

802.11n support in FreeBSD (for the run(4) driver)

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Motivation

- “Do something with operating systems”

OS Junkie: Ubuntu → Fedora → Arch Linux → Gentoo → FreeBSD

- Do something for the community

So much free (not free as in free beer) software out there for use

Time to give something back!

- Faster WiFi doesn't hurt

Makes FreeBSD more usable

Less angry users: “But this works on Lunix!”

FreeBSD

- Open source, UNIX
- Official webpage: freebsd.org
- Large, helpful community

IRC Channels on Freenode ([#freebsd](https://freenode.net))

Forums (forums.freebsd.org)

Mailing lists (lists.freebsd.org)

- Latest Release: FreeBSD 12 (2018)



802.11

- IEEE 802.11: Standard for WiFi

802.11b: 2.4GHz, Max rate 11 Mbps, range 150 ft., Year 1999

802.11g: 2.4 GHz, Max rate 54 Mbps, range 150 ft., Year 2003

802.11n: 2.4GHz or 5 GHz, Max rate 300 Mbps (single antenna), 450 Mbps (MIMO), range 175 ft., Year 2009

Ralink

- Produces WiFi chips

See <https://wikidevi.com/wiki/Ralink> for list of chips

- Linux driver: rt2800usb (USB Ralink 802.11n devices) (<https://wiki.debian.org/rt2800usb>).
- FreeBSD driver: run (see [https://www.freebsd.org/cgi/man.cgi?run\(4\)](https://www.freebsd.org/cgi/man.cgi?run(4)))

Caveats : “The run driver does not support any of the 802.11n capabilities offered by the RT2800, RT3000 and RT3900 chipsets.”

Existing code base

- The run driver supports several chipsets and adapters (such as ASUS USB N-66) but without support for 802.11n

This means reduced speeds

This means it will misbehave when you turn on your microwave

- run(4) also has annoying 'device timeout' errors where the card stops responding.



What will you add?

- Support for 802.11n to run driver for at least supporting the ASUS USB N66 device.
- Depending on the outcome and level of frustration, extend this to other chipsets if time permits

Who else is working in this area?

- FreeBSD developers:

Adrian Chadd, **the** wireless person in FreeBSD right now

Michael Zhilin, fixes issues with Ralink drivers

Avos, wireless hacker active on IRC

Others hanging out of #freebsd-wifi in EFNET

Lines of code (existing)

- /usr/src: 17 million lines
- /usr/src/sys/dev: 2.7 million lines
- /usr/src/sys/dev/usb/wlan: 28k lines
- /usr/src/sys/dev/usb/wlan/if_run.c: 6400 lines
- /usr/src/sys/net80211: 48k lines of code

Lines of code (to be added)

- `/usr/src/sys/dev/usb/wlan/if_run.c`: ~200 lines
- `/usr/src/sys/net80211`: ~1k lines (needs more investigation)



Licenses

- Linux drivers licensed under GPLv2
- FreeBSD drivers licensed under the BSD license.



Acceptance process

- Fix stuff
- Send patches to mailing list / FreeBSD developer
- New entry at reviews.freebsd.org
- Write enough documentation
- Get merged!

Plan of action

- Understand how a wireless USB device works under the hood to better understand driver code.
- Read the existing IEEE80211 stack, run driver code on freebsd along with linux's rtusb driver to see what needs to be added to run.
- Start writing code and test with the ASUS USB N66 device.
- Once everything works, submit for review.



Questions?

- “In a world without boundaries, who needs windows and gates?”



Credits

- BSD Daemon (Slide #3) : BSD Daemon Copyright 1988 by Marshall Kirk McKusick. All Rights Reserved. Permission to use the daemon may be obtained from: Marshall Kirk McKusick, 1614 Oxford St, Berkeley, CA 94709-1608, USA or via email at mckusick@mckusick.com