enable the Wifi you must reboot the router after it has flashed and booted up. The Wifi will be enabled after the second boot up.

ROOter Operation

When in operation the ROOter firmware does the following.

- When booting up the 5G top light will flash blue.
- After boot up the Light button above the LAN ports controls the 5G top light. Pressing it will enable the light which is used to show if there is Internet. If the light shows **purple** then it is checking for Internet. If it is **red** then there is no Internet. **Blue** means there is Internet.
- The bottom Led in the strip of Leds is the power light and is lit if the router has power.
- The second from the bottom is 2.4Ghz wifi and flashes with wifi traffic.
- The third Led from the bottom flashes **orange** when the modem is connecting. The faster it flashes the further along the connection process is. When the modem connects it will first turn solid **orange** and then solid **blue**.
- The top Led flashes to show the signal strength of the modem. If it is orange then the signal is weak to moderate. A fast blink means a stronger signal. If it turns **blue** the signal is better and flashes faster the stronger the signal is.
- The router supports modem power toggling which is the best way to restart a modem.
- Once the router has been flashed to ROOter it can have it's firmware updated by using the **System→Backup/Flash Firmware** menu and selecting the image that is labeled "**-upgrade.bin**".