

OpenWrt Failsafe

OpenWrt SquashFS-Images have a built-in failsafe mode. OpenWrt failsafe mode bypasses all configuration located on the JFFS2 partition (that is the writable partition), in favor of a few hard coded defaults located on the SquashFS partition (that is the read-only partition), resulting in a device boots up as **192.168.1.1/24** on the **eth0** network interface with only essential services running. (In case your device has multiple network interfaces (eth0, eth1, ...), usually eth0 is the interface connected to the switch. There may be very seldom exceptions.)

From this state you can **telnet** in, mount the JFFS2 partition with the command `mount_root` and fix problems located on the JFFS2 partition, e.g. forgotten password, bad firewall settings, broken startup scripts, etc. Please read **OpenWrt Flash Layout** to understand why OpenWrt failsafe is possible, and also Boot Process to understand how it works: basically OpenWrt contains an additional boot up stage, called preinit. This allows to boot into normal mode by default or boot into failsafe mode, if this was triggered by the user. The triggering can happen in two ways: via pressing a hardware button during preinit-stage or via keyboard command while connected over a serial cable to the PCB during preinit-stage. No matter how the booting into failsafe mode was triggered, once OpenWrt booted into failsafe mode, you can telnet in over Ethernet.

→ **generic.debrick**

Prerequisites

- **your device must have a configurable hardware button**, if there's a button on your router, it's likely to be configurable. Check if there's specific info about failsafe mode for your device and make sure everything still works as expected everytime you update!
- there must be a **SquashFS-Image** flashed to the device. Failsafe cannot be implemented on JFFS2-Images
- everything but the JFFS2 partition, i.e. the kernel partition and the SquashFS partition, must be intact, so that...
 - ...the boot process is able to get as far as required to register the pressing of the button
 - ...the minimal required binaries and the configuration files with some default settings are available (all on SquashFS)

Triggering via Hardware Button (Standard OpenWrt method)

Stage 0: Router preparation

- Power off the router
- Unplug the WAN port (in case that WAN IP address and LAN IP address are same (address collision happened), if you do not plug out wan port, you cannot enter failsafe mode)

Stage 1: Computer IP settings

- Set your computer's IP to **192.168.1.2**, subnet **255.255.255.0**. The router will be reached at **192.168.1.1** when failsafe mode is running.

Stage 2: Detect when failsafe mode can be triggered

- To detect when failsafe mode can be triggered, there are two options: look for a bootup LED blink pattern, or look for a special broadcast packet from the router

Stage 2 option 1: Trigger failsafe mode when the SYS LED begins to blink

On some routers (e.g. TP-LINK models), OpenWrt will start to blink a LED (e.g. the "SYS" LED) on the front of the router when it is in its early boot cycle. The blink rate is about twice a second. Looking for a blink pattern is much more convenient to use instead of having to use a packet sniffer.

- Power on the router

- As soon as this blink pattern is seen, press the hardware button the front of the router
- The SYS LED will change to faster blink pattern, indicating the router is now in failsafe mode

On some TP-Link routers, the button is on the back of the unit (often labeled "WPS/Reset"). The switch may have a physical button, or may be behind a hole in the case and require a paper clip or similar tool to operate.

At least one TP-Link router seems to respond better to repeatedly clicking the button *before* the SYS LED starts to blink, until the SYS LED lights with the rapid-flash pattern.

Stage 2 option 2: Trigger failsafe mode when the router sends a broadcast packet to UDP port 4919

If the LED blink detection method isn't desired, the alternative is to listen on the UDP 4919 port for a broadcast packet on the computer and then press the front button when this packet is seen.

Start a network sniffer under Linux using tcpdump

In a terminal enter the command

```
tcpdump -Ani eth0 port 4919 and udp
```



Unverified Information!

Up to today (Jan 11, 2013) this page didn't precise on which port to listen. In the case of TL-WR1043ND, it's the WAN port. If you find a contradictory example, it will be necessary to remove or adapt this note.

Start a network sniffer under Windows using recvdup.exe

You can employ the recvdup.exe [<http://downloads.openwrt.org/people/florian/recvdup/recvdup-win32.zip>] utility software - Launch it. You may also need to temporarily disable firewall.

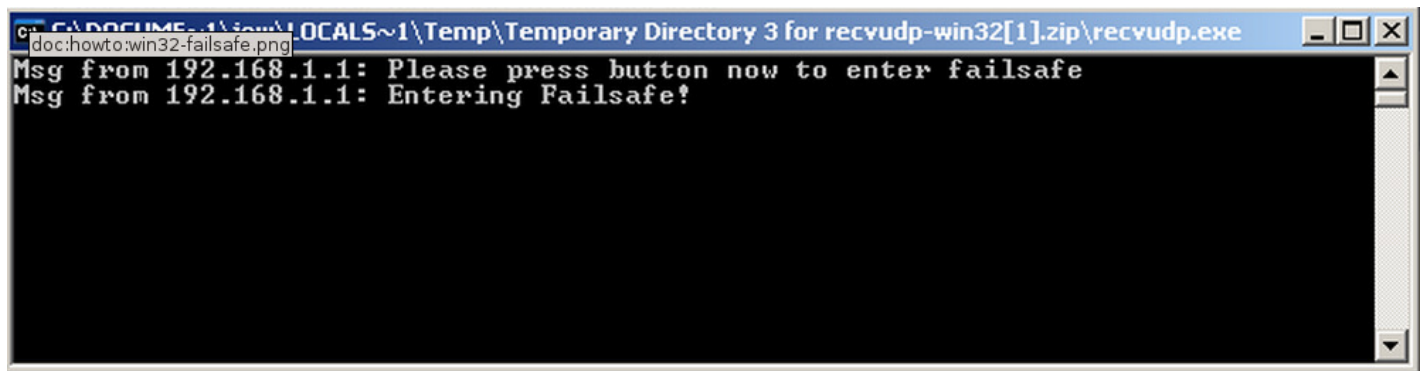
Look for the early boot network broadcast message

Power-cycle the router. The router will deliver a message telling it waits for your click on the button.

Message under Linux (only the first part)

```
jow@j400: ~  
File Edit View Terminal Help  
jow@j400:~$ sudo tcpdump -Ani eth0 port 4919 and udp  
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode  
listening on eth0, link-type EN10MB (Ethernet), capture size 96 bytes  
19:31:51.698343 IP 192.168.1.1.39212 > 192.168.1.255.4919: UDP, length 1001  
E.....@.@.....,7..=...Please press button now to enter failsafe.....  
19:31:56.298703 IP 192.168.1.1.48517 > 192.168.1.255.4919: UDP, length 1001  
E.....@.@.....7..u...Entering Failsafe!.....
```

Message under Windows (only the first line)



Stage 3: Trigger a failsafe boot using a button

Immediately when the LED blink pattern or the network broadcast message is seen, click the device button. If your device has multiple buttons, any button should work. OpenWrt is configured in a way, that pressing of any button during preinit will trigger booting into failsafe mode. But in case a button should not work, try another.

Stage 4: Log into the router using failsafe

Indications of failsafe mode:

- Once in failsafe mode, a network broadcast confirmation message appears (not always, for the TL-WR1043ND no message comes).
- On some router models (e.g. TP-LINK models), the SYS led blinks very quickly

Now, telnet at 192.168.1.1 from the computer. There is no username or password required.

Now go to section [In failsafe mode](#)

Remarks

- If the router does not boot in safe mode despite clicking the button, it may be a timing problem, missing the brief window when OpenWrt is looking for a button press. If so, immediately after turning the router on, rapidly click and keep clicking the button on the router for about 60 seconds to try to not miss the safe mode boot window.
- If your router has a ridiculously long boot time (such as [DIR-300 A](#)), then you may do this for a longer time.

Triggering via keyboard key combination in a serial console

1. Unplug the router's power cord.
2. Connect the router's WAN port directly to your PC.
3. Configure your PC with a static IP address between 192.168.1.2 and 192.168.1.254. E. g. 192.168.1.2 (gateway and DNS is not required).
4. Plug in the power.
5. Connect via serial
6. Wait until the following messages is passing: Press the [f] key and hit [enter] to enter failsafe mode
7. Press "f" and the "enter" key
8. You should be able to telnet to the router at 192.168.1.1 now (no username and password)

In failsafe mode

You get a message similar or same like this (using OpenWrt 12.09):

```
=== IMPORTANT =====
Use 'passwd' to set your login password
```

```

this will disable telnet and enable SSH
-----

BusyBox v1.19.4 (2013-03-14 11:28:31 UTC) built-in shell (ash)
Enter 'help' for a list of built-in commands.

 _ _ _ _ _ . _ _ _ _ _ . _ _ _ _ _ . _ _ _ _ _
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
|_| W I R E L E S S   F R E E D O M

-----
ATTITUDE ADJUSTMENT (12.09, r36088)
-----
* 1/4 oz Vodka      Pour all ingredients into mixing
* 1/4 oz Gin        tin with ice, strain into glass.
* 1/4 oz Amaretto
* 1/4 oz Triple sec
* 1/4 oz Peach schnapps
* 1/4 oz Sour mix
* 1 splash Cranberry juice
-----
root@(none):/#

```

NOTE: The root file system in failsafe mode is the only the SquashFS partition. The JFFS2 is not present. To mount JFFS2 in read-write mode run

`mount_root` [https://dev.openwrt.org/browser/trunk/package/base-files/files/sbin/mount_root]:

```
mount_root
```

and then repair your system:

- In case you forgot your password, you need to set a new one. Type:

```
passwd
```

- In case you forgot the routers IP address, get it with

```
uci get network.lan.ipaddr
```

- In case you filled up the entire JFFS2 by installing too big/too many packages, clean the entire JFFS2 partition. All settings will be reset and all installed packages are removed. (OpenWrt equivalent of a factory reset)

```
firstboot
```

or (this will reboot the device as part of the process)

```
mtd -r erase rootfs_data
```

or

```
rm -r /overlay/*
```

If you are done with failsafe mode use

```
reboot -f
```

to reboot. *Note: Normal `/sbin/reboot` will not work, because `init` is not running.* Or power cycle the router.

Notes

- the article [process.boot](#) may help you better understand when failsafe "kicks in" once activated

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