

Linux Wireless Drivers

Freedom considered harmful?

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- OpenWrt developer for >10 years
- Involved with Linux wireless drivers almost as long
- Main focus: access points and mesh nodes
- Preference for widely available consumer devices

Why do we need free 802.11 drivers?

- Security
- Stability
- Maintenance costs / complexity
- Interesting research projects
- Features not deemed relevant by vendors

My journey through Linux Wireless

Early days: Broadcom BCM47xx

- Binary-only driver for Linux 2.4
- Kernel hacks to deal with ABI changes
- Later partially replaced by b43

Early days: MadWiFi

- More 'free' than the Broadcom blob
- Still non-free binary parts
- No kernel dependent binaries anymore

- Finally a free replacement for MadWiFi
- Based on reverse engineering
- Useful prototype for developing mac80211 features

- Developed by Atheros
- Initial development driven by Laptop customer demand
- Strong push from community people to open more code / documentation
- Actually became stable enough for commercial use
- Used by some embedded hardware vendors

ath9k - Issues with Atheros (later QCA)

- Progress often prevented by high turnover
- Constant need to justify the development cost
- Very limited resources
- Crazy ideas about syncing with proprietary codebase
- Being obsoleted by ath10k

My current project: mt76

- Driver for current MediaTek 802.11ac chipsets
- Driver development contracted by MediaTek
- Proprietary (but very small) firmware
- Driver controls entire data path
- Not as free as ath9k, but usable

What's wrong with ath10k?

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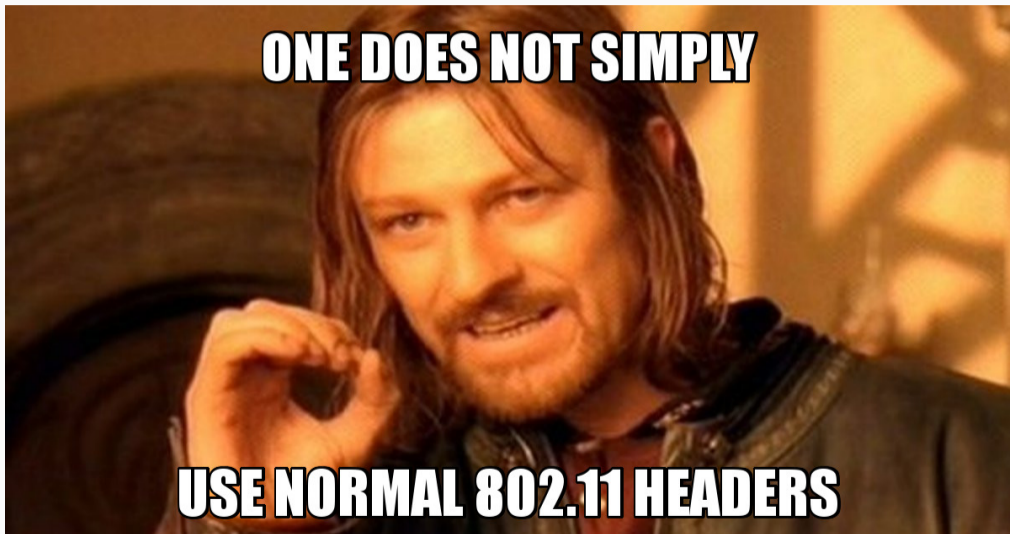
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What about other vendors?

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- Broadcom: main focus on fullmac devices, no progress on softmac
- Marvell: comparable to ath10k, limited driver capabilities
- Intel: too much firmware, very limited AP support
- Realtek: limited driver capabilities

Challenges and opportunities

On chipset vendors

- Educating chipset vendors is hard
- Often not sustainable
- Customer demand acts much faster

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- Can we engineer customer demand for free drivers?

Customer demand

- Educate big customers with enough volume
- Provide good reference code and examples
- Support GPL enforcement action

The FCC mess

- FCC noticed WiFi equipment interference with weather radar
- Treats user access to flexible radio devices as a bug
- New rules shifting responsibility to device vendors
- Strong backlash from the tech community
- Revised rules just as bad as original ones
- Potential secondary gain for another spectrum user (LTE-U)

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- **Similar problems in EU**

Hardware lockdown

- Chipset vendors considering hardware lockdown
- Some router manufacturers already doing it
- Provides a convenient excuse for not opening up
- Also used for market segmentation

What can we do?

What can we do?

- Spread the word on the FCC issue
- Disclose security / design issues in existing products
- Help write free 802.11 drivers
- Create material to educate vendor decision makers
- ...

Questions?