The Flipper Zero presentation for VanLUG community

by Levko Kravchuk ©

This cyberdolphin is from the Johnny Mnemonic movie

About me

Levko Kravchuk

I started my career back in 2008. I was involved in creating fiber optic networks and providing internet access. I administered Windows servers and client operating systems, as well as Linux, routers, and firewalls. I worked with networks of varying levels of security. I have a strong interest in cybersecurity and continuously develop my skills in this area.

The flipper in VanLUG conference

The Disclaimer

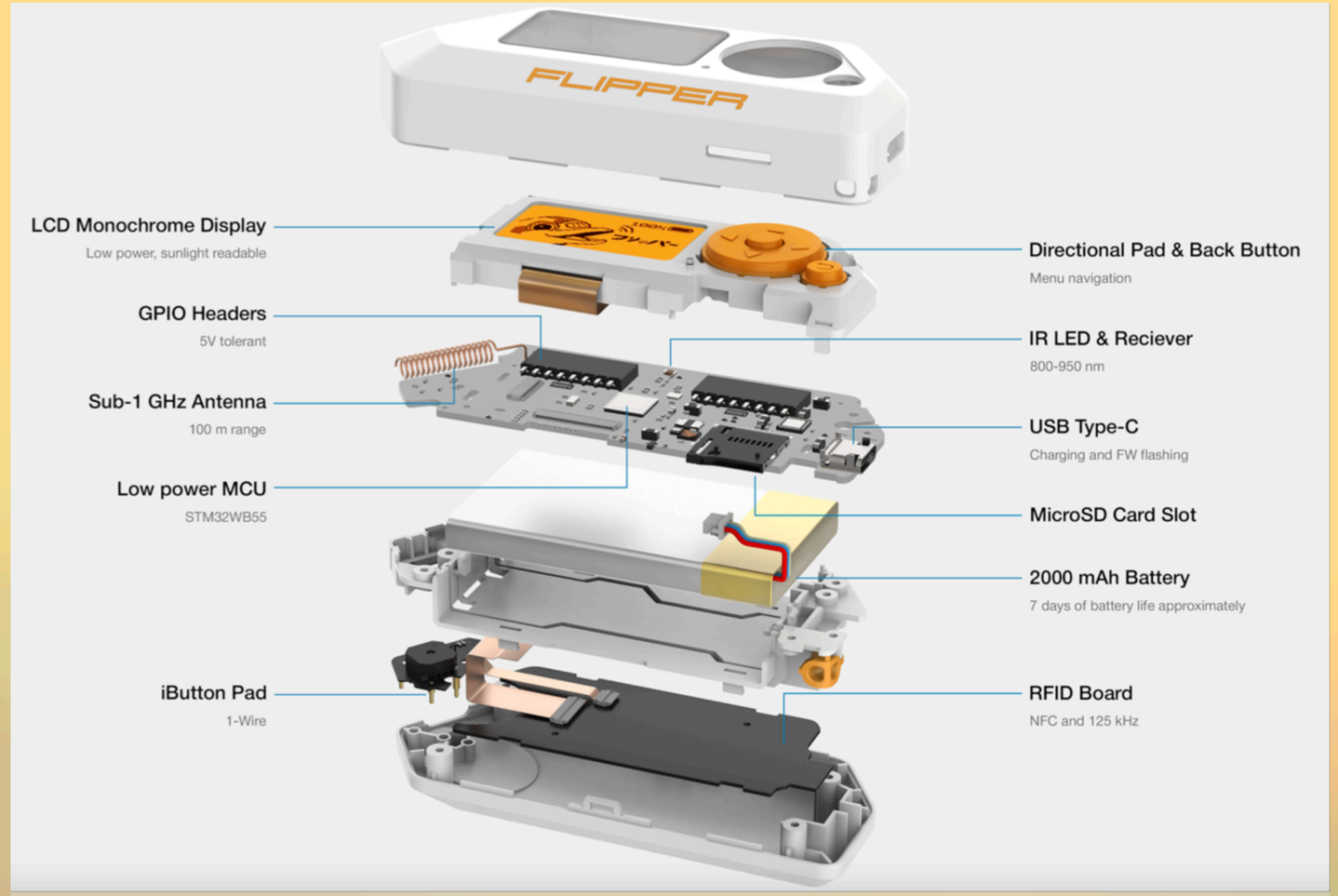
- Due to the prohibition of the flipper in Canada, I will solely showcase content that is already available on the internet and YouTube. I provide this information solely for *educational purposes* **only**, aiming to understand the potential dangers of this device and how to protect oneself. I do not assume any responsibility if anyone engages in any illegal activities, explicitly or implicitly, using the flipper or other devices and knowledge gained from this conference. My goal is to inform Canadians or guests about this device and its potential hazards, and how to be more safety.

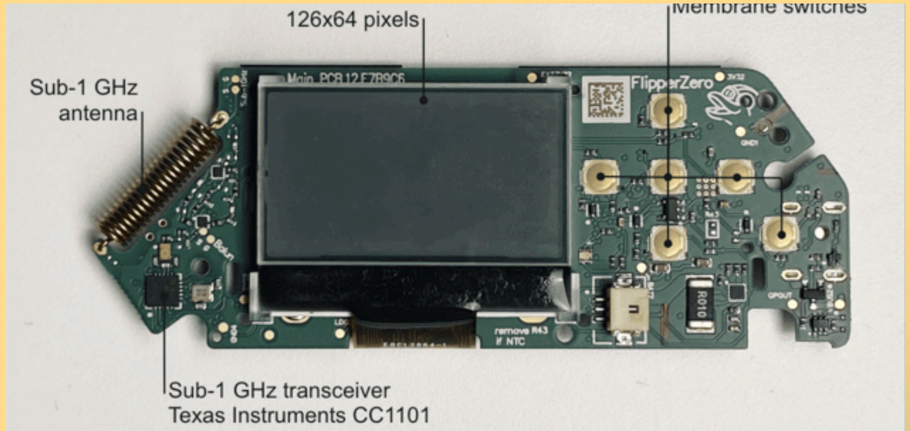
About flipper

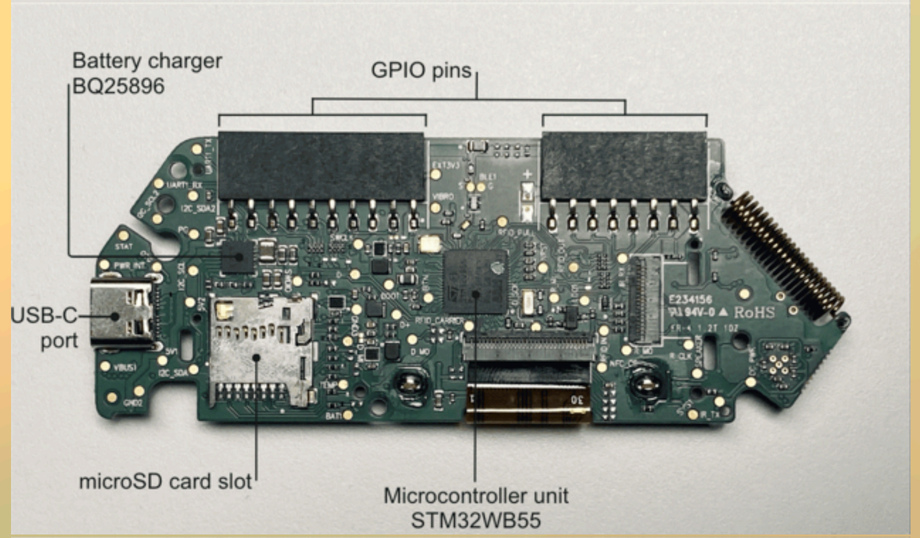
- Hardware ARM CPU.
- The Flipper is project are open sourced under the GNU License.
- Flipper OS: FreeRTOS (stewardship is Amazon)
- Ref. https://en.wikipedia.org/wiki/FreeRTOS
- Mosts applications are public in GitHub.

The Flipper Hardware

What's inside ?







Most popular Flipper firmwares

- Types of Flipper firmwares: RogueMaster, Unleashed, and Xtreme.
- https://flipper-xtre.me/
- https://rogue-master.net/
- https://github.com/DarkFlippers/unleashed-firmware

The Flipper's FWs compare list

Feature	RogueMaster	Unleashed	Xtreme
Stable Updates	✗	✓	✓
Rolling Code Support	✓	✓	✓
BLE Spam	? Noproto hacksmith API	✓	✓
Bad Keyboard (BT & USB)	? Only as two separate apps	? Only as two separate apps	✓
Subdriving (Saving coordinates for subghz)	✗	✗	✓
Full Customization (Layouts, Menus, Shortcuts, etc.)	✗	✗	✓
Management App (For easy configuration)	? Partial functionality	✗	✓
Enhanced RGB Backlight modes (Full customization & Rainbow mode)	✓	✗	✓
Easy spoofing (Name, Mac, Serial)	✗	✓	✓
Advanced Security measures (Lock on Boot, reset on false pins, etc.)	✗	✗	✓
Asset Packs	✗	✗	✓
Advanced Level System	✓	✗	✓
File Search	✗	✗	✓
Improved Error Messages (Showing actual root)	✗	✗	✓
External Apps (Last checked: 07.2023)	✓ 204	? Only with [e] pack (102)	✓ 122

Main app and Flipper CLI

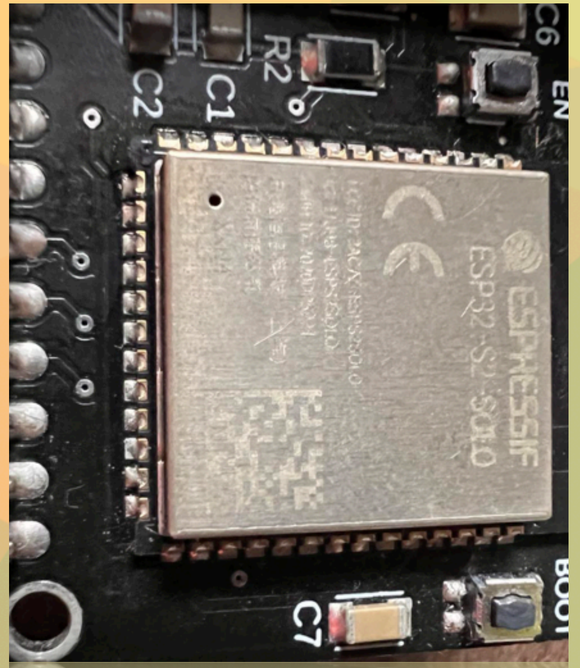
```
sudo cu -s 9600 -l /dev/cu.usbmodemflip_Leo1
Connected.

Welcome to Flipper Zero Command Line Interface!
Read the manual: https://docs.flipper.net/development/cli
Run `help` or `?` to list available commands

Firmware version: dev-cfw 946e (cc937a97 built on 22-02-2024)

>: ll
`ll` command not found, use `help` or `?` to list all available co
>: ?
Commands available:
!                           led
?                           loader
bt                          log
crypto                      nfc
date                        onewire
device_info                 power
factory_reset               ps
free                        rfid
free_blocks                 source
gpio                        start_rpc_session
help                        storage
i2c                         subghz
ikey                        sysctl
info                        update
input                       uptime
ir                          vibro
l
>:
```

The Flipper zero Article

- https://infosecwriteups.com/the-ultimate-guide-cheatsheet-to-flipper-zero-d4c42d79d32c

Wi-Fi Marauder hardware

- ESP32 controller - powerful Wifi controller developed for internet of things.
- Can be used for WiFi, Bluetooth, attack.
- 2.4 GHz ONLY!
- ESP32-S2-SOLO - Is my controller



The Flipper Marauder companion firmware

WIFI Marodeur firmware list

• https://lab.flipper.net/apps/esp32_wifi_marauder	• https://github.com/justcallmekoko/ESP32Marauder?tab=readme-ov-file
• https://github.com/SkeletonMan03/FZEasyMarauderFlash	• https://github.com/chris-bc/esp32-gravity

The Flipper Marauder companion & Gravity SW

- The gravity SW performs powerful attacks on Bluetooth, BLE, WiFi, and Zigbee.
- My ESP32-S2-SOLO is not supported by that FW :(
-

Supported Targets	ESP32	ESP32-C6	ESP32S2	ESP32S3
Wireless (802.11)	Yes	Yes	Yes	No(t Yet)
Bluetooth	Yes	Not Yet	No	No(t Yet)
BTLE	Yes	Maybe?	No	No(t Yet)
ZigBee/Thread (802.15.4)	No	Yes	No	No(t Yet)

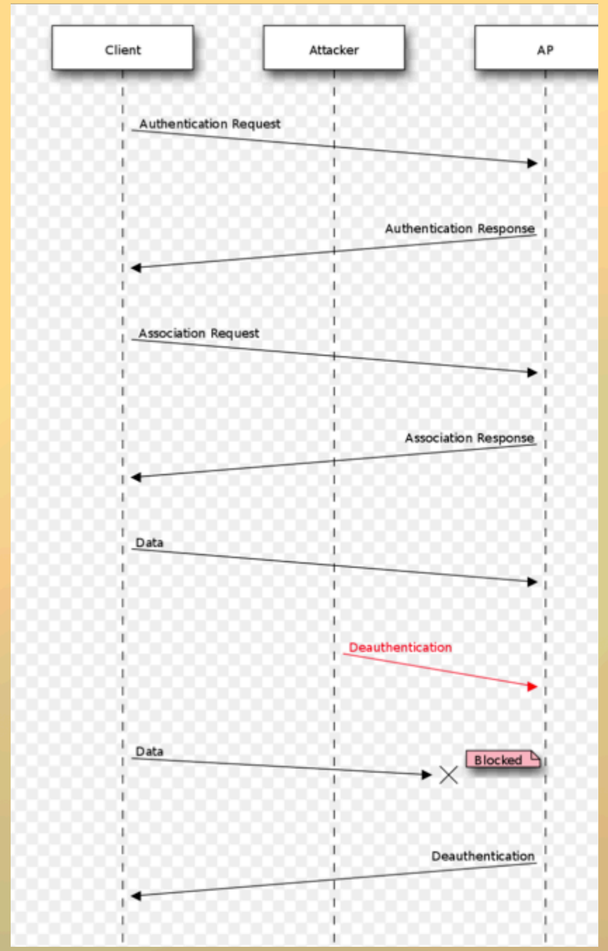
- https://github.com/chris-bc/esp32-gravity

What kind of Wi-Fi attacks Flipper (Marauder) support ?

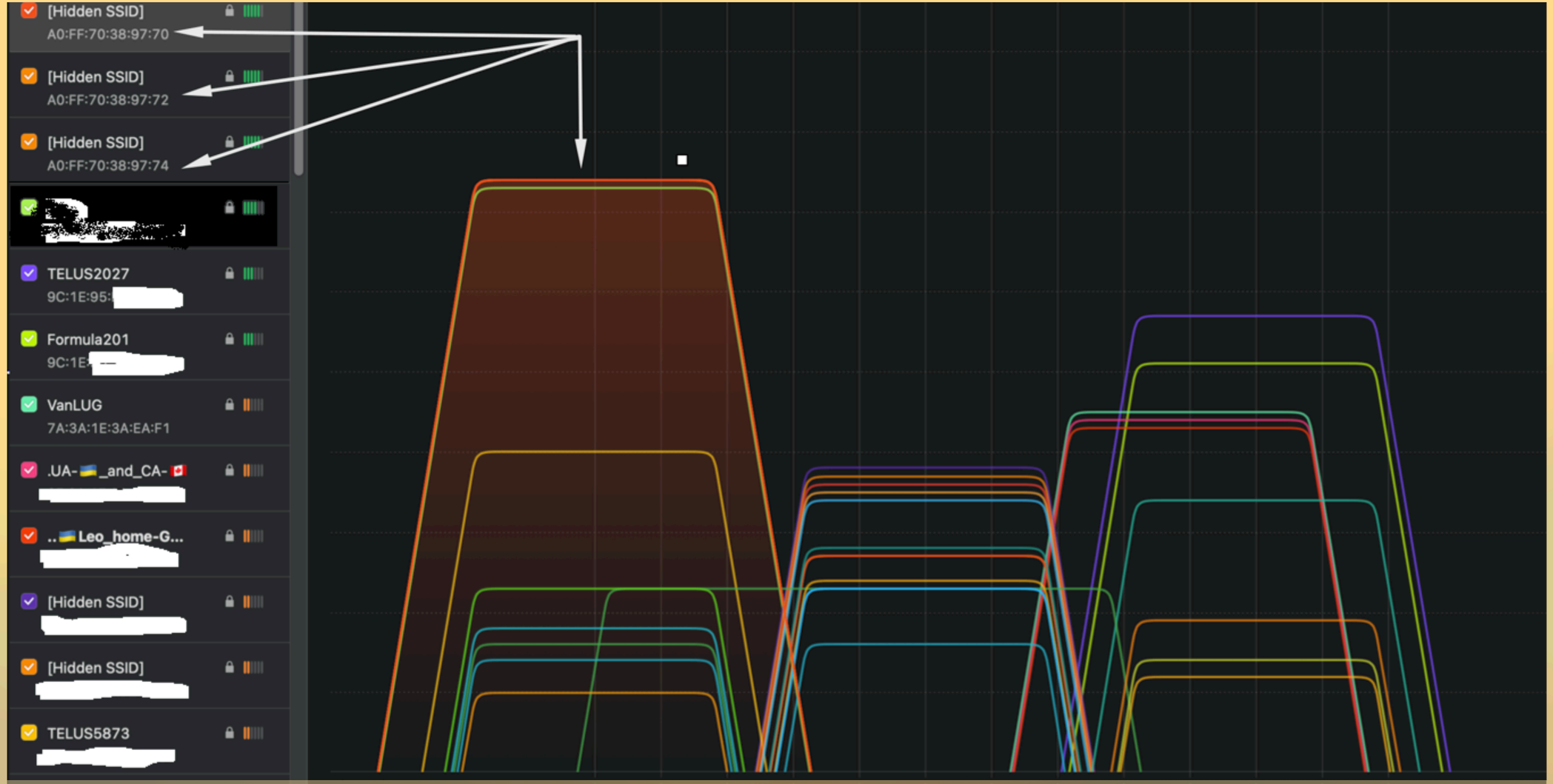
- Deathauthentication attack
- Probe attack
- Rickroll attack
- Sour Apple
- Swiftpair spam
- Samsung spam
- Google spam
- Bt spamm all

Wi-Fi “deauthentication” attack explanation

- This attack can performed on WPA, WPA2, (WPA3 not tested by me)
- It is used to perform Evil twin access point(s), and Password attacks, or just wireless duos.
- How to protect? - MFP/802.11w



Wi-Fi “deauthentication” attack detection



Wi-Fi “deauthentication” attack detection
Wireshark investigation

701	2.789685	3b:39:68:e0:6c:9b	64:ce:98:46:5a:bd	802.11	172	Disassociate, SN=476, FN=12, Flags=opm..MFT[Malformed Packet]
1503	5.138657			802.11	154	Disassociate[Malformed Packet]
1505	5.139768	ad:c0:f0:9b:31:c8	c5:a5:7e:44:36:2d	802.11	172	Disassociate, SN=3237, FN=1, Flags=o.m.R.FT[Malformed Packet]
2944	8.401539	7c:70:92:c7:0a:34	4d:f1:d1:a3:83:65	802.11	172	Fragmented IEEE 802.11 frame
6460	14.622990	54:09:1a:c7:02:aa	ad:6b:c7:9d:e7:e0	802.11	172	Disassociate, SN=417, FN=5, Flags=.p..RMFT
131…	19.368618	94:be:5d:ad:60:14	a1:20:3b:31:1e:6c	802.11	172	Disassociate, SN=1152, FN=6, Flags=..m.R.FT[Malformed Packet]
132…	19.572994	2e:68:a0:86:f7:91	33:21:c2:f0:93:7a	802.11	168	Fragmented IEEE 802.11 frame
158…	24.848034	c3:98:e1:5f:af:54	40:8f:b3:18:f0:6a	802.11	172	Disassociate, SN=1254, FN=2, Flags=.pmP.MFT
171…	27.931085	d6:5a:da:ea:cf:70	30:12:92:4d:42:e0	802.11	172	Fragmented IEEE 802.11 frame
178…	30.256615	b7:f9:ba:0c:b2:6d	7c:6b:d8:97:e7:fc	802.11	172	Disassociate, SN=1710, FN=6, Flags=op...M.T[Malformed Packet]
181…	31.383565		85:eb:82:d4:f9:4d (85:eb:82:d4:f9:…	802.11	172	Control Wrapper, Flags=op.P.M..
189…	33.286186	b0:e9:4c:e4:ec:b6	97:51:2e:be:5a:17	802.11	172	Disassociate, SN=3061, FN=8, Flags=.pmP.M.T
207…	35.450592	d2:40:51:c4:50:cd	8b:b8:70:25:94:fa	802.11	172	Fragmented IEEE 802.11 frame
216…	36.863520	32:51:84:66:d8:3d	bb:d2:e0:79:f0:12	802.11	172	Disassociate, SN=3129, FN=5, Flags=op..RM.T[Malformed Packet]
222…	37.722475	0b:3d:20:24:4e:22	5a:26:9b:df:2c:67	802.11	172	Disassociate, SN=3779, FN=11, Flags=o.mP...T[Malformed Packet]
226…	38.142853		6e:3a:1e:3a:ea:f1	802.11	183	Disassociate, SN=1964, FN=0, Flags=........
226…	38.143055		6e:3a:1e:3a:ea:f1	802.11	183	Disassociate, SN=1964, FN=0, Flags=........
270…	40.492662	94:b5:3c:c5:d9:08	17:b3:85:98:5e:05	802.11	172	Disassociate, SN=1481, FN=13, Flags=.p..RM.T
276…	42.080027	f1:ff:22:97:9a:6a	ff:2d:7a:80:b2:6a	802.11	172	Disassociate, SN=3207, FN=1, Flags=.......T[Malformed Packet]
334…	52.986075	7b:0f:bf:75:c9:f8	7f:16:4c:75:cb:8e	802.11	172	Disassociate, SN=1952, FN=12, Flags=.pmP..FT
338…	53.780275			802.11	154	Disassociate[Malformed Packet]
342…	54.511576	b5:ba:9a:2d:00:99	c5:ac:50:18:17:2f	802.11	172	Disassociate, SN=1468, FN=7, Flags=op..R..T[Malformed Packet]

Wireshark filter command: wlan.fc.type_subtype == 0x0c

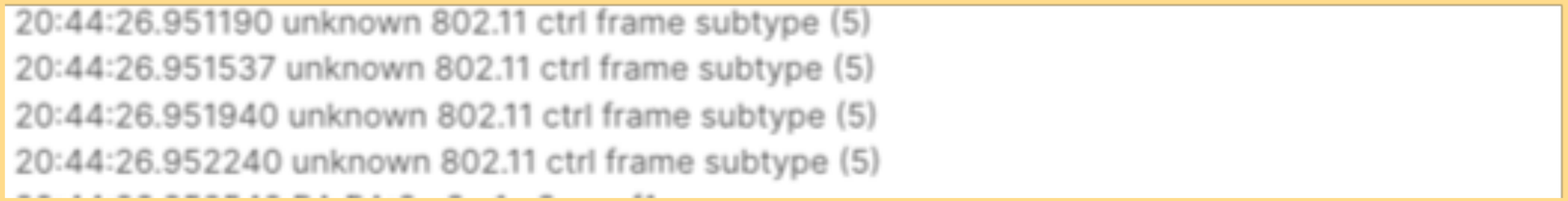
Rickroll Attack & Live Demo

The list of SSIDs of words form the Rickroll song

02 Never gonna let you down	4A:A4:69:37:97:B9		8	2.4	Open	4A:A4:69	b/g		-29	-29	-29	-29	-99	3s ago
07 Never gonna tell a lie	9E:FC:6E:07:4A:F2		5	2.4	Open	9E:FC:6E	b/g		-29	-29	-29	-29	-99	3s ago
02 Never gonna let you down	86:8E:04:EA:44:23		9	2.4	Open	86:8E:04	b/g		-29	-29	-29	-29	-99	3s ago
04 and desert you	60:11:25:9B:09:0E		5	2.4	Open	60:11:25	b/g		-30	-30	-30	-30	-99	3s ago
08 and hurt you	CC:57:E0:F8:62:CC		8	2.4	Open	CC:57:E0	b/g		-30	-30	-30	-30	-99	3s ago
06 Never gonna say goodbye	0A:20:F8:71:3B:3B		8	2.4	Open	0A:20:F8	b/g		-30	-30	-30	-30	-99	3s ago
05 Never gonna make you cry	D6:6E:9B:ED:DF:E8		9	2.4	Open	D6:6E:9B	b/g		-30	-30	-30	-30	-99	3s ago
06 Never gonna say goodbye	16:A1:B1:56:D7:28		5	2.4	Open	16:A1:B1	b/g		-31	-31	-31	-31	-99	3s ago
03 Never gonna run around	AE:3A:58:62:D0:13		9	2.4	Open	AE:3A:58			-31	-31	-31	-31	-99	3s ago
05 Never gonna make you cry	52:CA:37:3C:4D:38		9	2.4	Open	52:CA:37	b/g		-31	-31	-31	-31	-99	3s ago
01 Never gonna give you up	36:0D:89:44:8A:75		7	2.4	Open	36:0D:89	b/g		-31	-31	-31	-31	-99	3s ago
05 Never gonna make you cry	C0:C1:97:10:B0:41		7	2.4	Open	C0:C1:97	b/g		-31	-31	-31	-31	-99	3s ago
07 Never gonna tell a lie	6A:DE:20:91:21:1B		7	2.4	Open	6A:DE:20	b/g		-31	-31	-31	-31	-99	3s ago
07 Never gonna tell a lie	AA:A3:FD:CD:57:79		2	2.4	Open	AA:A3:FD	b/g		-32	-32	-32	-32	-99	3s ago
02 Never gonna let you down	1C:F6:C8:75:F1:74		5	2.4	Open	1C:F6:C8	b/g		-32	-32	-32	-32	-99	3s ago
04 and desert you	0C:FD:7E:03:48:46		8	2.4	Open	0C:FD:7E	b/g		-33	-33	-33	-33	-99	3s ago
03 Never gonna run around	AC:D4:FD:10:96:6C		1	2.4	Open	AC:D4:FD			-34	-34	-34	-34	-99	3s ago
02 Never gonna let you down	D0:B1:3B:D8:B4:A9		1	2.4	Open	D0:B1:3B	b/g		-34	-34	-34	-34	-99	3s ago
06 Never gonna say goodbye	CA:2B:38:B1:EE:F1		5	2.4	Open	CA:2B:38	b/g		-34	-34	-34	-34	-99	3s ago
03 Never gonna run around	08:BF:6F:95:C4:4B		2	2.4	Open	08:BF:6F			-34	-34	-34	-34	-99	3s ago
03 Never gonna run around	40:96:2F:5D:2B:2F		10	2.4	Open	40:96:2F			-35	-35	-35	-35	-99	3s ago
08 and hurt you	FA:DD:CC:81:F5:F1		2	2.4	Open	FA:DD:CC	b/g		-35	-35	-35	-35	-99	3s ago

The Wi-Fi Probe attack

Cisco's Meraki logs

- It is Probe spam (flood attack). It's DDOS tool
- 

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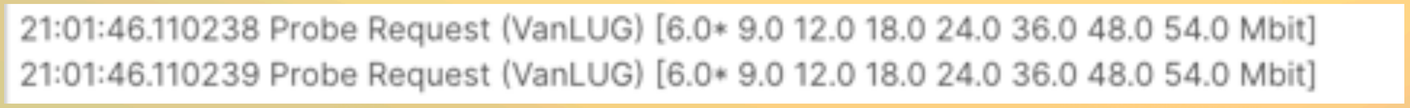
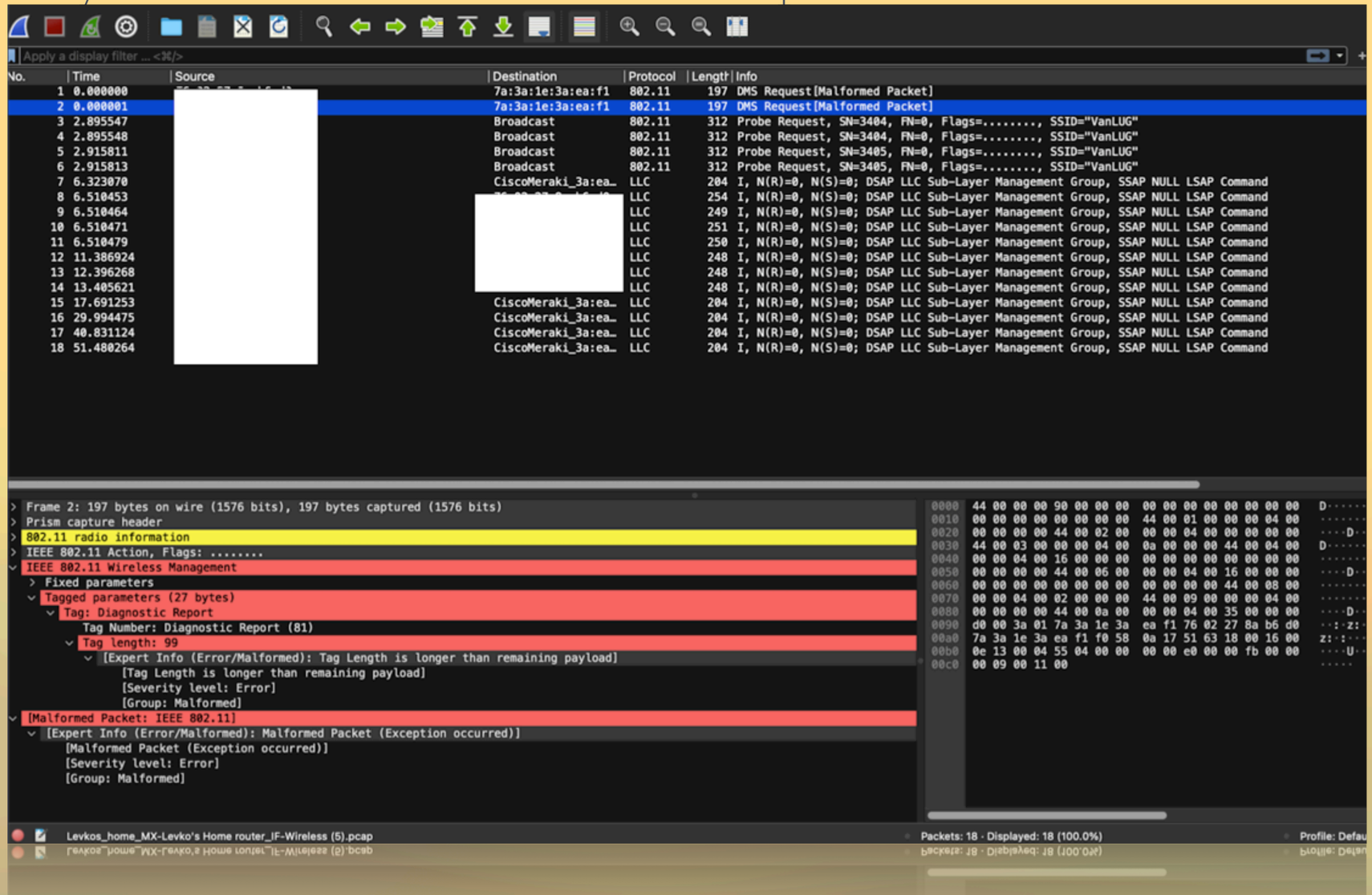
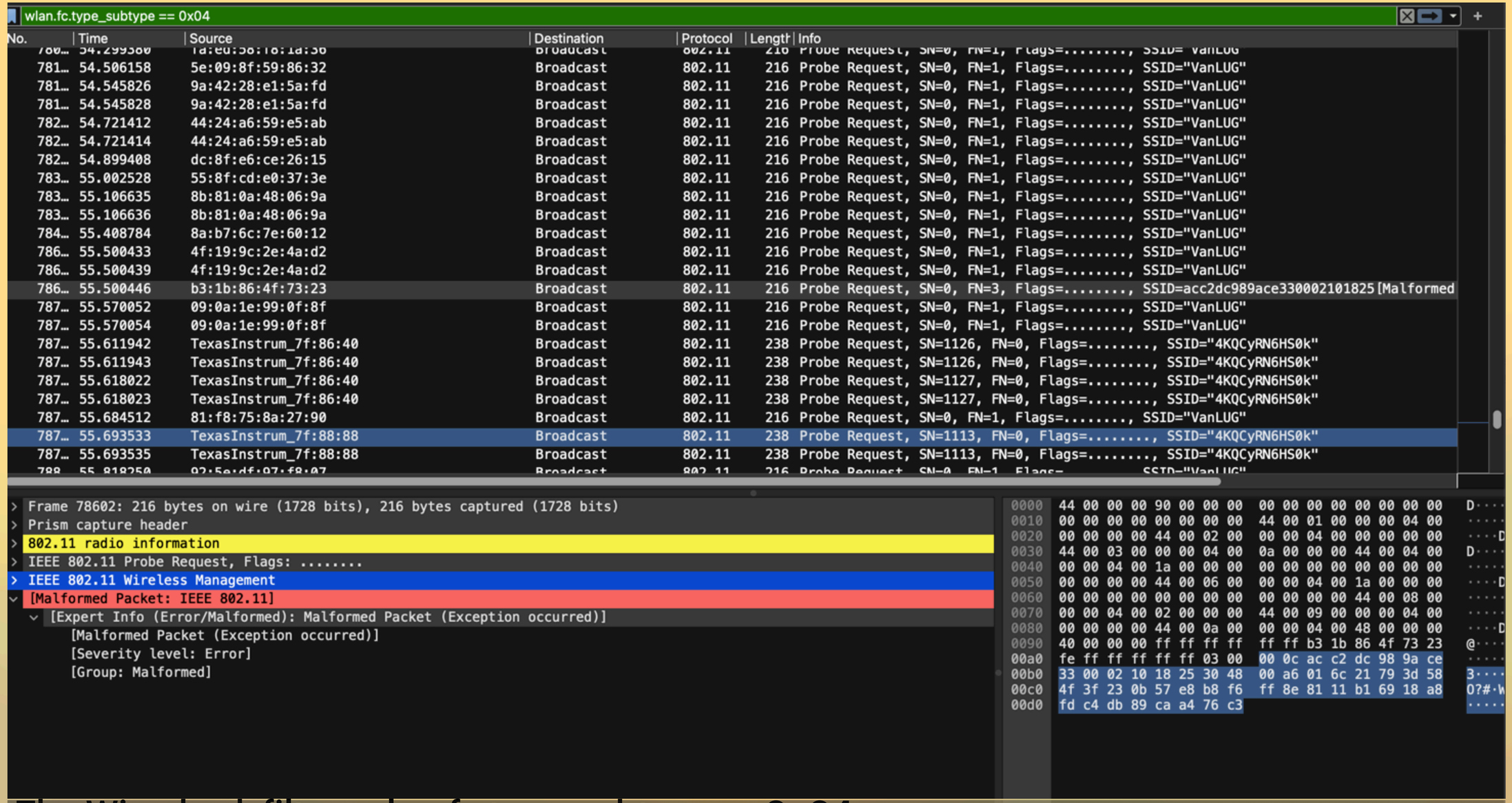
- 

The Wi-Fi Probe attack

Pay attention on Malformed packets



The Wi-Fi Probe Attack

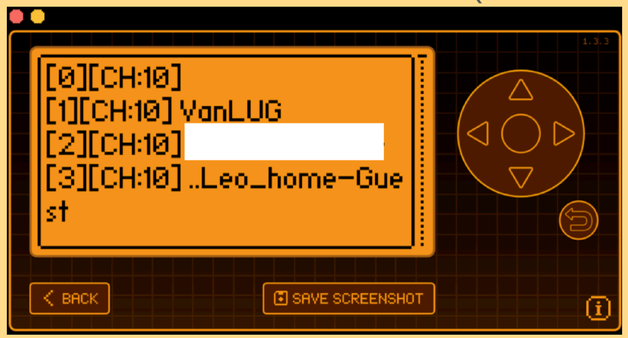


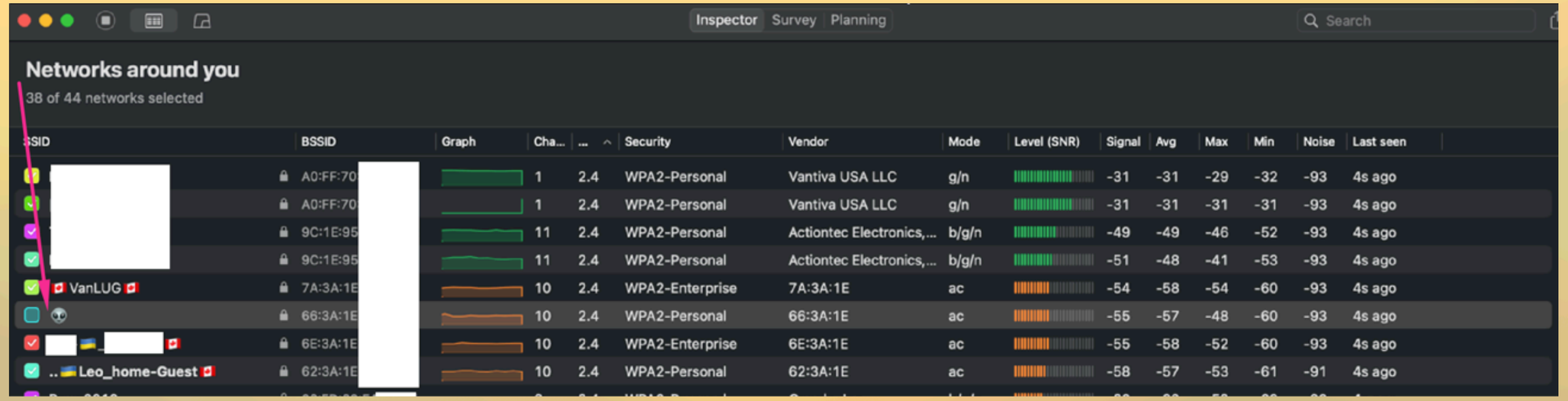
- The Wireshark filter: wlan.fc.type_subtype == 0x04

Wi-Fi SSID and Unicode name(s)

Flipper can’t visualise unicodes

- But it can attack (deauthentication) that network(s) by ID :)





Here is my article about Wi-Fi and unicodes:
https://leo2008k.medium.com/and-other-pictures-based-on-unicode-in-your-wireless-network-name-via-wifi-ssid-at-mikrotik-425a72a9ce34

WPA/WPA 2 and the Flipper zero

RAW data sniffed

- Manually Convert network dump file with handshakes: PMKID&EAPOL, PMKID, EAPOL-hccapx, EAPOL-hccap, WPAPSK-john to hashcat.2200 file https://github.com/ZerBea/hcxtools

- To Automatically convert that .pcap we can use that hashcat web site: https://hashcat.net/cap2hashcat/

- Then execute this command:
  hashcat -m 22000 -a 3 VanLUG_PMKID.hc22000 '123QWEasdZX?u'

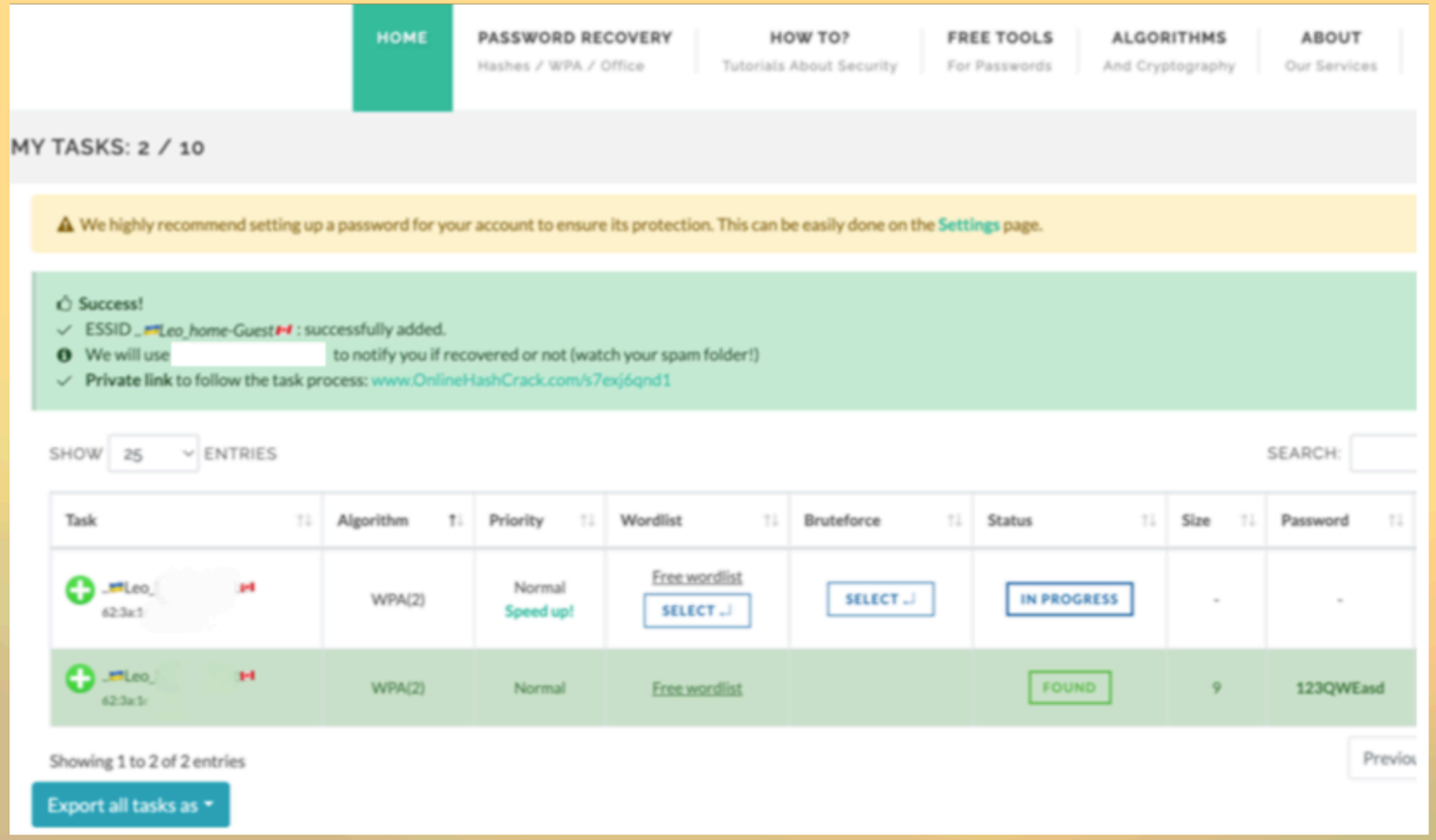
Wi-Fi and flipper zero

WPA/WPA 2 Hacking topic

- Live DEMO

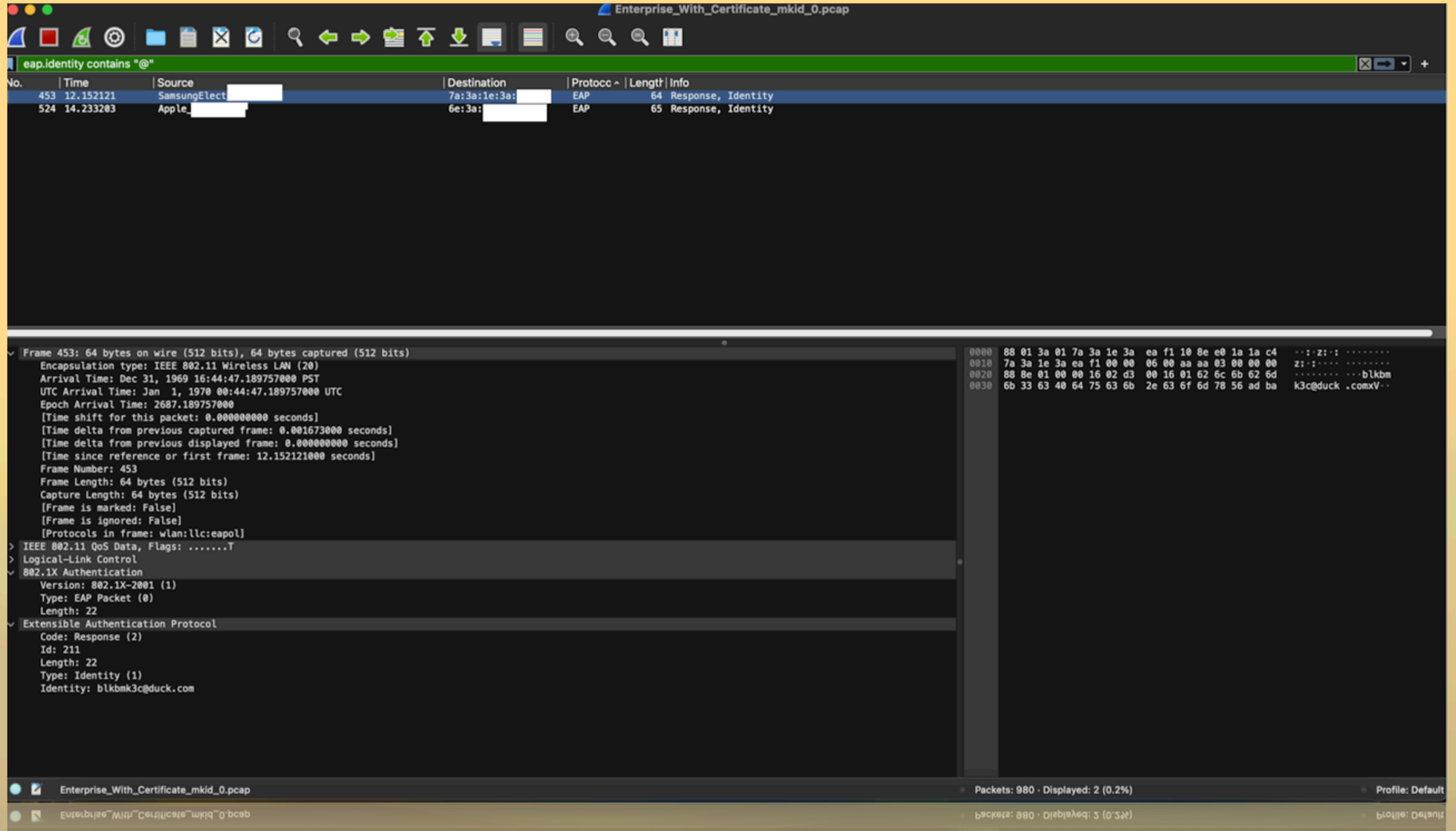
WiFi and flipper zero

We can Automate that process by this web resource:
https://www.onlinehashcrack.com/tasks



WPA 2 Enterprise

I found EAP Identity value - its means Wi-Fi reconnaissance attack can be performed



Evil Twin Attack

FAKE Access Point. Please don’t connect!

- Live DEMO

Evil Twin Attack

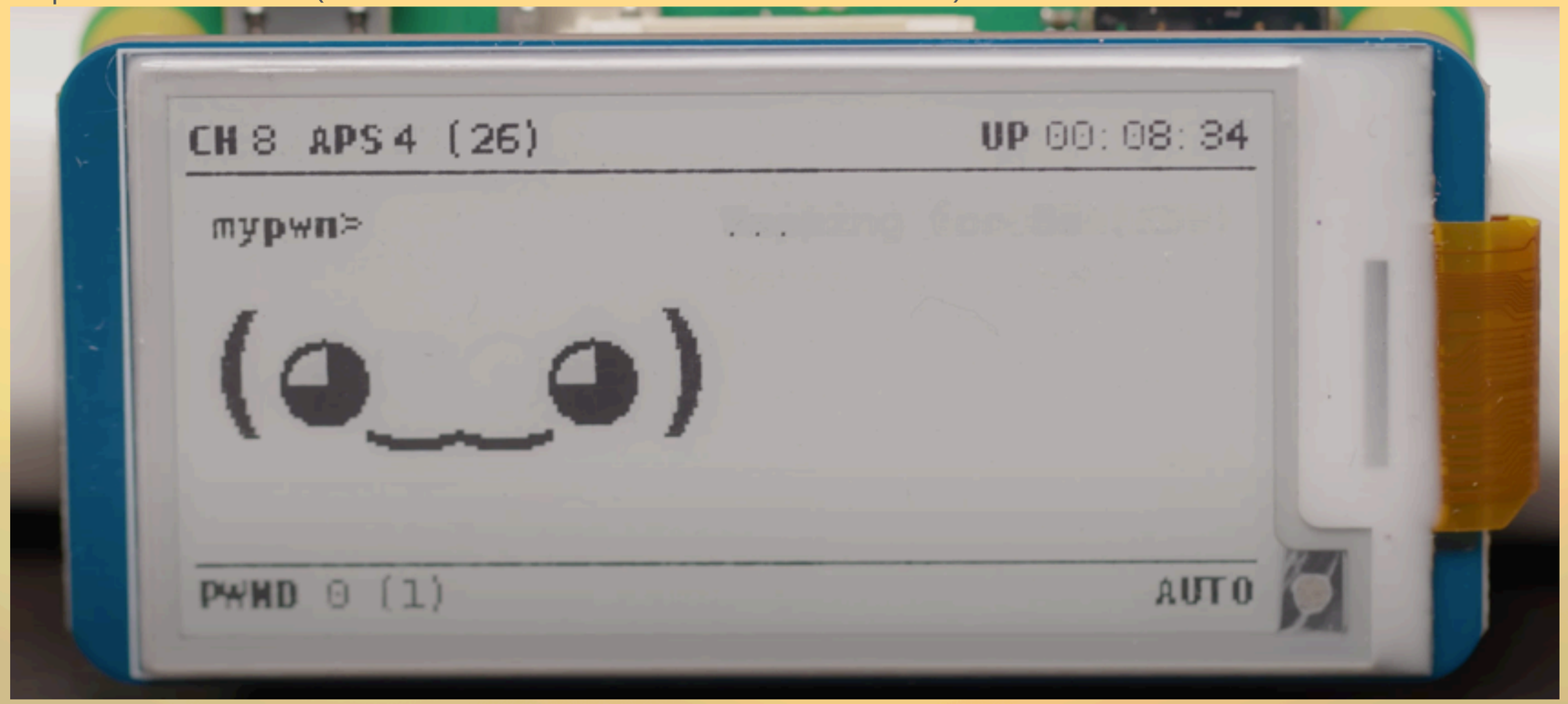
FAKE Access Point. Please don’t connect!

- How to protect?
- Use VPN in public Wi-Fi
- Check SSL/TLS

Flipper Fi-Wi hacking alternative(s)

PWNAGOTCHI

- Open source (Based on Arduino and Linux)



Car theft

Let’s review that video

As far as you can see, professionals use different devices than Flipper.

Bluetooth, BLE, spam/flood attack

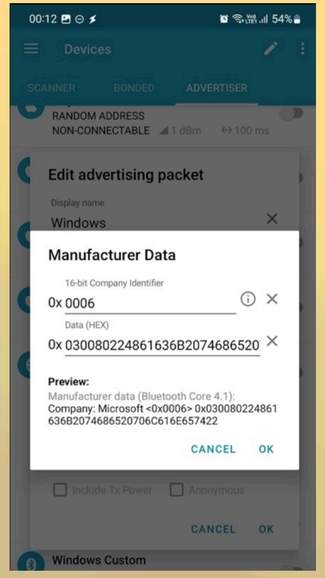
Live demo

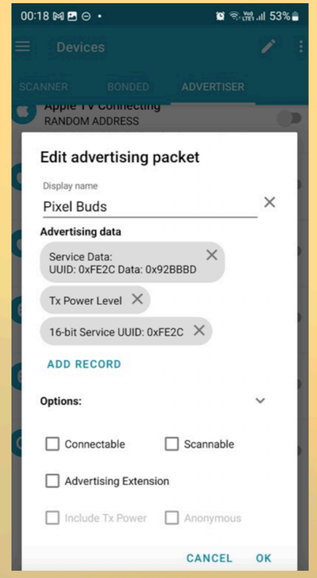
- Source https://github.com/ECTO-1A/AppleJuice
- Additional option “Mac randomisation”

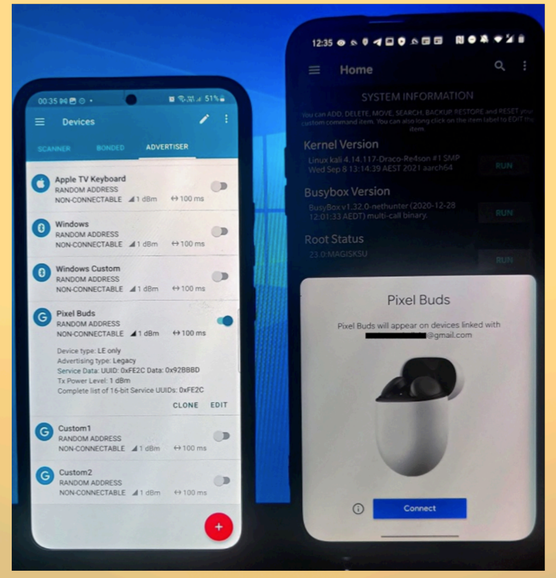
Bluetooth, BLE, flood alternative

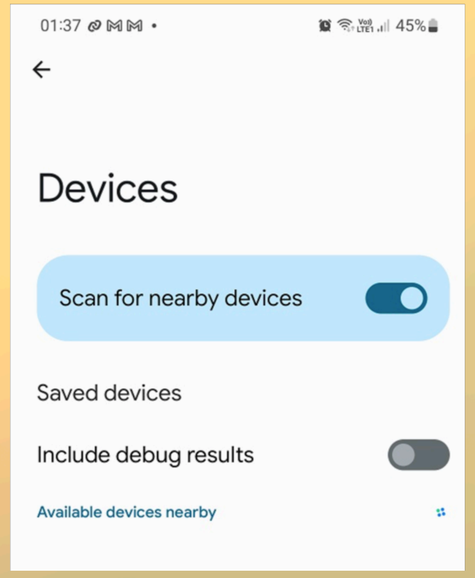
As variant it can perform via Android phone

- Alternative tool is mobile phones i.e. Android
- Source: https://www.mobile-hacker.com/2023/10/17/spam-ios-android-and-windows-with-bluetooth-pairing-messages-using-flipper-zero-or-android-smartphone/



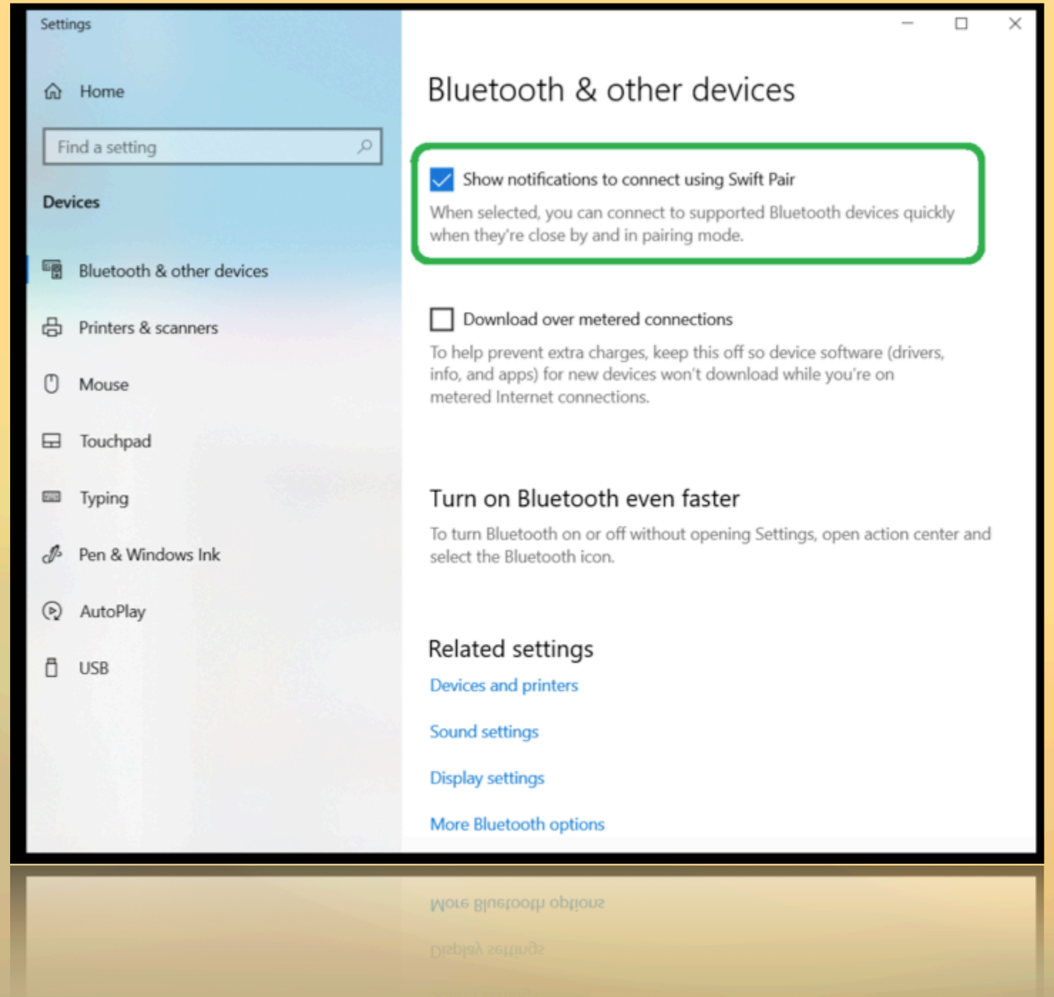


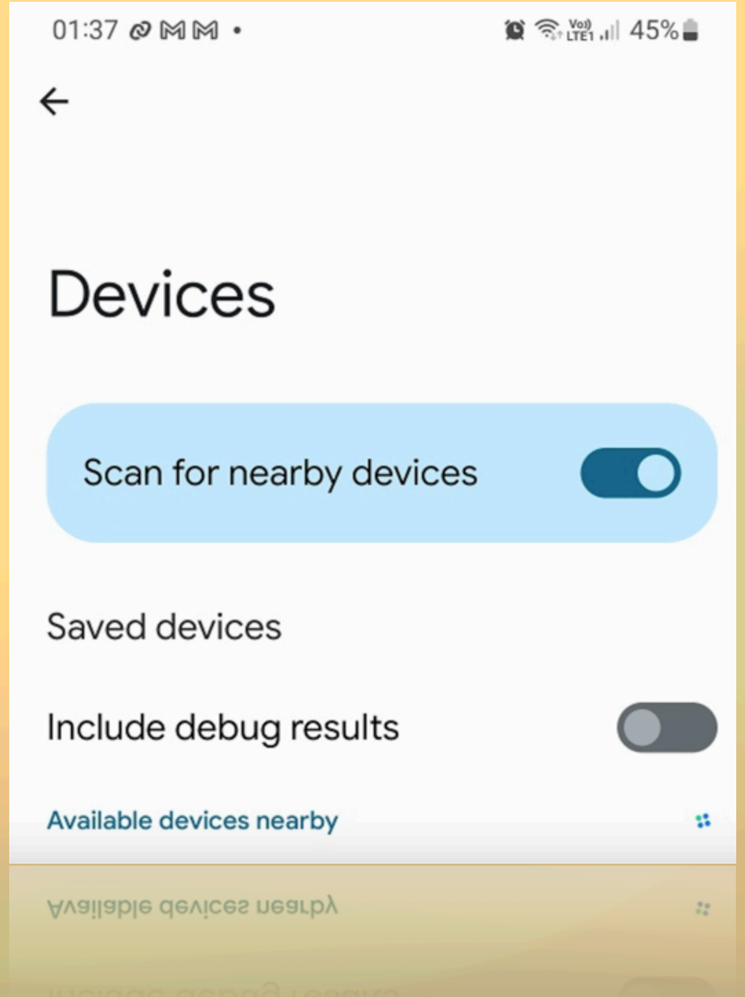




Bluetooth (BLE) spam protection, or better yet, mitigation of attacks.

How to protect? Solution: Disable Notifications or Bluetooth





Bad USB

- The Flipper support the “Rubber Ducky Script Language”
- Ref. https://web.archive.org/web/20220816200129/http://github.com/hak5darren/USB-Rubber-Ducky/wiki/Duckyscript
- Ref. https://github.com/UNC0V3R3D/Flipper_Zero-BadUsb/tree/main/BadUsb-Collection/Windows_Badusb/Execution
- Ref. https://github.com/topics/badusb
- Why it can be dangerous?



Bad USB

- Live demo

The NFC clone alternatives

- Proxmax3
- NFC Research group on GitHub
- Live demo

Infrared port, Sub Ghz, iButton, 125 Khz RFID, RFID

- The Flipper owner can enable/disable TVs, Air conditioners, control remote devices, etc.

The flipper’s alternatives

- 1. Raspberry Pi
- 2. Crazy Radio 2
- 3. Cactus WHID (Keylogger)
- 4. Dstike Wi-Fi Deauther
- 5. USB Rubber Ducky
- 6. LAN Turtle
- 7. Magspoof
- 8. Piña Wi-Fi
- 9. Ubertooth One
- 10. Smartphone(s)
- 11. The Wi-Fi Pineapple
- 12. ChameleonMini (NFC emulator)
- 13. USB Rubber Ducky (perform BAD USB attack)

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