

Router Repair Tool

User Guide (1.0.5) by Neo – RouterTech.Org

This tool is for Class II routers only and can be used instead of or as well as other repair tools such as PCTool.

The Router Repair Tool (RRT) can be used for three main purposes:

- Repairing / defragmenting the environment / config of a router.
- Un-bricking a router.
- Installing a (new or otherwise) firmware on to a router.

Important steps to carry out as soon as possible:

1. Ensure your firewall is not blocking the RRT – see “Settings > Test firewall blocking” on [page 5](#) for more information.
2. Backup your router’s MTD3 and environment (as described in this document on [page 7](#)).

Tips for owners of healthy routers

If your router’s environment is healthy and the router is not bricked, there are a few things you can already do with this software:

- Backup your router’s MTD3 (see [page 7](#)).
- Download and save the router’s environment (click on “Environment > Backup (Env)”, see [page 5](#) for details).

Once you have done those two things, there are some others to try with this utility:

- Sort your environment; or perhaps take the opportunity to remove spaces, duplicates or unnecessary environment variables.
- Upgrade your router’s firmware.

Note for non-default router IP addresses

If you have set up your router to have a different IP address from the default, you may find it easier to reset your router’s settings to the factory default before you use this tool – using the web interface is the most reliable way to reset the router. This reduces the chances of the router’s IP address changing as you use the RRT, which might cause problems.

Sections of this document

- [The Wizard](#): repairing the environment, unbricking and uploading firmwares – [pages 2 to 4](#)
- [The Menu](#): the numerous of functions found in the RRT’s menu – [pages 5 and 6](#)
- [Main functions](#): the primary operations the RRT can perform – [pages 7 to 10](#)
- [Advanced functions](#): more complex operations supported by the RRT – [pages 11 and 12](#)

The Wizard

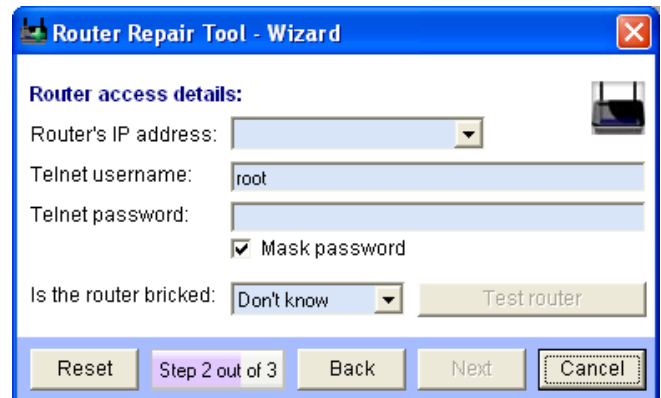
Using the Wizard is the quickest, easiest way to perform the main tasks. You can reset the wizard at any time by clicking on the 'Reset' button and you may also import the settings from the main window by using the 'Import settings' button – this may help save time if you have previously set up one or more aspects in previous sessions.

- **Repairing the environment**

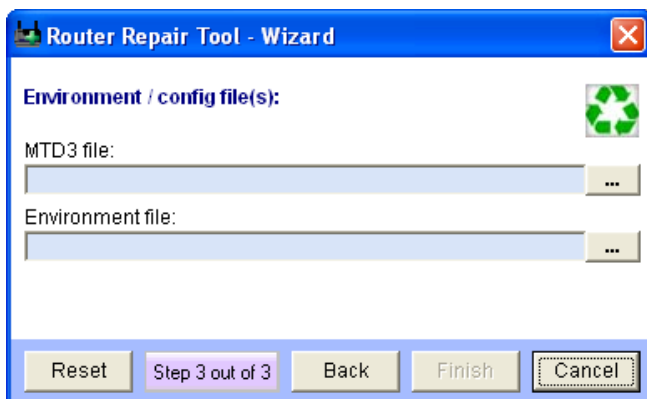
Note: To repair the router's environment, you will need to have previously backed up your environment when the router was working – see [pages 5 and 7](#) for more information.



1. Select "Repair the router's environment/ config".



2. Enter your router's IP address, Telnet username and password. If the router is bricked, select 'Yes' from the options. If the router is not bricked, select 'No' from the options. If you don't know, you can click on the 'Test router' button and the RRT will attempt to work out if your router is bricked or not.



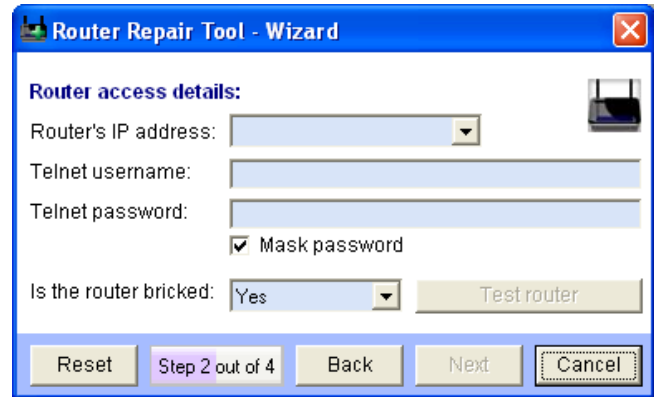
3. Select the files you wish to use to repair the environment. You can use just a working MTD3 file if the file has been previously downloaded from the same router. If the MTD values have changed since the MTD3 was backed up, you will need to reinstate the MTDs with the 'Set MTDs' function. If you have a suitable environment file, then you can use this in conjunction with any suitable MTD3 file.

Click on the 'Finish' button and the RRT will attempt to repair your router's environment.

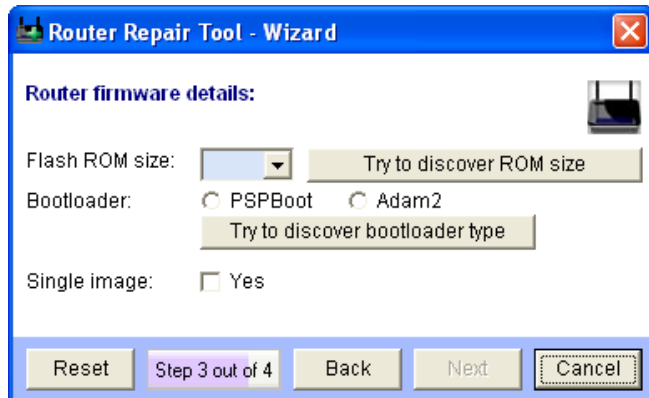
• Un-bricking



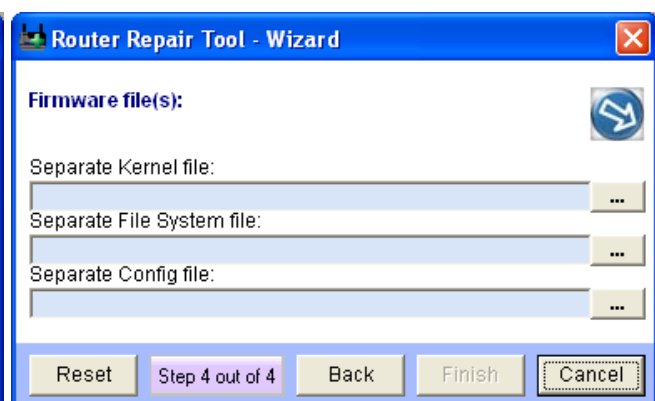
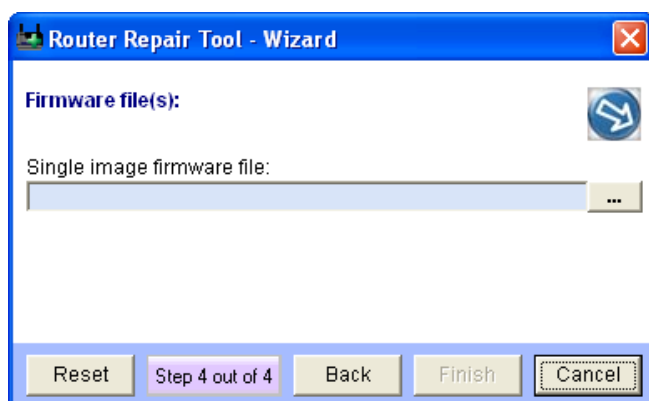
1. Select "Un-brick the router"



2. Enter your router's IP address, Telnet username and password.



3. Enter the router's Flash ROM size (in megabytes) – if you don't know what it is, you can click on the 'Try to discover ROM size' button and the RRT will try to discover the ROM size. Indicate whether the router's bootloader is PSPBoot or Adam2 and if you will be using a single image firmware file to un-brick the router. If you don't know the bootloader type, you can click on the 'Try to discover bootloader type' button and the RRT will try to discover it for you.



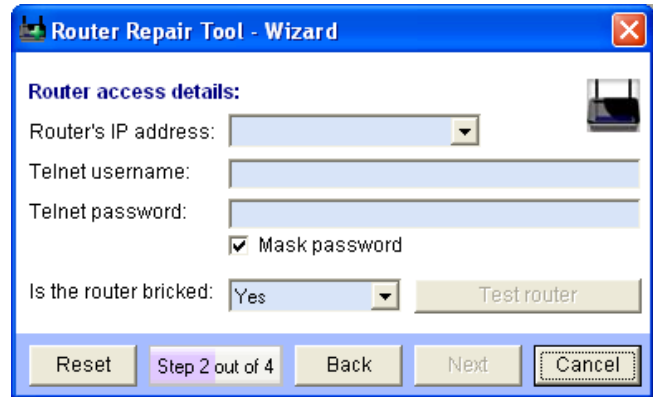
4. Select either the single image firmware or separate files depending on your choice in step 3.

Click on the 'Finish' button and the RRT will attempt to unbrick your router and upload the firmware selected.

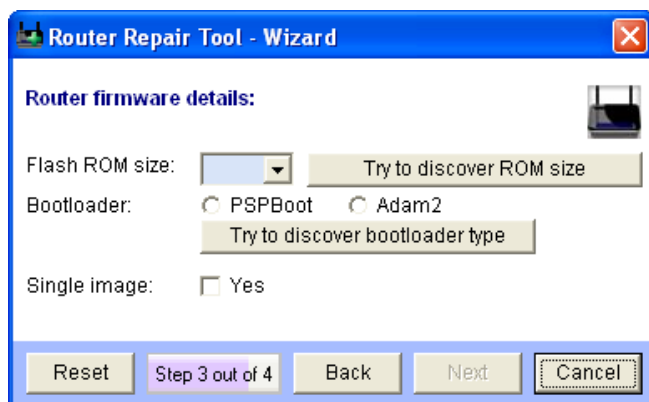
- Firmware flashing**



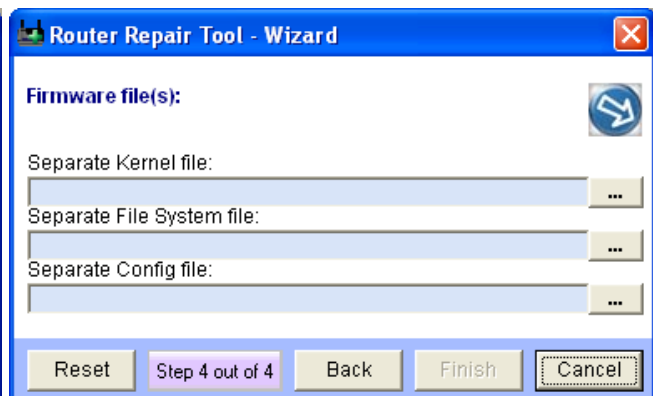
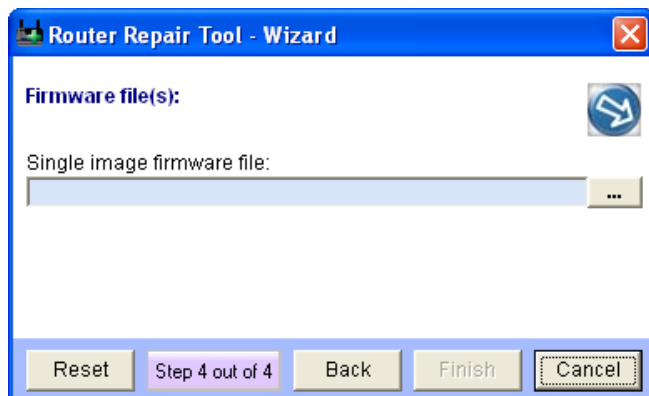
1. Select "Change the router's firmware"



2. Enter your router's IP address, Telnet username and password and whether your router is bricked or not.



3. Enter the router's Flash ROM size (in megabytes) – if you don't know what it is, you can click on the 'Try to discover ROM size' button and the RRT will try to discover the ROM size. Indicate whether the router's bootloader is PSPBoot or Adam2 and if you will be using a single image firmware file to un-brick the router. If you don't know the bootloader type, you can click on the 'Try to discover bootloader type' button and the RRT will try to discover it for you.



4. Select either the single image firmware or separate files depending on your choice in step 3.

Click on the 'Finish' button and the RRT will attempt to change your router's firmware to the one selected.

The Menu (Quick reference)

About – about the software.

Settings

Reset tool settings to default – resets the utility's settings to default.

Test firewall blocking – tests if your PC's firewall is blocking the utility.

Get ROM size (working router) – find the Flash ROM size from a non-bricked router.

Get Bootloader (working router) – find the bootloader type from a non-bricked router.

Determine static IP settings – work out the static IP address settings required.

Environment

Read – reads the router's current environment.

Backup (Env) – only backs up the router's environment.

Backup (MTD3) – backs up the router's entire current environment (and config).

Repair – repairs the router's environment, using the file(s) provided.

Bootloader

Set MTDs and upload firmware – set the MTDs and upload a firmware to the router.

Upload firmware (do not set MTDs) – upload a firmware to the router, without setting the MTDs.

Read environment – reads the router's current environment.

Backup environment – only backs up the router's environment.

MTDs

Set MTDs – set the MTDs on the router.

Read MTDs – read the current MTDs from the router.

Compare with calculated – compare the router's current MTDs with the calculated ones.

Get ROM size (bricked router) – find the Flash ROM size from a bricked router.

Get Bootloader (bricked router) – find the bootloader type from a bricked router.

Reboot – reboot from the bootloader.

Wizard – start the Wizard.

Abort – only enabled when performing certain tasks, this halts the current task.

Detailed descriptions for noteworthy menu items:

Settings > Test firewall blocking

This function is available to see if your PC's software firewall is blocking the utility from accessing your router. Various interfaces of the router will be probed and this provides the opportunity to make sure your firewall is not blocking access. If you run this test and your firewall pops up an alert, you should tell your firewall to 'allow' the utility. Performing this test before trying any of the main features ensures your firewall won't interfere and cause any potentially troublesome interruptions. The results log will show which of the probes successfully connected to the router (or just started in the case of the server test) – they will not always be an accurate indication of a firewall pass-through, so it is important to configure your firewall correctly while performing these tests. If your firewall does block the RRT, then many tasks will be interrupted and may not be able to complete at all.

Settings > Determine static IP settings

To access the bootloader of a router, it is usually essential to have set a static IP address. If you do not set one, it is very likely the connection to the bootloader will fail. If you know how to set a static IP address or have already done so then you can ignore this part.

The RRT can help set a static IP address for you, if you keep to the following instructions:

1. Make sure you have entered the router's IP address. Please note this may be different to the one set in the router's LAN Configuration IP settings and may be listed in your router's environment under "my_ipaddress".
2. Select the network adaptor that is connected to your router.
3. Click on "Settings > Determine static IP settings" from the menu.
4. If successful, you should see a valid IP address, subnet mask and default gateway. You can then click on the "Apply changes to network adaptor" button.

You are, of course, free to set a static IP manually if you wish – instructions here:

<http://www.routertech.org/pages.php?page=23> – bear in mind that you will need to set the static IP before running the RRT or click on the 'Refresh list' button to refresh the network adaptor list.

If you try to execute a task that requires a static IP address and you have not set one, RRT will offer to set one for you. In these situations, it is therefore important to select the network adaptor that is connected to your router beforehand.

When setting a static IP address, you may want to set the DNS server(s) also - this is not really necessary but you may want to set them to make it easier to get online when you have finished using the RRT. If this is the case, tick the 'Change DNS' checkbox on the 'Details' tab and enter the DNS server(s) you want. If you want to add multiple servers, then each server needs to be separated by a comma.

Environment > Backup (MTD3)

This function allows you to backup a healthy, working MTD3 and hence will not be any value if the router's environment is already corrupted. As a preventative measure, you should backup your router's MTD3 **before** it becomes damaged! The Router Upgrade Check (RUC) tool is also capable of backing up your router's MTD3. The saved MTD3 file will be named using the following format "**ddmmyy-hhmmss_mtd3.bin**", where 'ddmmyy' is the date and 'hhmmss' is the time – keep this file safe.

Bootloader > Read environment

This feature is supposed to download the router's current environment, however it should be noted that it is not always reliable and sometimes it can be incomplete. This is because the router can close the connection before the total environment has been sent. If the environment downloaded is incomplete, you may want to tick "Use FTP read timeout only" under the Advanced tab and then gradually increase the "FTP read timeout" value – this should increase the chances of receiving the whole environment, but this is not foolproof.

Bootloader > MTDs > Set MTDs

This sets the router's MTD values based on the options provided. If the "Bootloader > Set MTDs and upload firmware" menu item is clicked, this is the same as clicking on "Bootloader > MTDs > Set MTDs" and then clicking on "Upload firmware (do not set MTDs)". The RRT will calculate the MTDs using the firmware files you select (taking into account whether you are using single or separate image files) etc. if the "Calculate MTDs" checkbox is ticked. Alternatively, if you untick "Calculate MTDs", you may enter your own MTD values in the box provided: note that the format should be: **mtd,start,end** (example: **mtd0,0x90089000,0x901f0000**) or **mtd:start,end** (example: **mtd1: 0x90010090,0x90089000**). Each MTD should be on a separate line.

Bootloader > MTDs > Compare with calculated

Clicking on this menu item will read the router's current MTDs and then compare those with the MTDs calculated (based on the firmware files selected etc.). This can be useful if you want to see if any MTD values might need to be changed when the selected firmware is applied to the router.

Settings > Get ROM size (working router) and Bootloader > Get ROM size (bricked router)

MTD calculations require the Flash ROM size. This should be printed in your router's manual, on the router's box or listed on your router manufacturer's website. However, if you do not know the Flash ROM size, you can use these menu entries to try to find out: use "Get ROM size (working router)" if your router is not bricked and use "Get ROM size (bricked router)" if your router is bricked and you have already initiated a connection with the bootloader.

Settings > Get Bootloader (working router) and Bootloader > Get Bootloader (bricked router)

MTD calculations require the bootloader type. This may be printed in your router's documentation. However, if you do not know the bootloader, you can use these menu entries to try to find out: use "Get Bootloader (working router)" if your router is not bricked and use "Get Bootloader (bricked router)" if your router is bricked and you have already initiated a connection with the bootloader. The Router Upgrade Check (RUC) tool is also able to provide this data.

Bootloader > Reboot

Reboots the router, when connected to the bootloader. If the router is not bricked, it should reboot fully and start working normally. If the router is bricked, the router will typically reboot only as far as the bootloader.

Main functions

Repairing the environment

Occasionally the router's environment can become corrupted – entries may be deleted, duplicated or otherwise. If this occurs, the symptoms can vary from not being able to save new entries to the router being 'bricked'.

Back up

Fortunately this tool can repair the environment if you have a suitable backup of either working MTD3 or an MTD3 and a copy of the environment variables. You can create these backup files with the RRT:

To backup your router's MTD3:

1. Under the 'Details' tab, make sure you have entered your router's IP address, Telnet username and password.
2. Under the 'Defrag' tab, click on the 'Backup MTD3' button (or use the 'Environment > Backup (MTD3)' menu).
3. If successful, your router's MTD3 file will be saved to the RRT folder, using the following format "**ddmmyy-hhmmss_mtd3.bin**", where 'ddmmyy' is the date and 'hhmmss' is the time.

To backup your router's environment:

1. Under the 'Details' tab, make sure you have entered your router's IP address, Telnet username and password.
2. Click on the 'Environment > Backup (Env)' menu. If successful, your router's environment will be saved to the RRT folder, using the following format "**env_ddmmyy-hhmmss.txt**", where 'ddmmyy' is the date and 'hhmmss' is the time.

Or if you wish to carry out the task manually

1. Under the 'Details' tab, make sure you have entered your router's IP address, Telnet username and password.
2. Click on the 'Environment > Read' menu.
3. When the environment has been read and displayed, click on the 'Save report' button and save the environment to an appropriate file name (such as **env_myroutermodel.txt**).

If you have used the Router Upgrade Check (RUC) tool, then that may have also backed up both these aspects of your router.

Repair

To repair your router's environment:

Remember to select the network adaptor that is connected to your router, if it is not already selected.

1. Under the 'Details' tab, make sure you have entered your router's IP address, Telnet username and password.
2. Under the 'Defrag' tab, if your router is apparently bricked, tick 'Skip reboot in to bootloader' and 'Use bootloader interface'.
3. If you want to sort the environment variables, tick the corresponding checkbox. Note that this is only possible if you are using an environment file in addition to an MTD3 file.
4. Select the MTD3 file you wish to use.
5. Select the environment file you wish to use. If you do not have an environment file, tick the 'Use MTD3 file only, do not use environment file' option.
6. Click on the 'Repair MTD3' button and the RRT will endeavour to repair the router's environment.

The environment file that you use should have lines such as: `setenv ProductID AR7RD`

The 'setenv' part does not need to be present, but will be if the file is created by the Router Upgrade Check (RUC) tool.

Extracting the environment variables from MTD3 files

If you only have an MTD3 file and want/need to specify environment variables different from those in said file, you can try to extract the variables from the MTD3 file:

1. Under the 'Defrag' tab, select the MTD3 file you wish to use.
2. Click on the "Extract environment variables from MTD3 file" button.
3. If successful, the extracted environment variables will be displayed. If the file's bootloader type is PSPBoot then it's possible that not all variables will be revealed, depending on the contents of the [pspboot_env_vars.txt](#) file. See the section below on the [pspboot_env_vars.txt](#) file.
4. Click on the 'Save report' button and save the environment to an appropriate file name (such as env_myroutermodel.txt).
5. Edit the file you saved in your favourite text editor (e.g. Notepad) – add, remove or alter the variables as required and then save the file.
6. Back under the 'Defrag' tab, select the edited environment file.
7. Click on the 'Repair MTD3' button, as per the normal procedure.

pspboot_env_vars.txt file

This file contains instructions for the RRT on how to extract the environment variables from PSPBoot MTD3 files. Adam2 MTD3 files have a different structure which does not use predefined variables. Some PSPBoot variables are predefined based on the router's hardware characteristics. For example, some variables such as "HW_REV_MAJOR" are only present on wireless routers. Therefore, in order to correctly read all the environment values, the predefined variables in the [pspboot_env_vars.txt](#) file must match the variables that will be required for your router. See the [pspboot_env_vars.txt](#) file for more details.

Un-bricking

The key to victorious un-bricking is to connect to the router's bootloader. During a normal bootup of a router, the bootloader interface is only available for a few seconds: between the time the router is switched on and time the router starts working as a router (where you can access the web or telnet interface).

Connecting to the bootloader

NOTE: If your router is bricked, this step may not be required and the bootloader may already be accessible. You can test this by trying the "Bootloader > Read environment" or "Bootloader > MTDs > Read MTDs" menu items. If the bootloader is reachable, you should see the environment or MTDs in the report / log.

1. Under the 'Details' tab, make sure you have entered your router's IP address. Please note this may be different to the one set in the router's LAN Configuration IP settings and may be listed in your router's environment under "my_ipaddress".
2. If you haven't already done so, set a static IP address – see the previous details on the "Settings > Determine static IP settings" menu for more information.
3. If you plan on using some other software such as PCTool, and you just want the RRT to make the connection, you may want to 'Keep open' checkbox. This will keep the bootloader connection open until you click on the 'Close connection' button.
4. Click on the 'Initiate connection' button.
5. Switch off the router if it is on, then click on OK.
6. Switch on the router and wait for the RRT to connect. With a bit of luck, you will receive a message that the RRT has successfully connected to the router.

Actual Unbricking

Once you have connected to the bootloader (or tested that you can connect to the bootloader), you can begin unbricking the router by uploading a firmware. This firmware can be the same as the firmware currently on the router, or it can be a different firmware.

Remember to select the network adaptor that is connected to your router, if it is not already selected.

1. Under the 'Details' tab, make sure you have entered your router's IP address. Please note this may be different from the one set in the router's LAN Configuration IP settings and may be listed in your router's environment under "my_ipaddress".
2. Ensure that your router's Flash ROM size has been entered. This value may be printed on the router's packaging, in the router's user guide / manual, on the router manufacturer's website. The Router Upgrade Check (RUC) tool can also provide this information. If you do not know the value, you can use the aforementioned "Bootloader > Get ROM size (bricked router)" menu item to try to ascertain it.
3. Ensure that you select the appropriate bootloader type for your router. If you don't know the type, you can use the "Bootloader > Get Bootloader (bricked router)" option from the menu.
4. Under the 'Repair' tab, choose the type of firmware you wish to put on your router: if you want to use a single image firmware file, tick the 'Single image firmware' checkbox. If you want to use separate firmware files, untick the 'Single image firmware' checkbox.
5. Select the firmware file(s) you want to flash, depending on whether you are using single or separate files.
6. Click on the 'Upload firmware' button and the RRT will start the upload process. Clicking on the 'Upload firmware' button will set the MTDs (see the "Bootloader > MTDs > Set MTDs" menu details). If you don't want to set the MTDs, you should use the "Bootloader > Upload firmware (do not set MTDs)" menu.

Depending on the size and number of the firmware files, this may take a few minutes – do not interrupt this process or disconnect the router until you are certain the flashing is complete.

If you use a single image firmware, after firmware flashing, it is recommended that you log in to the router and then reset it to defaults.

If all goes well, you should have restored your router back to its former healthy condition!

Firmware flashing

In the RRT, the process of firmware flashing is similar to the un-bricking process. In both cases, firmware files are sent to the bootloader interface. This method is well suited to people wanting to make the transition from a separate file firmware to a single file firmware.

Remember to select the network adaptor that is connected to your router, if it is not already selected.

1. Under the 'Details' tab, make sure you have entered your router's IP address, Telnet username and password.
2. Ensure that your router's Flash ROM size has been entered. This value may be printed on the router's packaging, in the router's user guide / manual, on the router manufacturer's website. The Router Upgrade Check (RUC) tool can also provide this information. If you do not know the value, you can use the aforementioned "Settings > Get ROM size (working router)" menu item to try to ascertain it.
3. Ensure that you select the appropriate bootloader type for your router. If you don't know the type, you can use the "Settings > Get Bootloader (working router)" option from the menu and the Router Upgrade Check (RUC) tool can provide this information as well.
4. Under the 'Repair' tab, choose the type of firmware you wish to put on your router: if you want to use a single image firmware file, tick the 'Single image firmware' checkbox. If you want to use separate firmware files, untick the 'Single image firmware' checkbox.
5. Select the firmware file(s) you want to flash, depending on whether you are using single or separate files.
6. Click on the 'Upload firmware' button and the RRT will start the upload process. Clicking on the 'Upload firmware' button will set the MTDs (see the "Bootloader > MTDs > Set MTDs" menu details). If you don't want to set the MTDs, you should use the "Bootloader > Upload firmware (do not set MTDs)" menu.
Depending on the size and number of the firmware files, this may take a few minutes – do not interrupt this process or disconnect the router until you are certain the flashing is complete.

If you use a single image firmware, after firmware flashing, it is recommended that you log in to the router and then reset it to defaults.

Advanced functions

Functions that will only need to be used rarely, if at all, in most cases. Many of these functions were added to help testing of this software and so some may be removed as most users will not need them.

Login options: Shell

Some routers require the 'shell' command to access the main Telnet interface. If your router is one of these, then tick this option.

Login options: Skip username

Some routers do not ask for a username during a Telnet log in. If your router is one of these, then tick this option.

Ping timeout (ms)

The RRT will try to ping the router to determine its status. This is the time out for these pings.

Repair connection interval (ms)

When the RRT tries to initiate a bootloader connection it will keep trying to connect to the bootloader every X milliseconds, where X is this interval.

Reboot interval (sec)

When the RRT wants to (re)connect to the bootloader after a reboot, it will wait X seconds, where X is this interval.

FTP read timeout (sec)

When trying to read data from the router via FTP connected to the bootloader, the RRT will wait for this number of seconds (after receiving no more data) before it times-out and closes the connection.

Use FTP read timeout only

When trying to read data from the router via FTP connected to the bootloader, the RRT will ignore any 'send complete' responses from the router and just rely on the timeout alone.

Flash port range

The RRT needs to use a port each time it tries to send a file to the router via the bootloader connection. In theory, one port should be sufficient but ports can often stay active until the RRT is completely closed, so it is preferable to specify a range which the RRT can cycle through.

Show file flash progress bytes in log

If the RRT encounters problems sending a file to the router (during a firmware flash or un-bricking) then you can tick this option to see how far the file gets in bytes, in the log.

Use single image for all MTD calculations

MTD calculations use the firmware files. If this option is not ticked, the single image file is used when the 'Single image firmware' checkbox is ticked and the separate files are used when the 'Single image firmware' checkbox is not ticked. If this option is ticked, both calculations will use the single image file, so you will need to specify a single image file even if you plan on using separate files. This option is provided in case the calculation based on the separate images is incorrect for some reason.

Use max kernel size in MTD calculations

By default, all MTD calculations will use the file system offset method. For separate images, a maximum kernel size method is also available which tries to maximise the kernel size partition.

Set autoload

The autoload environment variable tells the router whether to boot normally or to stop at the bootloader. If the value is “1” the router should boot conventionally (if it can). Therefore, if you want to make it easier to connect to the bootloader and your router is not bricked, you can use this button to set the autoload value to “0”.

Enable autoload via bootloader

In theory, if the autoload environment variable has been set to “0” (as in the previous function) then the only way to re-enable it is to connect to the bootloader and to use this button (or you can do it manually if you prefer).

Reboot router via Telnet

If the router is not bricked, you can use this button to reboot the router.

Reboot and connect to bootloader

If the router is not bricked and you want to connect to the bootloader (perhaps to test something) you can use this button to reboot the router and connect to the bootloader.

Skip reboot after bootloader functions

Several bootloader-based tasks have a reboot at the end to try to get the router to reboot into its normal mode. You can skip this reboot by ticking this option. Please note that this may lead to erratic behaviour from the router and/or RRT and should really only be used in advanced testing.

Reset router via Telnet

This experimental function is supposed to reset a working router to defaults but it may not work and it is probably better for users to reset their routers manually through the web interface.

Show advanced log

Using the “/advlog” switch at the command line when running the RRT enables the advanced logging. If this is enabled, clicking on the “Show advanced log” button will display the advanced log.

Clear advanced log

Clears the advanced log, assuming it has been enabled.

Disclaimer

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDER "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

If you do not agree with these terms, then you are advised to not use the software in question.