

## Contents

- 1 Hardware
  - ◆ 1.1 Specifications
  - ◆ 1.2 Main board
- 2 Installation Instructions
  - ◆ 2.1 Out-of-the-box factory firmware upgrade
    - ◇ 2.1.1 Principle steps
    - ◇ 2.1.2 How it is done
    - ◇ 2.1.3 Notes:
  - ◆ 2.2 How to upgrade with new DD-WRT firmware
  - ◆ 2.3 How to restore to factory firmware
- 3 Current Known Issues and Bugs
- 4 Other
  - ◆ 4.1 NVRAM near full?
  - ◆ 4.2 Overclocking
  - ◆ 4.3 Recovery Mode
  - ◆ 4.4 If you have bricked your Asus RT-N16
  - ◆ 4.5 Upgrading the Power Supply
- 5 Performance
- 6 Links

## Hardware



The ASUS RT-N16 is a Single Band N-Router (2.4GHz only) with lots of RAM (128Mb) and FlashRAM (32Mb), so it is well equipped to run DD-WRT

The ASUS RT-N16 is in the 100Mbps+ Routing class, meaning it can route at higher speeds than a 100Mbps WAN connection can handle, but it does not even attempt to approach GigaBit WAN performance. Performance details below.

## Asus\_RT-N16

If you are looking for a Dual Band N-Router (both 2.4GHz and 5GHz bands) also with lots of RAM (256MB) and FlashRAM (32Mb), you could take a look at the [ASUS RT-N66U](#). If you are looking for a cheaper router, but still with DD-WRT Mega specs (and USB port) you could take a look at the [Asus RT-N10U](#) Single Band N-Router with 32Mb RAM and 8Mb FlashRAM.

## Specifications

Unit RAM = 128 MB (2x 64MB - Samsung K4N511163QZ-HC25 or 2x 64MB - Samsung K4T51163QG-HCE6)

Unit Flash = 32 MB (MACRONIX MX29GL256EHTI2I-90Q)

Unit NVRAM = 32K

Unit CPU = Broadcom 4716, 533 MHz (Factory clocked to 480MHz)

use command `cat /proc/cpuinfo` in a terminal program like puTTY to get the full CPU details

USB ports = USB2.0 x 2

Stock Power Supply = 12V - 1,25A max ([Upgrading the Power Supply](#))

Ethernet Ports = WAN x 1 RJ-45 for 10/100/1000 Base T, LAN x 4 RJ-45 for 10/100/1000 Base T

Antennas = 3 x external detachable 2dBi antennas

WiFi Operating Frequency = 2.4GHz ~ 2.5GHz

802.11n Draft = up to 300Mbps

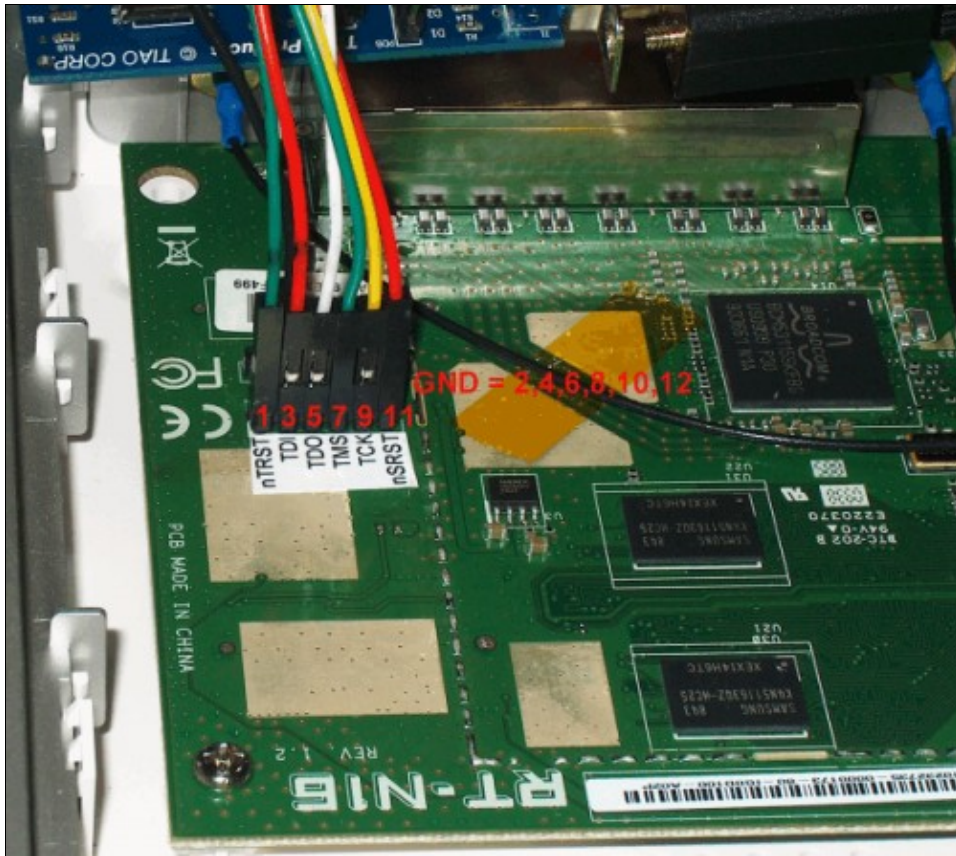
802.11g = 6, 9, 12, 18, 24, 36, 48, 54Mbps

802.11b = 1, 2, 5.5, 11Mbps

Unit Switch Chip = Broadcom BCM53115SKFBG

Color of LEDs = Blue

## Main board



This shows the main board for the Asus RT N16 along with the location for the JTAG headers.

## Installation Instructions

### Out-of-the-box factory firmware upgrade

Please note: The RT-N16 does REQUIRE the **K26** Firmware builds as Broadcom has not released drivers for the non-K26 builds. (Read more here: [Recommended Firmwares](#)). So the NEWD firmwares were actually specifically designed for this generation of Broadcom based routers.

Details of the DD-WRT firmware build variations are [found here](#)

### Principle steps

- ◇ Restore Factory Default settings ([Clear NVRAM](#))
- ◇ Install the INITIAL ASUS RT-N16 version of DD-WRT (file name ends in **.trx**)
- ◇ Restore Factory Default settings ([Clear NVRAM](#))
- ◇ "Upgrade" to your final version of DD-WRT (file name ends in **.trx** or **.bin**)
- ◇ Restore Factory Default settings ([Clear NVRAM](#))

Optional:

- ◇ Install more packages, like Optware packages (see: [Optware, the Right Way \(OTRW\)](#) and [OTRW Take 2](#)).

## How it is done

1. Do a Restore Factory Default settings in the Asus GUI. Asus factory default username/password is admin/admin. Let the router reboot. Disconnect all cables (WAN, USB, etc.) and plug the Ethernet cable from your PC into the LAN1 port on the router.
2. Select the INITIAL dd-wrt firmware, located here :
  - ◆ Recommended Build for initial flashing:  
[dd-wrt.v24-14929\\_NEWD-2\\_K2.6\\_mini\\_RT-N16.trx](#) (see note about NAT loopback below)
3. Flashing the INITIAL Firmware to the router (the one where the file name ends in .trx)  
EITHER Using your browser, Flash the downloaded firmware (.trx file) through the router's GUI
  - Open you browser at <http://192.168.1.1/>.
  - Goto Administration tab -> Firmware Upgrade tab.
  - Upload and wait for router to reset on its own (may take anywhere from 3 to 15 minutes).  
*Note on browsers:* Some users report problems using anything but Internet Explorer. Other users successfully report using whatever browser they are used to using. So your mileage may vary.ALTERNATE - set the router in "Recover mode" (same as other Asus routers)
  - Use ASUS Firmware Restoration Utility to upload the new firmware (included on router CD or downloadable from [here](#)).
  - You need to set the PC to Static IP 192.168.1.2 ([Static IP guide](#))
  - Set the router in recovery mode by holding in the reset button when plugging in the power. The power light should now be blinking slowly, meaning the router is in restore/recovery mode and ready for the new firmware. Upload and wait for the router to reset on its own (may take anywhere from 3 to 15 minutes).  
*Note on Asus Recovery Utility:* The recover utility is basically a fancy tftp server, with added wait timer, so non-windows users may use standard tftp tools to upload firmware, just remember to do the proper wait for 3 minutes or more, for the unit to re-boot on its own, after the 10 to 30 seconds of tftp'ing is done. Inspiring tftp guides: [Tftp flash](#), [Asus TFTP Flash](#)
4. After the reboot from flashing, wait for the device to show the password change screen for DD-WRT. Enter **root** as the user and anything for the password as you will do the user/pass procedure again after the final flash.
5. Do a Factory Reset to [clear the NVRAM](#).
  - ◆ *Method A* - Use the DD-WRT GUI. Goto Administration -> Factory Defaults -> click Yes -> select Apply Settings.
  - ◆ *Method B* - Do a [Hardware Reset or 30-30-30](#). The following procedure will clear out the NVRAM and set dd-wrt back to default values:
    - ◇ With the unit powered off, press and hold the Red WPS button on the back of the unit.
    - ◇ Without releasing the WPS button plug the power in, and hold the WPS button for 30 seconds
    - ◇ When releasing the WPS button the unit will reboot and Factory Default settings will be loaded.

Note on hardware reset to clear the NVRAM: ASUS units have a different

## Asus\_RT-N16

reset procedure than Linksys units. The above described method actually works on the RT-N16! See also [Eko Forum note](#)

6. Do not skip step 5! :- The resetting of NVRAM is IMPORTANT!!! and should be done BEFORE and AFTER every firmware upgrade/downgrade.
  7. "Upgrade" to the dd-wrt firmware you want to end up with (the one where the file name ends in .bin) (see [K26 Build Features](#) for options) . This time you can use the web interface to do the upload. Administration -> Firmware Upgrade. Make sure you understand that you need a k26 build for this router, and how to flash properly. READ THE PEACOCK ANNOUNCEMENT in the broadcom forum.
1. Reward yourself for reading and following these instructions with a cold beverage of your choice. Enjoy DD-WRT on the RT-N16 ! Also, please think about donating to DD-WRT as we are an open-source community and charge nothing to turn a sub \$100 consumer router into \$600-\$1000 commercial grade router.
  2. Consider [OTRW](#) and [OTRW Take 2](#) to add useful services such as pixelserv, stophammer and much more. Asterisk with Gtalk been succesfully installed. Use the search function in the forum to find Gtalk, Asterisk and Asterisk. The same applies in digium.com forums (also search for threads by gatorback in here).

Also read [Wireless-N Configuration](#) to learn how to get the most WiFi data speed out of your new N-Router.

### Notes:

- If NAT loopback is needed, then flash the 14929 build.
- NAT loopback does not work using any build above 15778 (though see [Forum](#) for a possible NAT loopback fix for newer versions of firmware)
- Read the [peacock announcement](#) for more details about recommended build, NAT loopback problem and more essential DD-WRT firmware details.
- Note the Asus RT-N16 needs a K26 build! Build 14929 is the currently recommended broadcom build.
- Special thanks to Eko for making the initial work on getting the RT-N16 to work with DD-WRT!
- Likely stable newer build for RT-N16 is [svn15962](#) see [Forum notes](#) Will likely still need [NAT loopback fix](#)

## How to upgrade with new DD-WRT firmware

If DD-WRT is already loaded on your router, you can upgrade/upload a firmware using these steps

1. Download more recent firmware
  - ◆ Mini [-dd-wrt.v24-18024\\_NEWD-2\\_K2.6\\_mini\\_RT-N16.trx](#) R18024.
  - ◆ Mega [-dd-wrt.v24-18024\\_NEWD-2\\_K2.6\\_mega.bin](#) R18024.
2. Open the DD-WRT's web interface in your web browser. It's <http://192.168.1.1/> by default.
3. Do a Restore Factory Default settings ([Clear NVRAM](#)). Let the router re-boot.
4. Open the DD-WRT's web interface in your web browser. Upload/upgrade the firmware using the
5. Administration tab -> "Firmware Upgrade" button.
6. Click "browse" button -> select the dowloaded firmware file -> click "Upgrade" button. It will take about 2-5 minutes to upload and write the flash. Your browser will reload and let you know when it is done.

7. Do a Restore Factory Default settings (Clear NVRAM). Let the router re-boot.
8. That's it.

Note: As part of the upload/upgrade process it is possible in "After flashing, reset to" choose "Reset to Default settings" and the router will automatically reset to Factory Default settings when it re-boots. This way you may skip step 7, as its done automatically. But just to be on the safe side, I would just do step 7 anyway :)

## How to restore to factory firmware

1. Download the latest ASUS firmware from the ASUS web site [1]. Or go to <ftp://ftp.asus.com.tw/pub/ASUS/wireless/RT-N16> with a client FTP.
2. Rename the asus file from .trx to .bin
3. Do a Restore Factory Default settings (Clear NVRAM) while DD-WRT is still loaded on your router.
4. Go into the DD-WRT firmware upgrade page, set it to reset defaults, and select the ASUS firmware you renamed.
5. After the flash finishes, and the router has re-booted, you see the ASUS GUI.
6. Do a Factory Reset to clear the NVRAM (using the Asus web gui)
7. Try to enjoy ASUS's firmware, and keep missing DD-WRT (fortunately you can just flash back to dd-wrt again when ever you want)

## Current Known Issues and Bugs

- Hardware (capacitor) Fix for RT-N16 wireless drop-outs [2]
- UPnP is currently not working for the RT-N16, so for now leave the feature disabled unless you want a full CPU Load. **FIXED** with SVN [trac Changeset #13527](#)
- Access Restriction with MAC-Filter doesn't work on Asus RT-N16. **FIXED** [trac Ticket #1319](#) (as of 12/18/09)
- On this router the reset button will only bring you to recovery mode. If you wish to restore defaults, use the Red WPS button while plugging power in. [Post By Eko](#)
- Rflow data reports only on upload traffic ([Trac #1139](#)). Further discussed in [this thread](#) (this issue only affects people actively using/enabling Rflow).
- This device only has 32K of NVRAM and using traff (Traffic graph in Status\_Internet.asp) or UPnP will cause the NVRAM to fill up quickly. Once full, router functions like ddns will stop functioning and upon the next reboot the router will reset it self to firmware defaults. Disable traff and/or UPnP to prevent this or flush the traff stats occasionally.
  - ◆ Note on traff: Status -> WAN -> (at the buttom) Data Administration -> button "Delete" flushes the traff stats. Services -> Services -> WAN Traffic Counter -> ttraff Daemon: Disable -> Apply settings, will stop the collection of traff data. You may however just choose to reset/delete traff data every month, and the traff data will not take much room in the NVRAM
  - ◆ Note on UPnP: Access to UPnP settings: NAT/QoS -> UPnP. In newer builds (Spring 2012) UPnP is disabled by default.
  - ◆ Note on 32k NVRAM. Tornado is working on a solution to change this setting to a 60/64k

NVRAM setting (June 2012). See [techinfodepot.info](http://techinfodepot.info) or contact [tornado@tjtag.com](mailto:tornado@tjtag.com) to help out.

- ◆ Note on monitoring NVRAM usage. In newer builds (spring 2012) NVRAM usage/max is displayed on the front Web GUI at "Space Usage"
- USB HDs after Build 15407: "The devs of dd-wrt have removed the loading of file system drivers from the startup of the firmware. They are now loaded on demand with automount. Well, this presents a problem for those of us with USB HDD that automount doesn't detect. In order to load the file system drivers at startup you need to add the following to save startup in the commands tab" for more, see [techinfodepot, Asus\\_RT-N16, DD-WRT Notes](#)

## Other

### NVRAM near full?

This device currently has only 32K of NVRAM available due to limitations within the CFE coding, and some users have reported their routers rebooting and resetting themselves due to NVRAM becoming overfilled. Save the following as a startup script, it will remove initialized variables that are stored in NVRAM and currently have no value assigned to them (This cleared up nearly 5K of NVRAM in my experience).

```
#!/bin/bash
rm /opt/tmp/nvramshow
nvram show >> /opt/tmp/nvramshow
i=0
while read -r line; do
val=${line#*=}
var=${line%*=}
if [[ "$val" == "" ]]; then
    nvram unset $var
fi
i=`expr $i + 1`
if [[ $i == 50 ]]; then
    sleep 2
    i=0
fi
done < /opt/tmp/nvramshow
exit 0
```

Here is another simpler version. instead of outputting to a file and checking each var if they are empty, we can easily use grep to find empty vars

check current size and empty var count

```
root# nvram show | grep = $ | wc -l
size: 30273 bytes (2495 left)
414
```

clean up

```
root# for line in `nvram show | grep = $ `; do var=${line%*=}; nvram unset $var; done
```

check again....

## Asus\_RT-N16

```
root# nvram show | grep =$ | wc -l
size: 24307 bytes (8461 left)
0
```

saved almost 6K

```
root# echo "$((8461 - 2495))"
5966
```

## Overclocking

By factory default the cpu is clocked at 480 MHz and the Ram at 240 MHz. Overclocking at CPU 532 MHz / Ram 266 MHz can be achieved with these commands in a Telnet/SSH session :

- nvram set clkfreq=532,266
- nvram commit
- reboot

Note : some users have had overheating issues, so adding a fan may be a good idea if you want to try the overclocking.

More informations here with pictures to prevent overheating issues with heat sinks :

- <http://www.dd-wrt.com/phpBB2/viewtopic.php?t=69261> and
- <http://www.dd-wrt.com/phpBB2/viewtopic.php?t=70202> or
- <http://www.dd-wrt.com/phpBB2/viewtopic.php?p=442803> again
- <http://www.dd-wrt.com/phpBB2/viewtopic.php?t=73175&highlight=rtn16>

Note :

- other instability issues may also arise from overclocking. Overclocking is NOT a good idea.
- See also [Overclocking BCM 47xx CPU's](#) for more info.

## Recovery Mode

This router does have a recovery mode if ever needed for flashing, and to access it, press the WPA button (not the reset button like other ASUS), then plug in power, and tftp the firmware you want to flash. Don't forget to do a Factory Reset in the GUI before and after every flash to make sure you don't have any nvram problems or conflicts. On this router reset button only resets the nvram partition. If you wish to use tftp to restore defaults, use the wps button while plugging power in.

## If you have bricked your Asus RT-N16

1. You could try to Hardware reset it to Factory Defaults by holding in the red WPS button while plugging in the power. [Eko Forum note](#)
2. You could try to use the Recovery mode, and upload a different firmware.



3. You could use the serial connector (inside the router) and use CFE-level commands. Use 3.3V TTL level signaling. For example [Sparkfun FTDI Serial adapter](#) (US shop) a small and very reliable unit providing: Virtual Serial port via PC USB to 3.3V-TTL (Rx, Tx) Serial signaling. [UK outlet](#)
4. You could try to reset/reload the firmware using the [TJTAG](#) software and the [JTAG](#) connector inside the router.

## Upgrading the Power Supply

A higher amperage about the power supply (adapter) for the Asus RT-N16 is possible. Please take a look at this : <http://www.dd-wrt.com/phpBB2/viewtopic.php?t=77149>

## Performance

Test Description	Throughput - (Mbps)
WAN - LAN	141.1
LAN - WAN	143.3
Total Simultaneous	155.9
Max. Connections	200
Firmware Version	1.0.0.6

Sources: [\[3\]](#) Testing methods: [\[4\]](#), [\[5\]](#)

## Links

- [Forum: Support Thread \(100 pages\)](#) => [Condensed into one forum post](#) is also new RT-N16 Support Thread
- [about RT-N16 @ techinfodepot](#)

## Reviews

- <http://blog.itechtalk.com/2010/review-on-asus-rt-n16-router/>
- <http://www.smallnetbuilder.com/wireless/wireless-reviews/31058-asus-rt-n16-gigabit-n-router-reviewed>