

Networking Hardware

Information and guides related to home networking and computer hardware, including Routers, PCs, devices, and appliances.

- Router Firmware for SOHO Equipment
 - Fresh Tomato
 - DD-WRT
 - OpenWRT
- Open Source Router Software
 - OPNsense

Router Firmware for SOHO Equipment

Router custom firmware information for common models of Small Office/Home Office router equipment, such as Netgear, Asus, and Linksys routers.

Fresh Tomato



..FRESH TOMATO..

FreshTomato is a firmware project based on Linux, targeting home and SOHO routers. FreshTomato is distributed on the [GPL license](#).

FreshTomato supports Broadcom based systems.

“ I currently run Fresh Tomato firmware on several Netgear Nighthawks. The R7000 and R8000 are my current preferred routers for Fresh Tomato firmware.

It is far superior in both security and features than the original Netgear firmware that came with these routers. Unlike Netgear, updates for the router firmware to address security vulnerabilities or correct bugs are available on a regular basis. Netgear would usually take well over a year to address security issues, if at all.

Status

- Overview
- Device List
- Web Usage
- Logs
- Bandwidth
- IP Traffic
- Tools
- Basic
- Advanced
- Port Forwarding
- Access Restriction
- DoS
- Bandwidth Limiter
- Captive Portal
- Web Server
- USB and NAS
- VPN Tunneling
- Administration

System

Name	N66U
Model	Asus RT-N66U
Bootloader (CFE)	1.0.1.9
Chipset	Broadcom BCM5300 chip rev 1 pkg 0
CPU Frequency	600MHz
Flash Size	32MB
Time	Mon, 20 Apr 2020 18:07:54 +0200
Uptime	0 days, 00:04:31
CPU Load (1 / 5 / 15 mins)	1.23 / 0.71 / 0.29
Total / Free Memory	249.39 MB / 221.96 MB (89.00%)
Total / Free NVRAM	64.00 KB / 24.04 KB (37.55%)

Ethernet Ports State



WWAN Modem Status

Modem type	hilink
Current Mode	LTE
RSSI	-71 dBm
RSRP	-103 dBm
RSRQ	-9 dBm
SINR	-1 dB
Location	MCC: 2 MNC: 06 LAC: 0x0 (0) Cell ID: 0x0 (211) PC: 0x155 (341)

WAN

MAC Address	50:46:...
Connection Type	4G/LTE
IP Address	192.168.8.100
Subnet Mask	255.255.255.0
Gateway	192.168.8.1
DNS	192.168.8.153
MTU	1500
Status	Connected
Connection Uptime	0 days, 00:02:51
Remaining Lease Time	0 days, 23:57:09

Renew Release

LAN

Router MAC Address	50:46:...
Router IP Addresses	br0 (LAN) - 192.168.1.1/24 br1 (LAN1) - 192.168.2.1/24 br2 (LAN2) - 192.168.3.1/24
DHCP	br0 (LAN) - 192.168.1.2 - 192.168.1.51 br1 (LAN1) - 192.168.2.2 - 192.168.2.51 br2 (LAN2) - 192.168.3.2 - 192.168.3.51

Wireless (2.4 GHz / eth1)

MAC Address	50:46:...
Wireless Mode	Access Point
Wireless Network Mode	Auto
Interface Status	Up (LAN)
Radio	Enabled
SSID	pedro-test2
Broadcast	Enabled
Security	WPA2 Personal (PSK) + AES
Channel	6 - 2.437 GHz
Channel Width	40 MHz
Interference Level	Acceptable
Rate	54 Mbps

Enable Disable

Wireless (5 GHz / eth2)

MAC Address	50:46:...
Wireless Mode	Access Point
Wireless Network Mode	Auto
Interface Status	Up (LAN)
Radio	Enabled
SSID	pedro-test5-2
Broadcast	Enabled
Security	WPA2 Personal (PSK) + AES
Channel	104 - 5.520 GHz
Channel Width	40 MHz
Interference Level	Acceptable
Rate	450 Mbps

Enable Disable

Wireless (2.4 GHz / wi0.1)

MAC Address	52:46:...
Wireless Mode	Access Point
Interface Status	Up (LAN1)
SSID	pedro-guest
Broadcast	Enabled
Security	WPA2 Personal (PSK) + AES

Installing on a R8000 Router

Since I use Netgear Nighthawk R8000 routers in my environment, I thought I would outline the process I use to flash fresh Tomato firmware to them. Fresh Tomato supports other broadcom based routers as well. If you have another make and model of router, you can check if yours is supported by going [here](#).

Be sure to read the installation information for your model of router. This installation guide is simply the way I install the firmware on my R8000 routers. I do not imply any guarantee this will work for yours. You are responsible for taking the risk.

“ I will get the instructions in here as soon as time permits. A bit busy with life at the moment.

Fixing a 'Bricked' R8000 Router

Recently, I decided I wanted a router as a "shelf spare" in the event one of my production routers failed. Since I have previously flashed many R8000s for myself without issue, I proceeded to purchase a used R8000 from eBay. This particular router, however, 'bricked' on me when I attempted to flash Tomato firmware to it.

“Bricking” essentially means a device has turned into a brick. It may be an electronic device worth hundreds of dollars, but it’s now as useful as a brick (or perhaps a paperweight). A bricked device won’t power on and function normally. A bricked device cannot be fixed through normal means.

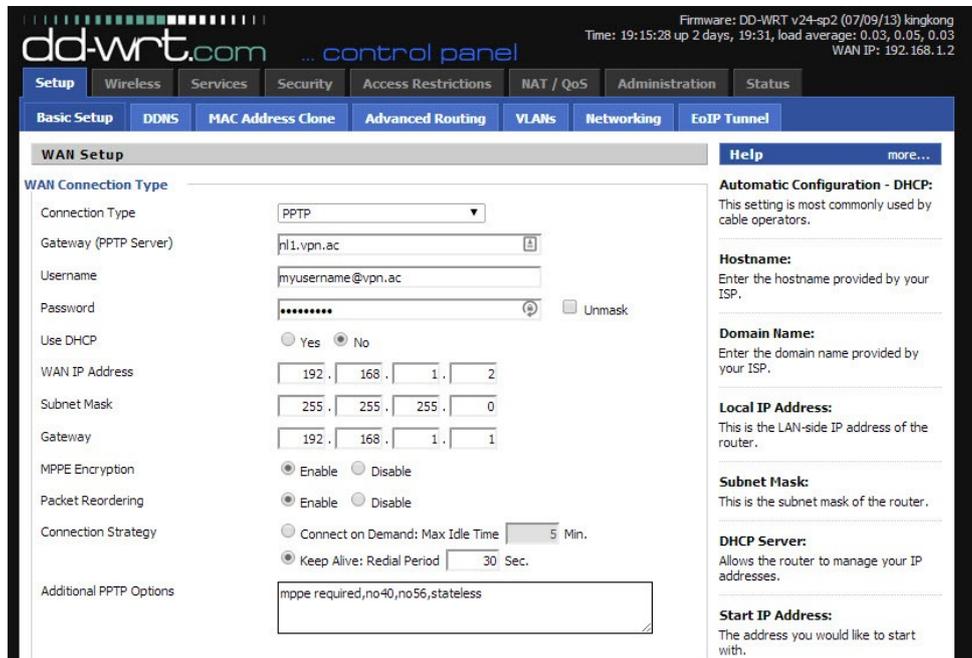
Anyway, I thought I would detail the steps and requirements I used to 'unbrick' my router and get it working with Tomato firmware.

“ I will get the instructions in here as soon as time permits. A bit busy with life at the moment.

DD-WRT



DD-WRT is a Linux based alternative OpenSource firmware suitable for a great variety of WLAN routers and embedded systems. The main emphasis lies on providing the easiest possible handling while at the same time supporting a great number of functionalities within the framework of the respective hardware platform used.

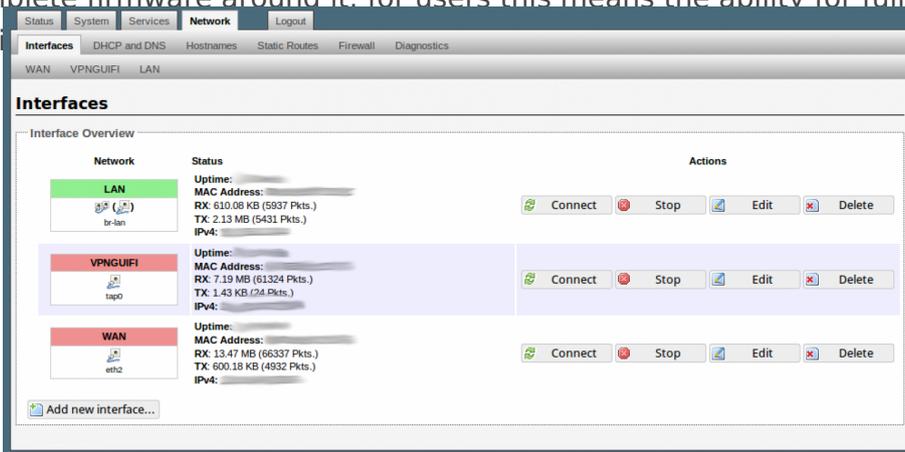


DD-WRT Control Panel

OpenWrt



The **OpenWrt** Project is a Linux operating system targeting embedded devices. Instead of trying to create a single, static firmware, OpenWrt provides a fully writable filesystem with package management. This frees you from the application selection and configuration provided by the vendor and allows you to customize the device through the use of packages to suit any application. For developers, OpenWrt is the framework to build an application without having to build a complete firmware around it; for users this means the ability for full customization, to use the dev



LuCi Interface for OpenWrt

Open Source Router Software

Software for building your own router/firewall/IDS/IPS appliance.

OPNsense



<https://opnsense.org/>

OPNsense is an open source, FreeBSD-based firewall and routing software.

Installed on appropriate hardware, it replaces SOHO routers with a much more robust, effective and powerful appliance to protect your home network. Using built-in and available add-ons, you can build a feature set as simple or complex as you require. Integrations such as intrusion detection/prevention, DHCP and DNS services, VPN services, Firewall with aliasing just to name a few, come standard with OPNsense. Add-ons, both free and subscription-based are available. Using the add-ons, referred to as plug-ins in OPNsense, you can setup proxys, reverse-proxys, web caching, and much more.

As an example, I have my OPNsense appliance setup with extra security measures using Crowdsec, Maltrail, Country Blocking and Zen Armor (Formerly Suricata). I also have a Wireguard VPN setup to permit secure access to my internal devices and servers should I need to access them remotely. I utilize OPNsense's built-in Unbound DNS application to manage and secure my domain name services.

Frankly, I had been using consumer routers (NetGear, ASUS, etc) with custom firmware (DD-WRT, Fresh Tomato, etc) for years. They just couldn't keep up with the demands placed on them and they had very little in the way of firewall and no intrusion detection/prevention ability. Using OPNsense, I have essentially future-proofed my home network from most bad actors and have noticed a SIGNIFICANT improvement in throughput as well. You are really only limited by the hardware you choose to run it, which, even on low end hardware, is substantially more powerful than any high-end consumer (SOHO) router.

While OPNsense's default Lobby dashboard is pretty good, I'd recommend using a combination dashboard that utilizes InfluxDB, Grafana and Telegraph or Ansible. A really good example of this is Brendan Smith's implementation shown in the pic below and instructions for this dashboard can be found on his website "[How to Configure an OPNsense Dashboard](#)"

Hardware

Active Users

1

Uptime

9 days, 23:37

CPU Total

5.59%

CPU

CPU

	max	avg	current
cpu0	100.0%	6.6%	11.2%
cpu1	100.0%	8.8%	12.5%
cpu2	100.0%	8.6%	10.4%
cpu3	100.0%	8.4%	14.4%

Process Information

Running	Idle	Sleeping	Wait	Blocked	Zombies
4	32	10	1	23	0

Load

	max	avg	current
load1	4.00	0.45	0.40
load15	1.00	0.43	0.42
load5	1.74	0.45	0.46

Disk Utilization

	max	avg	current
/	1.59%	1.58%	1.59%

Ram

	min	max	avg	current
Ram Used	14.1%	16.2%	15.0%	15.0%

Temperature Sensors

	min	max	avg	current
cpu0	54.1 °C	60.5 °C	57.1 °C	57.5 °C
cpu1	54.1 °C	60.5 °C	57.1 °C	57.5 °C
cpu2	54.1 °C	60.5 °C	57.1 °C	57.5 °C
cpu3	54.1 °C	60.5 °C	57.1 °C	57.5 °C

Firewall

Firewall Blocked Events on igb0

5690

Firewall Blocked Destination Ports on igb0

Value	Value
23	171
6379	153
8080	87
8443	80
7680	70

Firewall Blocked Event Locations on igb0

Top IP Blocked on igb0

89.248.165.86

Firewall Blocked Protocols on igb0

Value	Value
tcp	5195
udp	495
icmp	32

Network Stats

Gateway RTT - All

	min	max	avg	current
WAN_DHCP	8.40 ms	34.1 ms	11.3 ms	34.1 ms

Interface summary

Interface	Friendly Name	IPv4 Address	Physical Address	Status
igb0	WAN	0.0.0.0	aa:aa:aa:aa:aa:aa	UP
igb1_vlan2	Management	172.16.2.1	aa:aa:aa:aa:aa:aa	UP
igb1_vlan3	Voice	172.16.3.1	aa:aa:aa:aa:aa:aa	UP
igb1_vlan4	Services	172.16.4.1	aa:aa:aa:aa:aa:aa	UP
igb1_vlan5	Home	172.16.5.1	aa:aa:aa:aa:aa:aa	UP
igb1_vlan6	Guest	172.16.6.1	aa:aa:aa:aa:aa:aa	UP
igb1_vlan7	IoT	172.16.7.1	aa:aa:aa:aa:aa:aa	UP
igb1_vlan8	Other	172.16.8.1	aa:aa:aa:aa:aa:aa	UP

Gateway Summary - All

Gateway Description	Monitor IP	Gateway IP	Status
Interface WAN_DHCP Gateway	0.0.0.0	0.0.0.0	online

WAN Interface - igb0

Interface Summary

Interface	Friendly Name	IPv4 Address	Physical Address	Status
igb0	WAN	0.0.0.0	aa:aa:aa:aa:aa:aa	UP

WAN Traffic - igb0 (Bits/sec)

	max	avg	current
Bits Recv	223.44 Mb/s	5.28 Mb/s	4.66 Mb/s
Bits Sent	24.24 Mb/s	182.71 kb/s	24.24 Mb/s

igb0 - Bits Recv

5.51 Mb/s

igb0 - Bits Sent

28.68 Mb/s

igb0 - Bytes Recv - This Month

53.15 GiB

igb0 - Bytes Sent - This Month

1.83 GiB

WAN Throughput - igb0

	min	max	avg	current
Packets Recv	7.100	18.703 K	456.070	1.287 K
Packets Sent	9.100	6.340 K	246.032	2.239 K

LAN Interface - igb1_vlan5

Interface Summary

Interface	Friendly Name	IPv4 Address	Physical Address	Status
igb1_vlan5	Home	172.16.5.1	aa:aa:aa:aa:aa:aa	UP

LAN Traffic - igb1_vlan5 (Bits/sec)

	max	avg	current
Bits Recv	24.15 Mb/s	99.47 kb/s	24.15 Mb/s
Bits Sent	232.06 Mb/s	2.61 Mb/s	25.15 Mb/s

igb1_vlan5 - Bits Recv

28.85 Mb/s

igb1_vlan5 - Bits Sent

30.04 Mb/s

igb1_vlan5 - Bytes Recv - This Month

1019.51 MiB

igb1_vlan5 - Bytes Sent - This Month

26.22 GiB

LAN Throughput - igb1_vlan5

	min	max	avg	current
Packets Recv	6.70	6.50 K	64.72	2.37 K
Packets Sent	4.90	19.43 K	236.37	2.96 K

LAN Interface - igb1_vlan2 (5 panels)

LAN Interface - igb1_vlan3 (5 panels)

LAN Interface - igb1_vlan4 (5 panels)

LAN Interface - igb1_vlan6 (5 panels)

LAN Interface - igb1_vlan7 (5 panels)

LAN Interface - igb1_vlan8 (5 panels)

