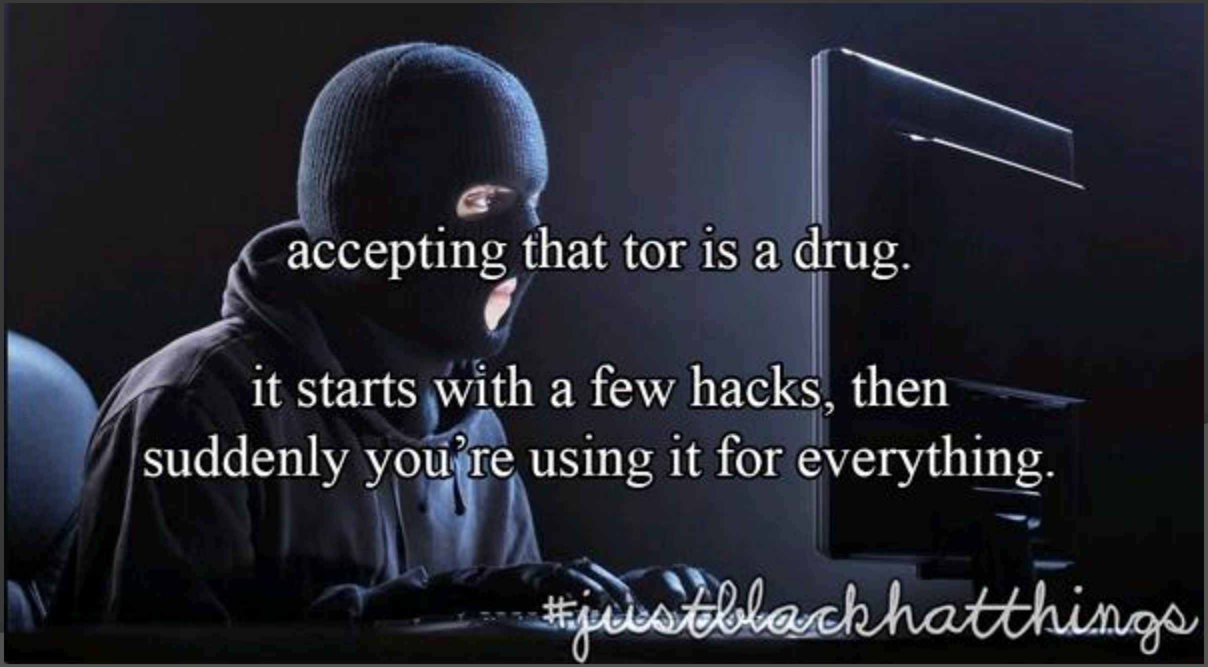
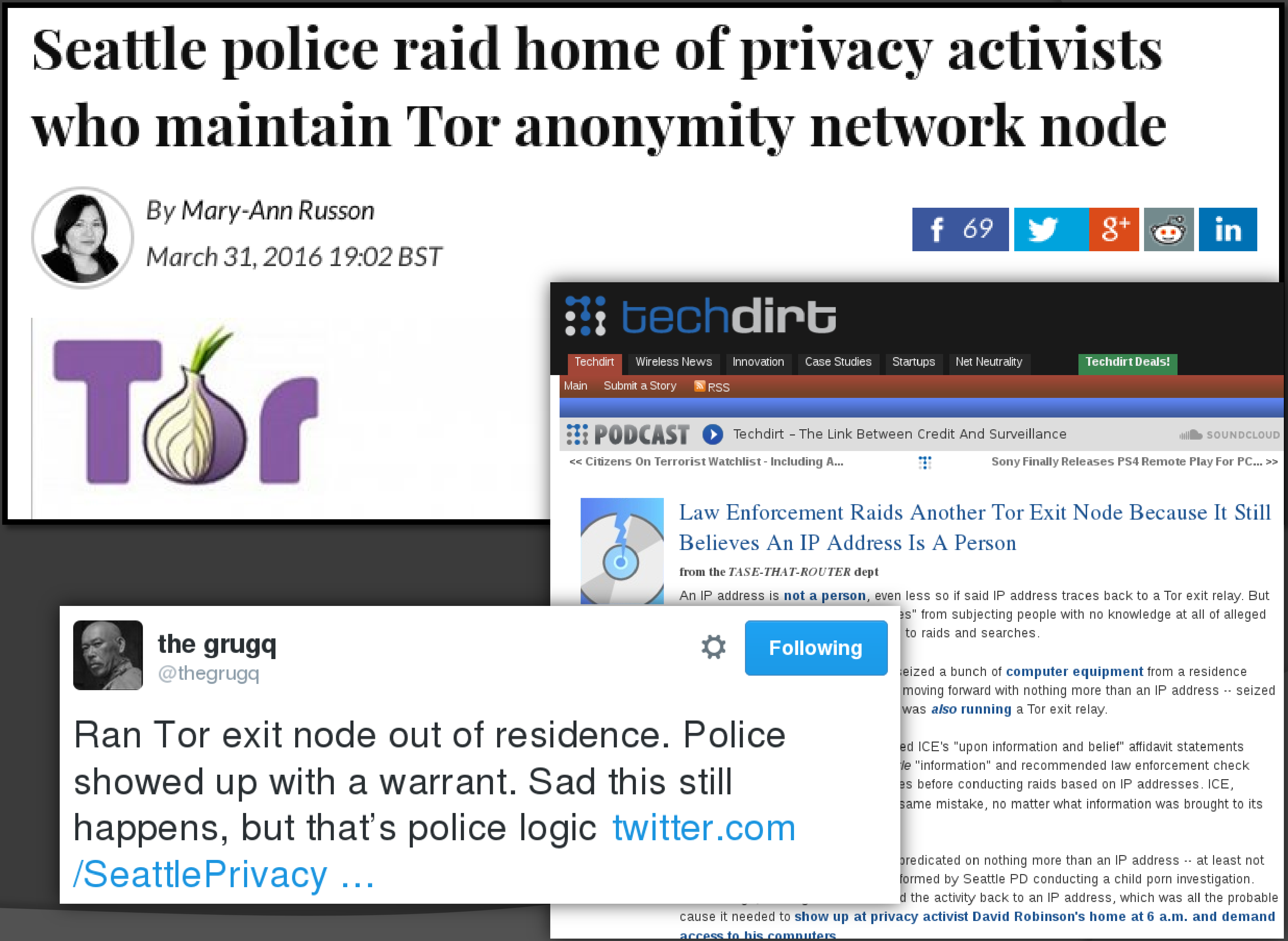
Fun and mayhem for ~ 80 zl

GUERRILLA TOR

Let’s hide our IP address...

- A VPN/proxy implies trust in a third party
  - Passive adversary can still learn your IP
- Tor implies trust in the exit nodes
  - Setting up your own exit nodes fixes this


accepting that tor is a drug.
it starts with a few hacks, then suddenly you’re using it for everything.
#justblackhatthings



Seattle police raid home of privacy activists who maintain Tor anonymity network node

By Mary-Ann Russon

March 31, 2016 19:02 BST

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Law Enforcement Raids Another Tor Exit Node Because It Still Believes An IP Address Is A Person

from the *TASE-THAT-ROUTER* dept

An IP address is **not a person**, even less so if said IP address traces back to a Tor exit relay. But

es" from subjecting people with no knowledge at all of alleged

to raids and searches.

eized a bunch of **computer equipment** from a residence

moving forward with nothing more than an IP address -- seized

was ***also* running** a Tor exit relay.

ed ICE's "upon information and belief" affidavit statements

le "information" and recommended law enforcement check

es before conducting raids based on IP addresses. ICE,

same mistake, no matter what information was brought to its

predicated on nothing more than an IP address -- at least not

formed by Seattle PD conducting a child porn investigation.

d the activity back to an IP address, which was all the probable cause it needed to **show up at privacy activist David Robinson's home at 6 a.m. and demand access to his computers**

the grugq
@thegrugq

Ran Tor exit node out of residence. Police showed up with a warrant. Sad this still happens, but that's police logic twitter.com /SeattlePrivacy …

Our idea

- Set up **disposable** Tor exit nodes:
  - It’s our own node, not someone else’s box
  - Only used a few times, then never again (good OPSEC)
  - Cannot be traced back to you (no hosting)
  - Must be cheap
    - If we were rich we wouldn’t be here, folks!
  - Must use public internet infrastructure

Can we trust Tor?

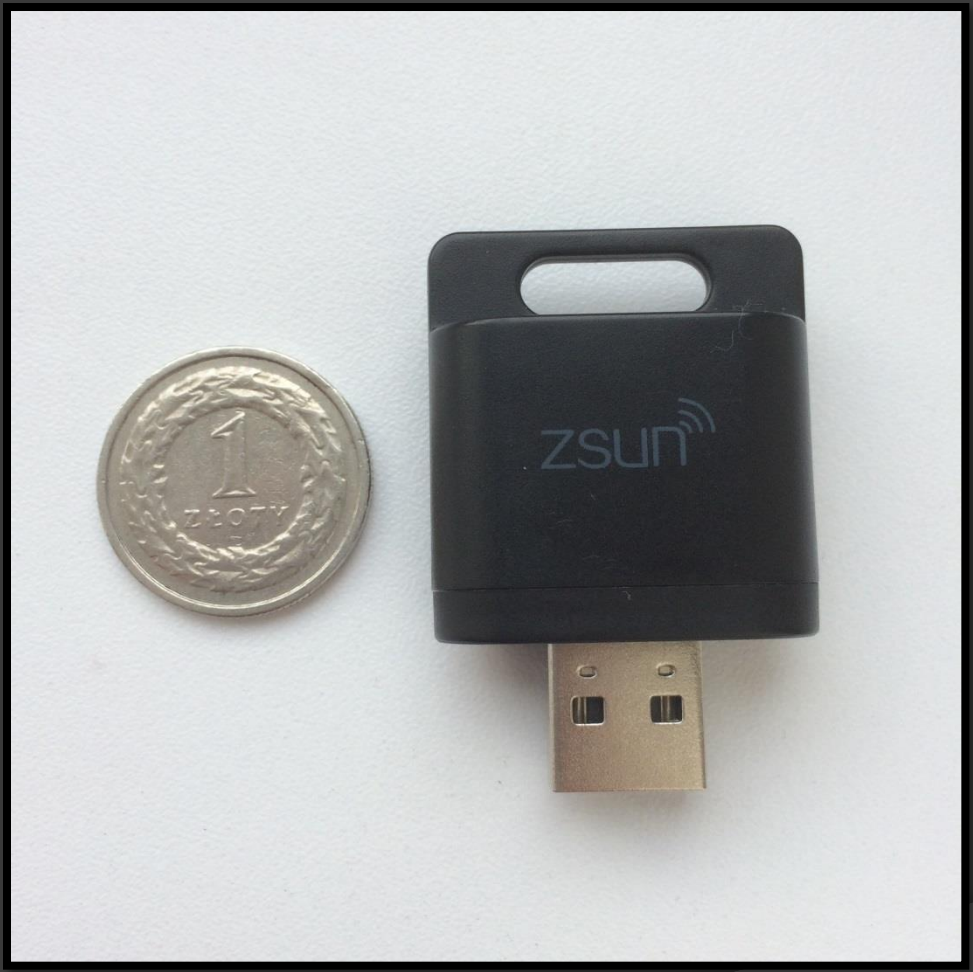
- Ehrm… no. But we don’t need to:
  - We control the exit nodes ☺
  - Using OpenVPN we can thwart existing crypto & traffic analysis attacks against Tor
  - Time is our ally here
  - Don’t forget OPSEC

Our first prototype: TL-WR703N

Problems

- Somewhat bulky, difficult to hide in public places
- Requires external power
- Comes with only 8 Mb of ROM
  - You can fit a minimal build of OpenWRT with Tor, but little else
- Requires a USB stick for additional storage

Here comes the ZSUN



Here comes the ZSUN

- Even cheaper than the TP-LINK!
- Much, much, much smaller
- Doubles the RAM and ROM
- External storage can be a MicroSD card
- Hardware is (relatively) easy to change
- Powered from the USB port itself
- Already researched at ***hackerspace.pl***

zsun
micro SD HC 4
4GB
C04G CHINA
1605PY27336
Kingston®
SDC4/4GB

TRAVELADAPTER
Адаптер питания
MODELNO./МОДЕЛЬ:ART-U90EWE
INPUT/TEG LISTRIK/ВХОД:
100-240V~FREKUENSI 50-60Hz 0.35A
OUTPUT/ВЫХОД : 5.0V ⎓ 2.0A
SIN, Серийный номер : RT1C915CS/B-E
Дата производства: 27.03.2014Z
MADE IN CHINA/ СДЕЛАНО В КИТАЕ
001
AB10 K ZO,02.0072
zsun

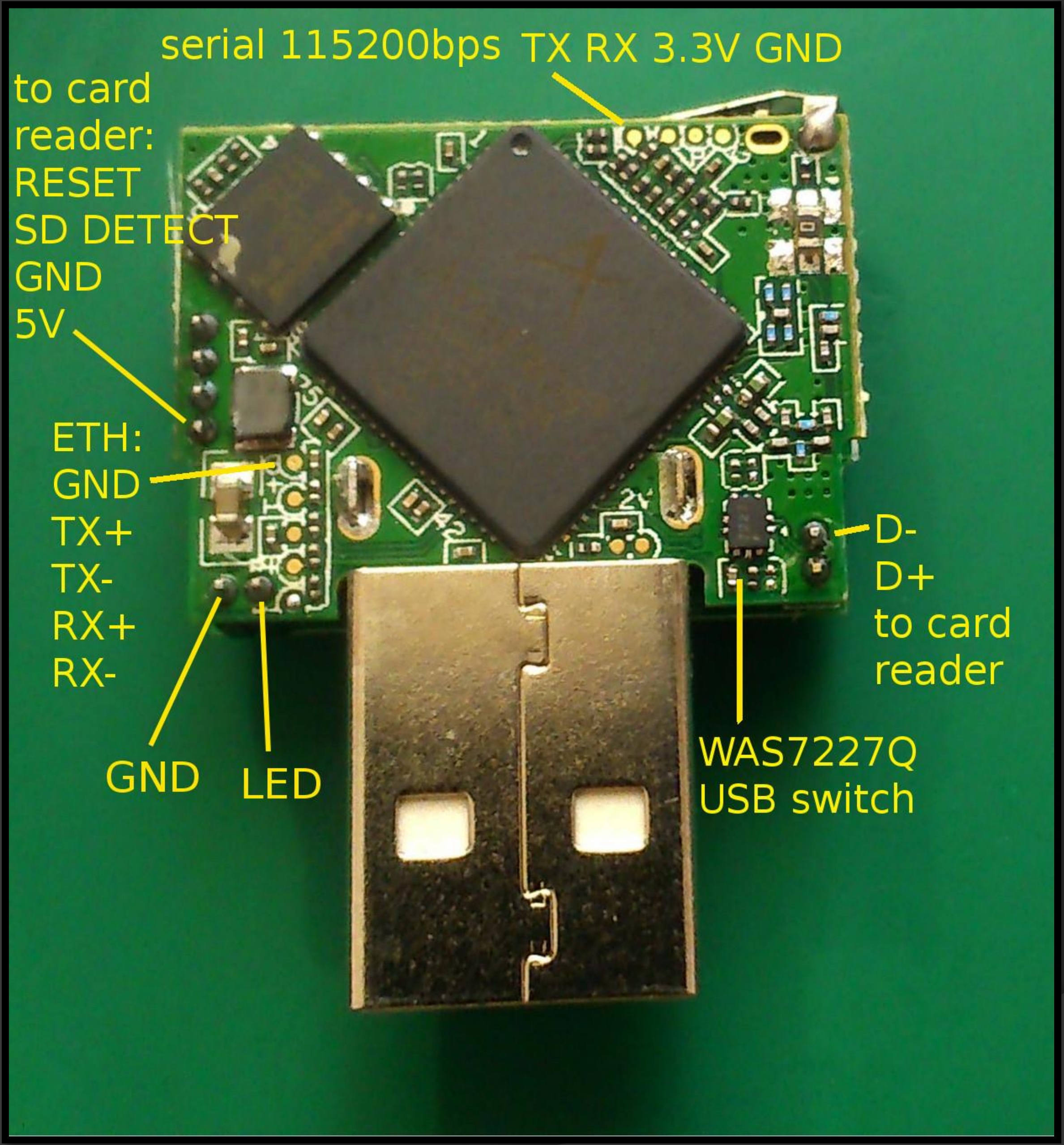


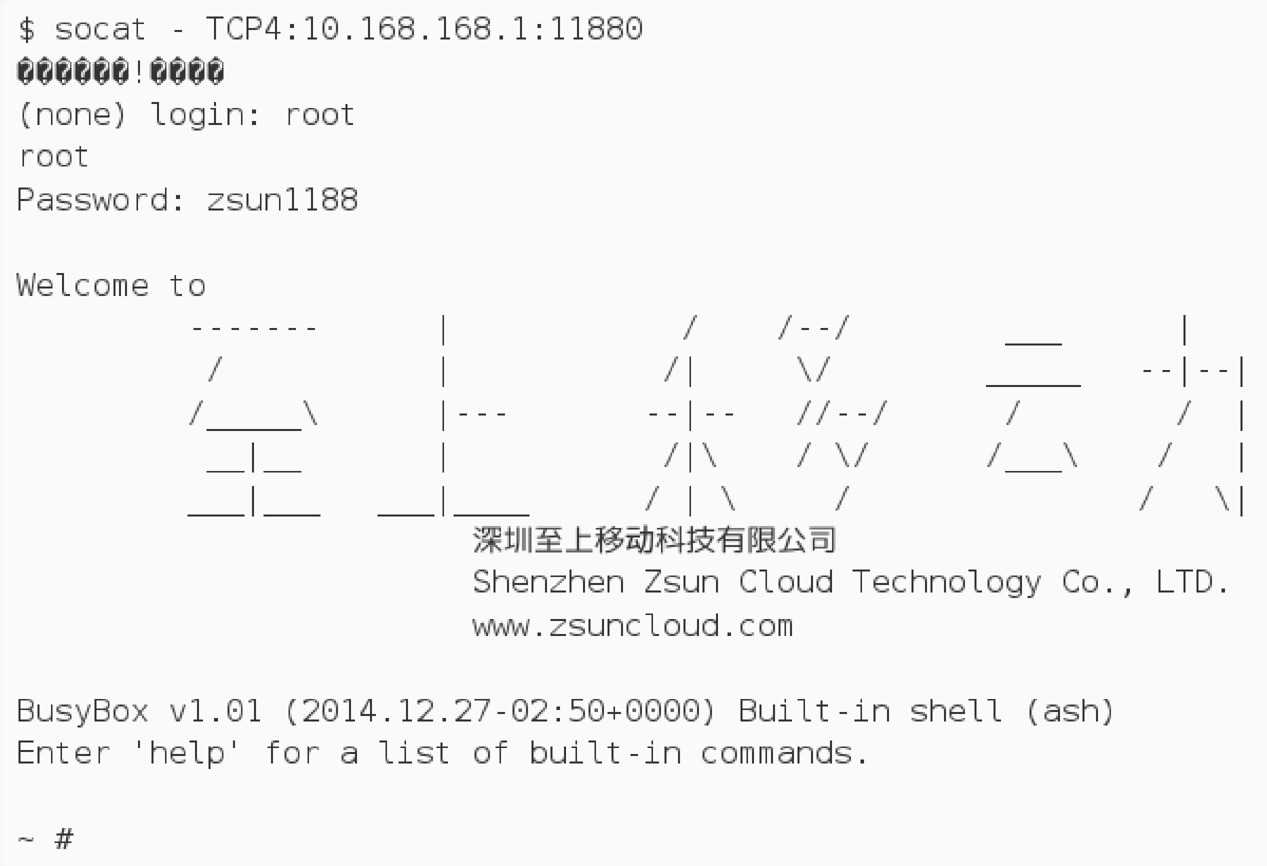
Image credit: https://wiki.hackerspace.pl/projects:zsun-wifi-card-reader

Getting the hardware

- We ordered our prototype devices from DealExtreme
  - This won’t do in real life, cash is better
  - For bulk purchasing go to the manufacturer
- Prices:
  - ~60 zl – ZSUN WiFi SD Card Reader
  - ~40 zl – Waterproof Solar Power Bank
  - ~16 zl – MicroSD & USB Charger
  - Prices may change in your country! ☹

Let’s change the firmware

- We’ll miss this beautiful banner though!



```
$ socat - TCP4:10.168.168.1:11880
������!����
(none) login: root
root
Password: zsun1188

Welcome to
         -------      |            /    /--/        ___      |
          /           |           /|     \/        _____   --|--|
         /_____\      |---       --|--   //--/      /        /  |
          __|__       |           /|\    / \/      /___\    /   |
         ___|___   ___|____      / | \     /               /   \|
                        深圳至上移动科技有限公司
                        Shenzhen Zsun Cloud Technology Co., LTD.
                        www.zsuncloud.com

BusyBox v1.01 (2014.12.27-02:50+0000) Built-in shell (ash)
Enter 'help' for a list of built-in commands.

~ #
```

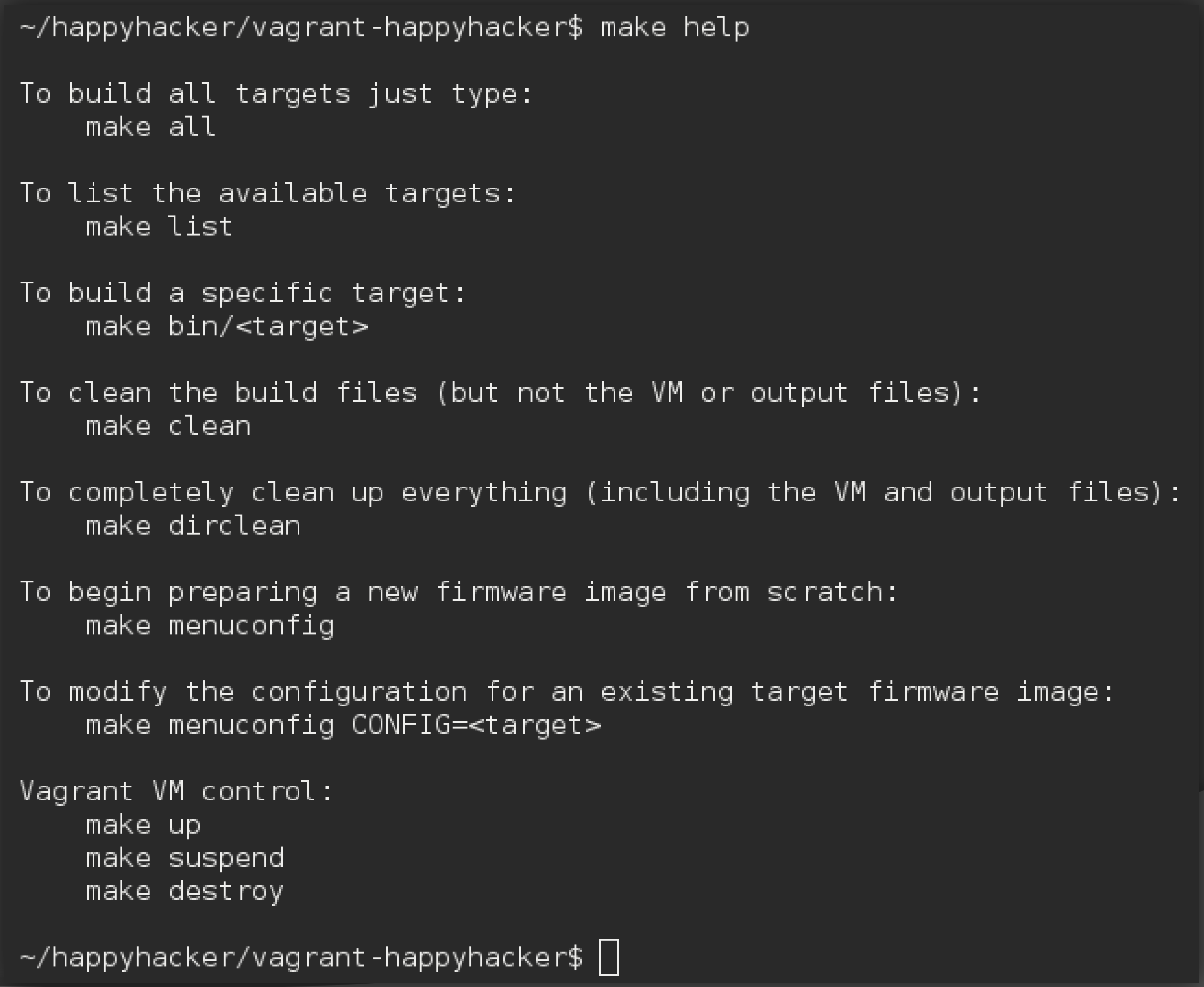
Building OpenWRT

- The folks at Hackerspace.pl already wrote a kernel patch for this hardware
  - It’s for an old kernel now, but we ported it to more versions (3.18.29, 4.1, 4.4)
- The OpenWRT sources have to be compiled on Ubuntu
  - We prefer real Linux, thank you :P
  - Vagrant comes to the rescue!

Building OpenWRT

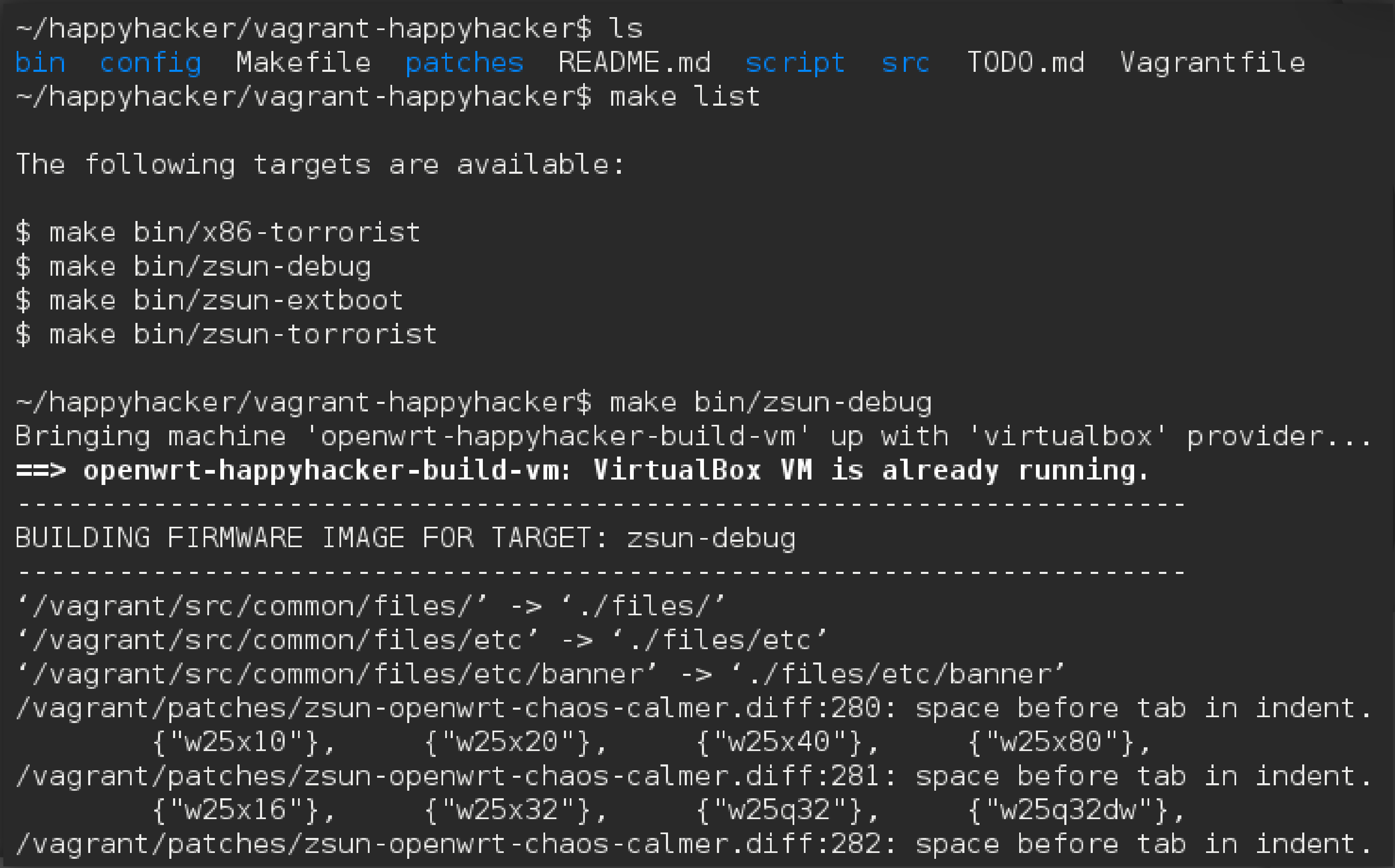
- Using Vagrant, we set up an Ubuntu box
  - Downloads all dependencies and sources automatically
- A Makefile takes care of automating the process of parallel building multiple images
  - Support for adding patches and additional software and configuration files
  - SSL/SSH/VPN/Tor certificates generated automatically on each build
- Just git clone and you’re good to go

Building OpenWRT



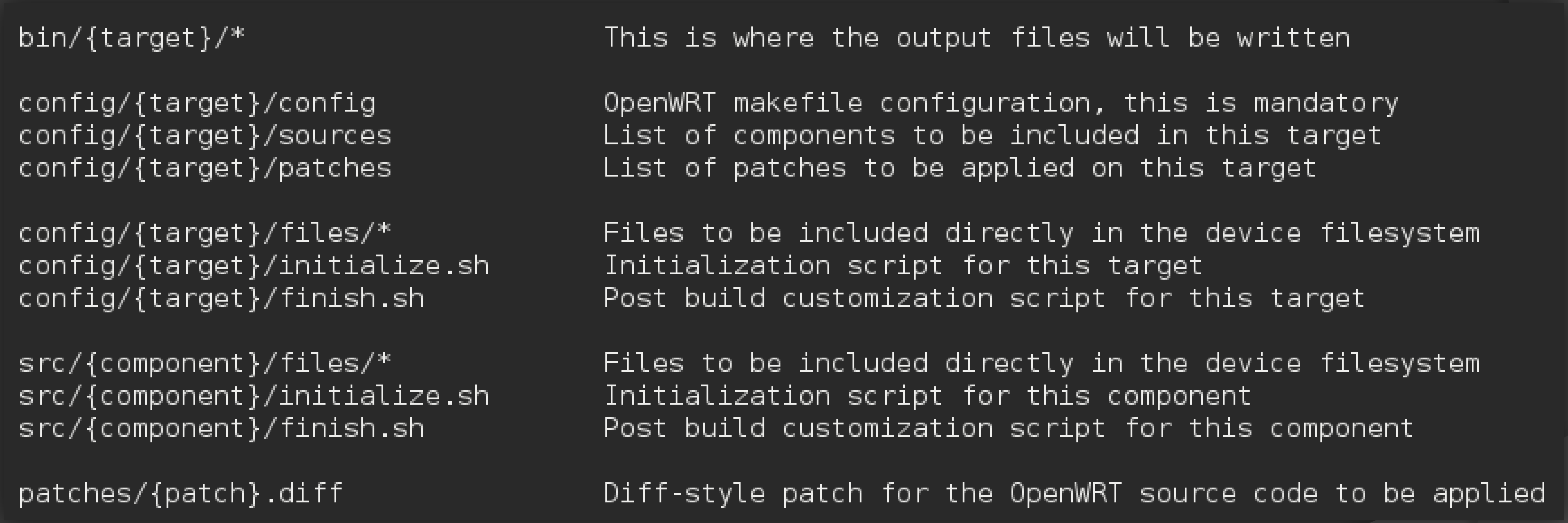
```
~/happyhacker/vagrant-happyhacker$ make help

To build all targets just type:
    make all

To list the available targets:
    make list

To build a specific target:
    make bin/<target>

To clean the build files (but not the VM or output files):
    make clean

To completely clean up everything (including the VM and output files):
    make dirclean

To begin preparing a new firmware image from scratch:
    make menuconfig

To modify the configuration for an existing target firmware image:
    make menuconfig CONFIG=<target>

Vagrant VM control:
    make up
    make suspend
    make destroy

~/happyhacker/vagrant-happyhacker$ 
```

Building OpenWRT



```
~/happyhacker/vagrant-happyhacker$ ls
bin  config  Makefile  patches  README.md  script  src  TODO.md  Vagrantfile
~/happyhacker/vagrant-happyhacker$ make list

The following targets are available:

$ make bin/x86-torrorist
$ make bin/zsun-debug
$ make bin/zsun-extboot
$ make bin/zsun-torrorist

~/happyhacker/vagrant-happyhacker$ make bin/zsun-debug
Bringing machine 'openwrt-happyhacker-build-vm' up with 'virtualbox' provider...
==> openwrt-happyhacker-build-vm: VirtualBox VM is already running.
---------------------------------------------------------------------
BUILDING FIRMWARE IMAGE FOR TARGET: zsun-debug
---------------------------------------------------------------------
‘/vagrant/src/common/files/’ -> ‘./files/’
‘/vagrant/src/common/files/etc’ -> ‘./files/etc’
‘/vagrant/src/common/files/etc/banner’ -> ‘./files/etc/banner’
/vagrant/patches/zsun-openwrt-chaos-calmer.diff:280: space before tab in indent.
        {"w25x10"},     {"w25x20"},     {"w25x40"},     {"w25x80"},
/vagrant/patches/zsun-openwrt-chaos-calmer.diff:281: space before tab in indent.
        {"w25x16"},     {"w25x32"},     {"w25q32"},     {"w25q32dw"},
/vagrant/patches/zsun-openwrt-chaos-calmer.diff:282: space before tab in indent.
```

Building OpenWRT



```
bin/{target}/*                      This is where the output files will be written

config/{target}/config              OpenWRT makefile configuration, this is mandatory
config/{target}/sources             List of components to be included in this target
config/{target}/patches             List of patches to be applied on this target

config/{target}/files/*             Files to be included directly in the device filesystem
config/{target}/initialize.sh       Initialization script for this target
config/{target}/finish.sh           Post build customization script for this target

src/{component}/files/*             Files to be included directly in the device filesystem
src/{component}/initialize.sh       Initialization script for this component
src/{component}/finish.sh           Post build customization script for this component

patches/{patch}.diff                Diff-style patch for the OpenWRT source code to be applied
```

Our setup: ph33r the “torrorist”

- Tor configured to act as an exit node, with additional hidden services
  - OpenVPN for masking our own traffic
- Optional applications can be added
  - A file sharing application to act as an anonymous dead drop for files
  - More fun stuff can be added too:
    - IRC/XMPP servers for chat
    - Murmur server for voice

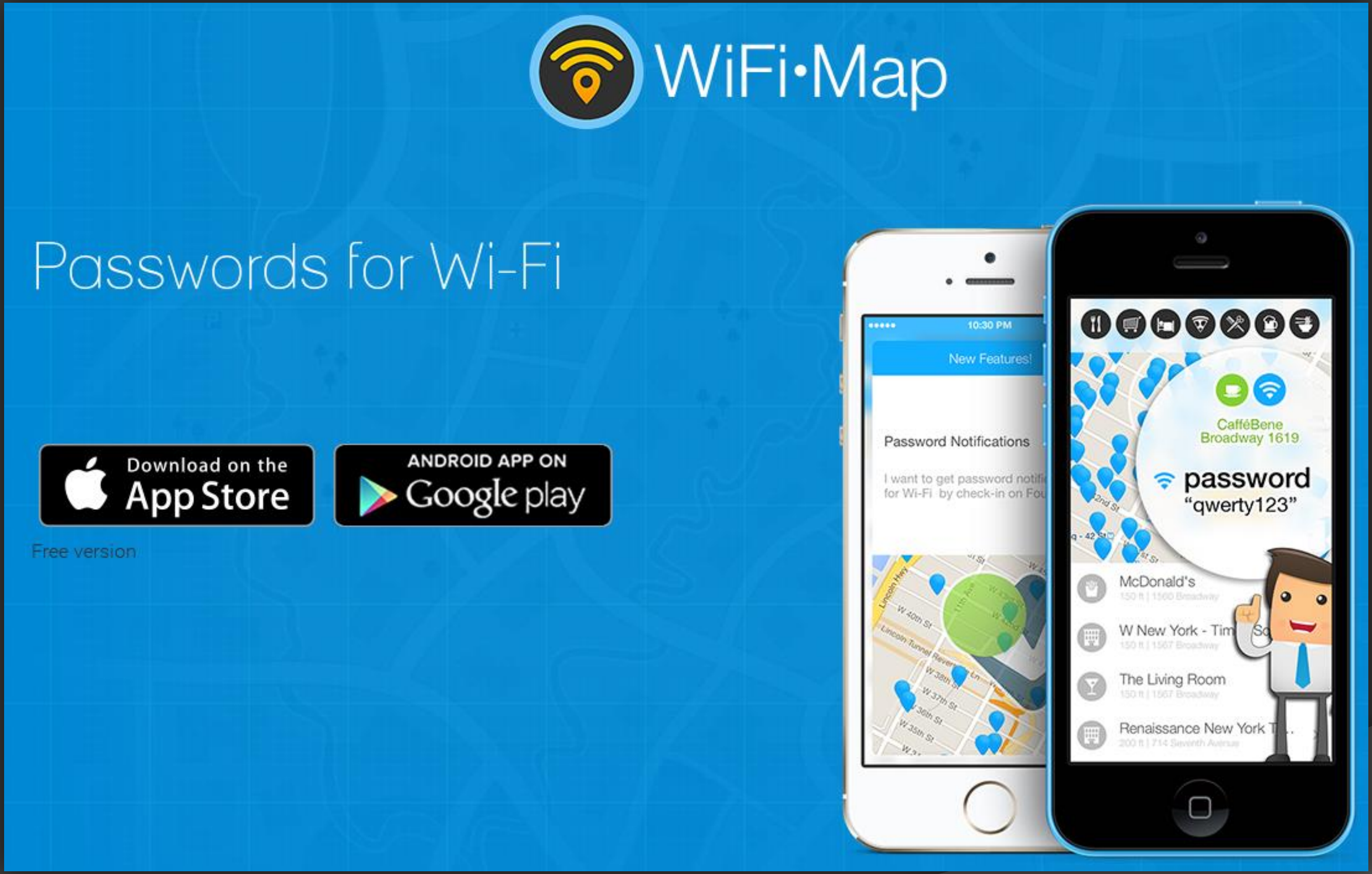
Connecting to the Internet

- This proved to be the most difficult part
- Our first idea: 4G modems
  - They provide a reasonable speed
  - Can be deployed almost anywhere
  - Some countries (like Poland) don’t ask for ID when buying a SIM card
- Problem: 4G modems are expensive!
  - Still doable if you’ve got the cash

Connecting to the Internet

- Our evil scheme: public Internet access
  - Many cities in the world have public WiFi infrastructure
  - Depending on local legislation, you may get away with using WiFi connections from bars and other publically accessible locations
  - Technical problem is solved, human problems begin ☹
  - Consult your local tech lawyer!

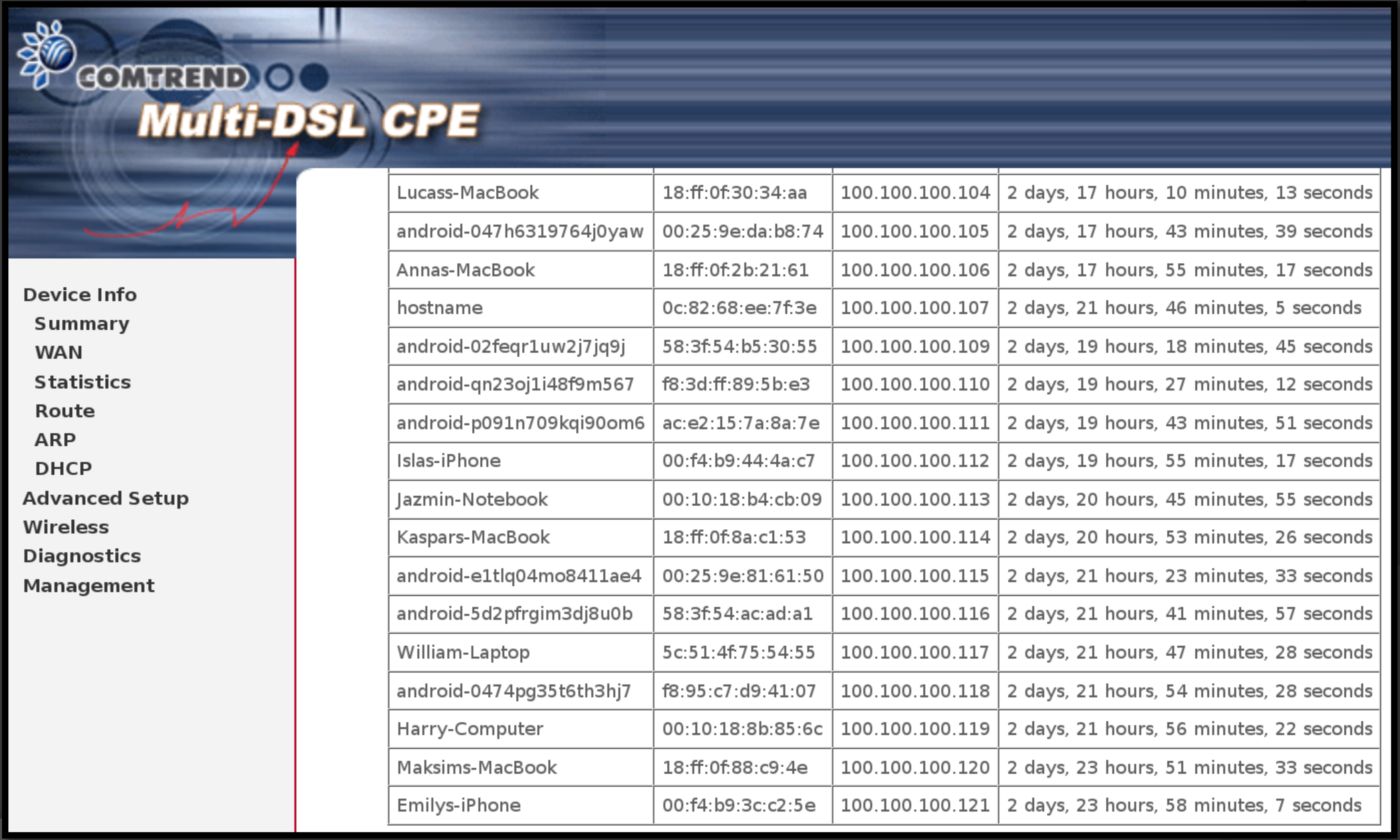
Connecting to the Internet



Using the Wi-Fi Manager

- We developed our own Wi-Fi manager
  - Can connect to multiple Wi-Fi networks at the same time
  - Each connection has a different “identity”, with random ***realistic*** hostnames and MAC addresses
  - Integrates with UCI, the OpenWRT configuration system
  - Modular and very configurable
    - But works directly out of the box too

Using the Wi-Fi Manager



Lucass-MacBook	18:ff:0f:30:34:aa	100.100.100.104	2 days, 17 hours, 10 minutes, 13 seconds
android-047h6319764j0yaw	00:25:9e:da:b8:74	100.100.100.105	2 days, 17 hours, 43 minutes, 39 seconds
Annas-MacBook	18:ff:0f:2b:21:61	100.100.100.106	2 days, 17 hours, 55 minutes, 17 seconds
hostname	0c:82:68:ee:7f:3e	100.100.100.107	2 days, 21 hours, 46 minutes, 5 seconds
android-02feqr1uw2j7jq9j	58:3f:54:b5:30:55	100.100.100.109	2 days, 19 hours, 18 minutes, 45 seconds
android-qn23oj1i48f9m567	f8:3d:ff:89:5b:e3	100.100.100.110	2 days, 19 hours, 27 minutes, 12 seconds
android-p091n709kqi90om6	ac:e2:15:7a:8a:7e	100.100.100.111	2 days, 19 hours, 43 minutes, 51 seconds
Islas-iPhone	00:f4:b9:44:4a:c7	100.100.100.112	2 days, 19 hours, 55 minutes, 17 seconds
Jazmin-Notebook	00:10:18:b4:cb:09	100.100.100.113	2 days, 20 hours, 45 minutes, 55 seconds
Kaspars-MacBook	18:ff:0f:8a:c1:53	100.100.100.114	2 days, 20 hours, 53 minutes, 26 seconds
android-e1tlq04mo8411ae4	00:25:9e:81:61:50	100.100.100.115	2 days, 21 hours, 23 minutes, 33 seconds
android-5d2pfrgim3dj8u0b	58:3f:54:ac:ad:a1	100.100.100.116	2 days, 21 hours, 41 minutes, 57 seconds
William-Laptop	5c:51:4f:75:54:55	100.100.100.117	2 days, 21 hours, 47 minutes, 28 seconds
android-0474pg35t6th3hj7	f8:95:c7:d9:41:07	100.100.100.118	2 days, 21 hours, 54 minutes, 28 seconds
Harry-Computer	00:10:18:8b:85:6c	100.100.100.119	2 days, 21 hours, 56 minutes, 22 seconds
Maksims-MacBook	18:ff:0f:88:c9:4e	100.100.100.120	2 days, 23 hours, 51 minutes, 33 seconds
Emilys-iPhone	00:f4:b9:3c:c2:5e	100.100.100.121	2 days, 23 hours, 58 minutes, 7 seconds

Future work

- More security improvements are needed
  - OpenWRT is clearly not designed as a secure environment…
  - Defaults to building with ALL exploit mitigations turned off
  - By default everything runs as root

Future work

- We’re working on a way to boot OpenWRT directly from the SD card
  - Not as easy as it seems! We don’t have a helpful BIOS here like we do in x86 ☹
  - Re-mouting rootfs and loading a new kernel using kexec seems like the way to go, but there are still some problems to solve
  - The advantage for the end user: no need to flash a new image, just change the SD card

Future work

- Another evil plan: using LXC
  - Containers are handy for isolating the different services running on the device
  - Deploying containers remotely over Tor is also a possibility
    - Everything would be volatile – shutting down the device would destroy all data
    - Think of a guerrilla cloud environment ☺

Thanks for all the fish!