penthertz

RF Swift: a swifty toolbox for all wireless assessments

By Sébastien Dudek

Founder of Penthertz

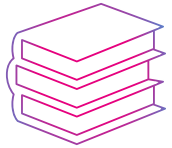
- Sébastien Dudek (@FlUxIuS)
- CEO of Penthertz
  - Founded during COVID in 2020
  - Specialized in Wireless communications security
- > 10 years of experience in Software & Hardware security
  - Security researcher
  - Pentester & Red Team
  - Vulnerability researcher

Perfect mix to make Penthertz!

Main activities

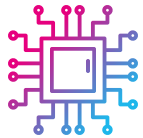
Security assessments

- Wireless communications (RFID, Wi-Fi, Mobile communications, Bluetooth, etc.)
- Embedded devices
- Backend servers
- Red Team



Trainings

- Software-Defined Radio Hacking
- Wi-Fi Red teaming
- RFID Hacking
- Mobile attacks (2G/3G/4G/5G), and more...

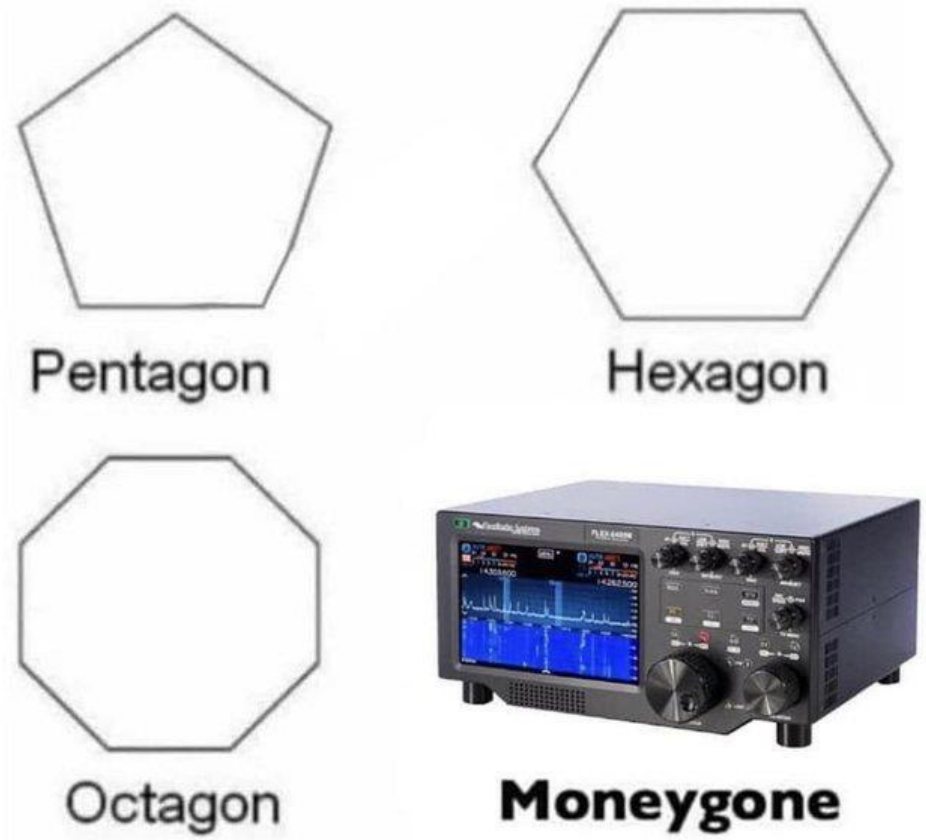


Hardware security

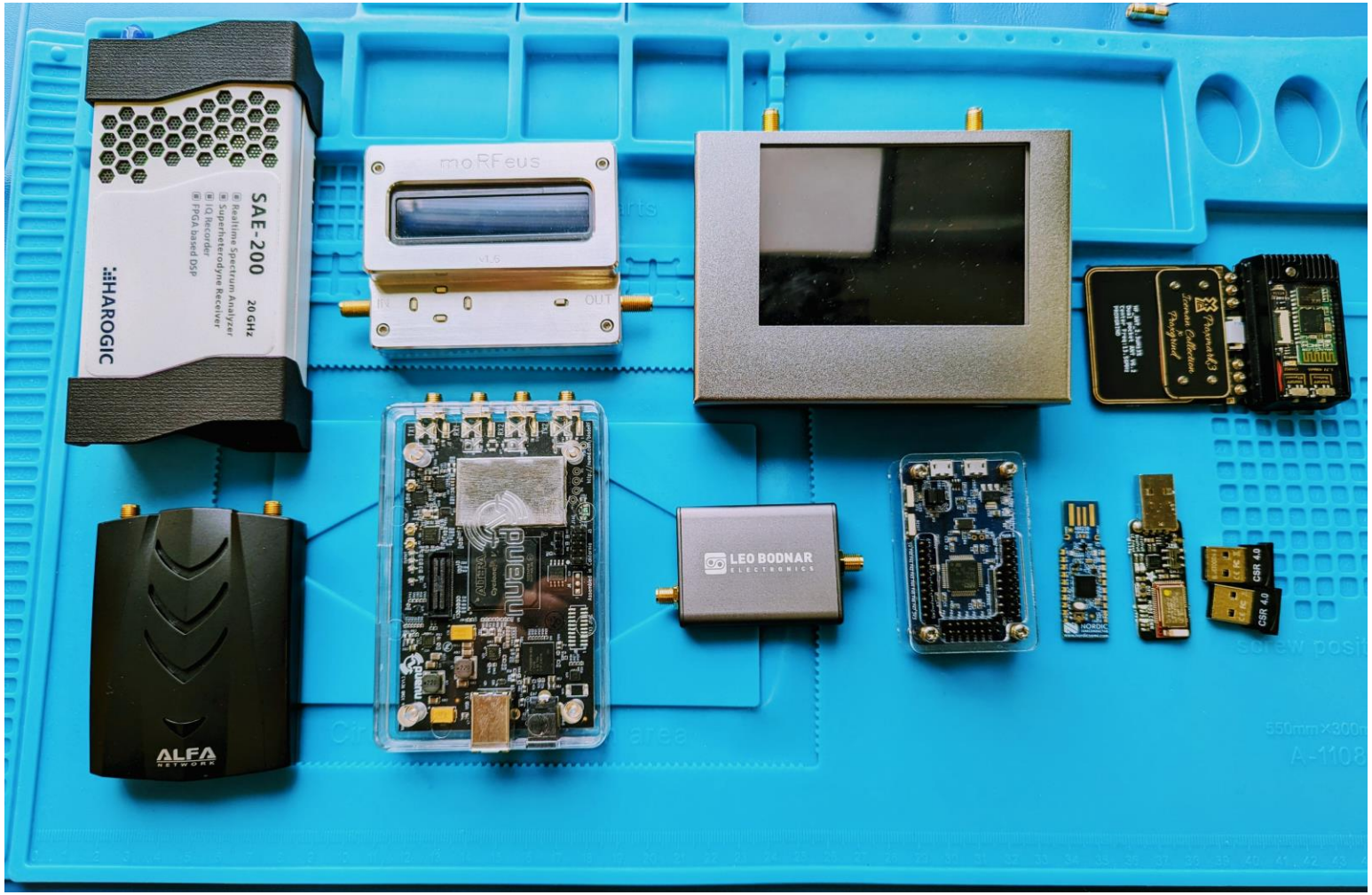
- Firmware extraction
- Chip off
- Secrets extraction
- Library's analysis
- Vulnerability hunting

RF Pentester 010: Having a good setup

A real lab -> follow the geometry...



A minimum setup for RF assessments: ~3-4k€

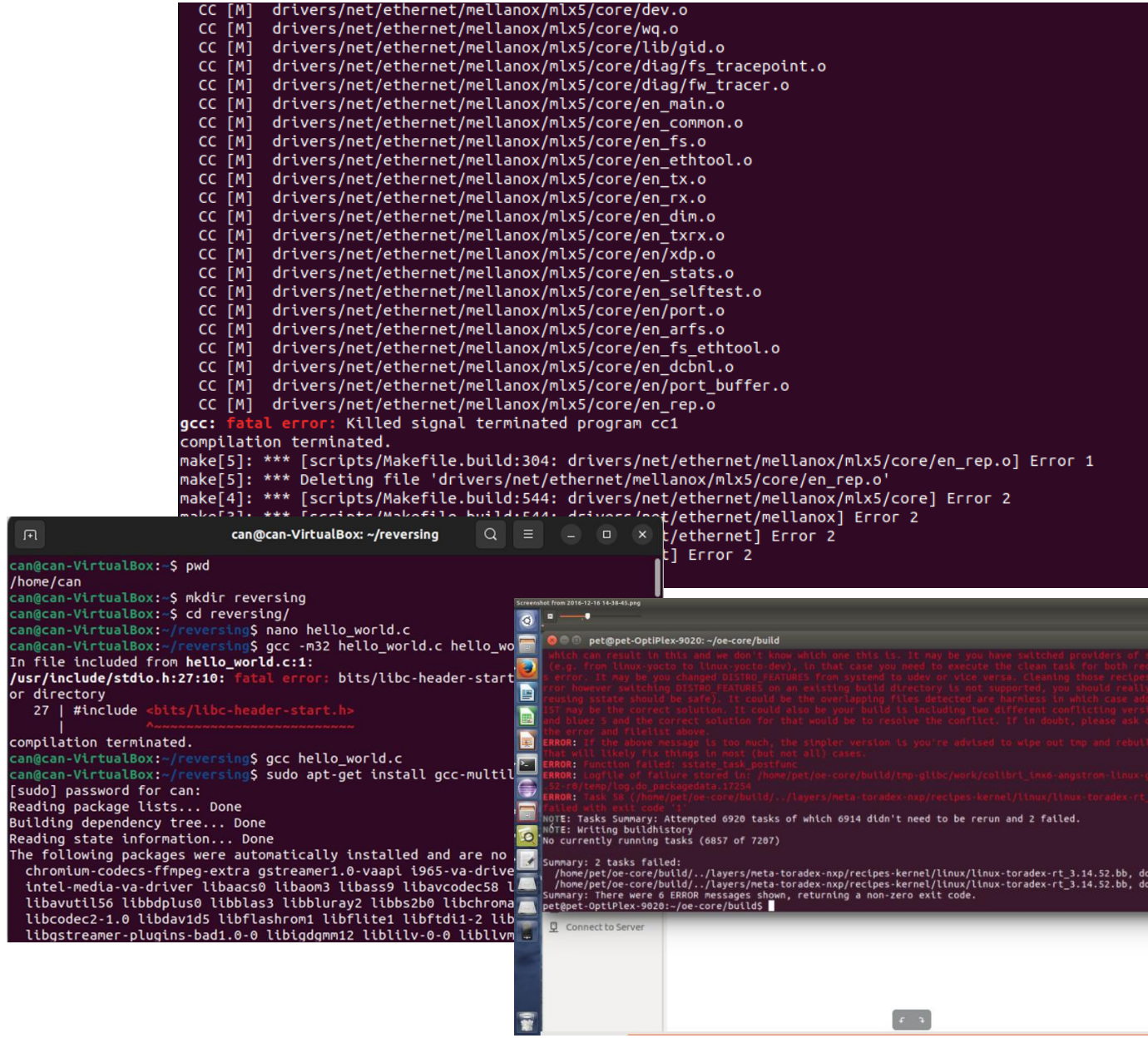


Software setup

- We need all required pentests tools for different context:
  - Wi-Fi
  - RFID
  - Bluetooth Classic & LE 4/5
  - Telecom
  - And even exotic communications
- In addition: report generator, common network tools, web tools, etc.
- But: takes at least 1-5 days to setup properly (depending on number of tools)

Compile your tools

- Need to deal with:
  - Compilation issues
  - Dependencies
  - Collisions/conflicts
- A good setup can take a day to a week depending on needed tools
- Time is running
- Not good when rushing on an assessment...



Alternative distributions

- Existing alternative distributions:
  - Kali: packages for Wi-Fi, Bluetooth, RFID, SDR and many other pentest tools
  - Pentoo: Like Kali with extra GNU Radio tools and modules, SDR tools as well (https://github.com/pentoo/pentoo-overlay/tree/master/net-wireless)
  - Dragon OS: Really focusing on radio tools and much more complete that other distributions
  - Others
- **But nothing specific to RF & Hardware security with hardware accesses (USB, mPCIe, GPU, sound, etc.)**

Alternative distributions (2)

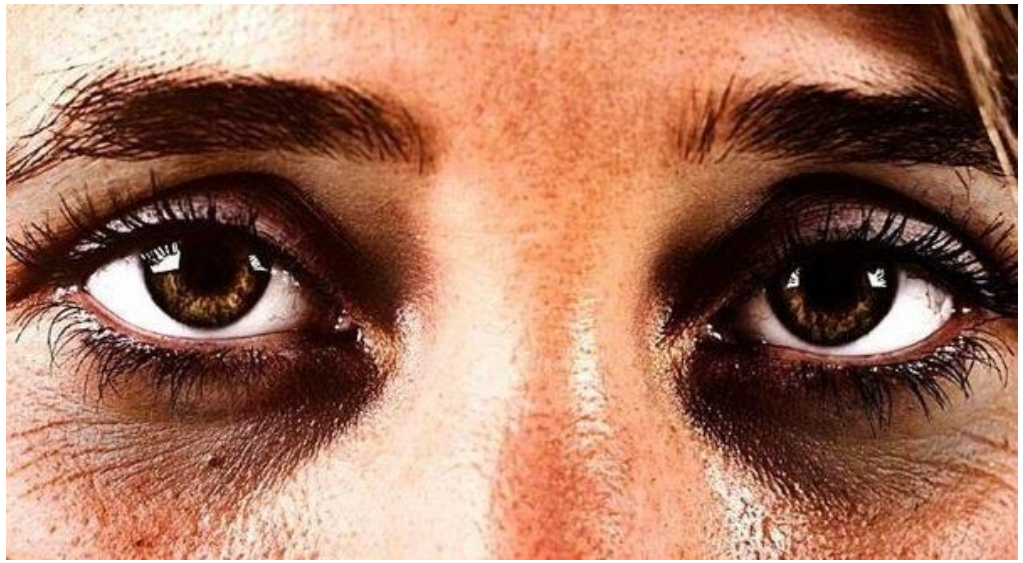
- **Pros**:
  - Packages as much tools as possible --> reducing installation time
    - Tools not yet package can be installed after
  - Less troubleshooting during our setup --> tools are ready to be used
  - Perfect for less experienced people
- **Cons**:
  - Need to reinstall the computer with the specialized distribution
    - And also to complete it with missing tools
  - Dependencies issues with new installed tools --> breaking the setup
  - No scalability

Alternative distributions

- Existing alternative
  - Kali: packages
    many other pente
  - Pentoo: Like Kali with ex
    modules, SDR tools as well
    (https://github.com/pen
    overlay/tree/master
  - Dragon OS: Re
    more complete t
  - Others
- **But nothing specific to RF & Hardware security with hardware accesses (USB, mPCIe, GPU, sound, etc.)**

Breaking the setup

- **Need to reinstall everything! Sometimes until 5am right before a pentest...**
- **You morning starts like that:**



Breaking the setup (2)

- **How the client sees you during the assessment:**

Each mission is different

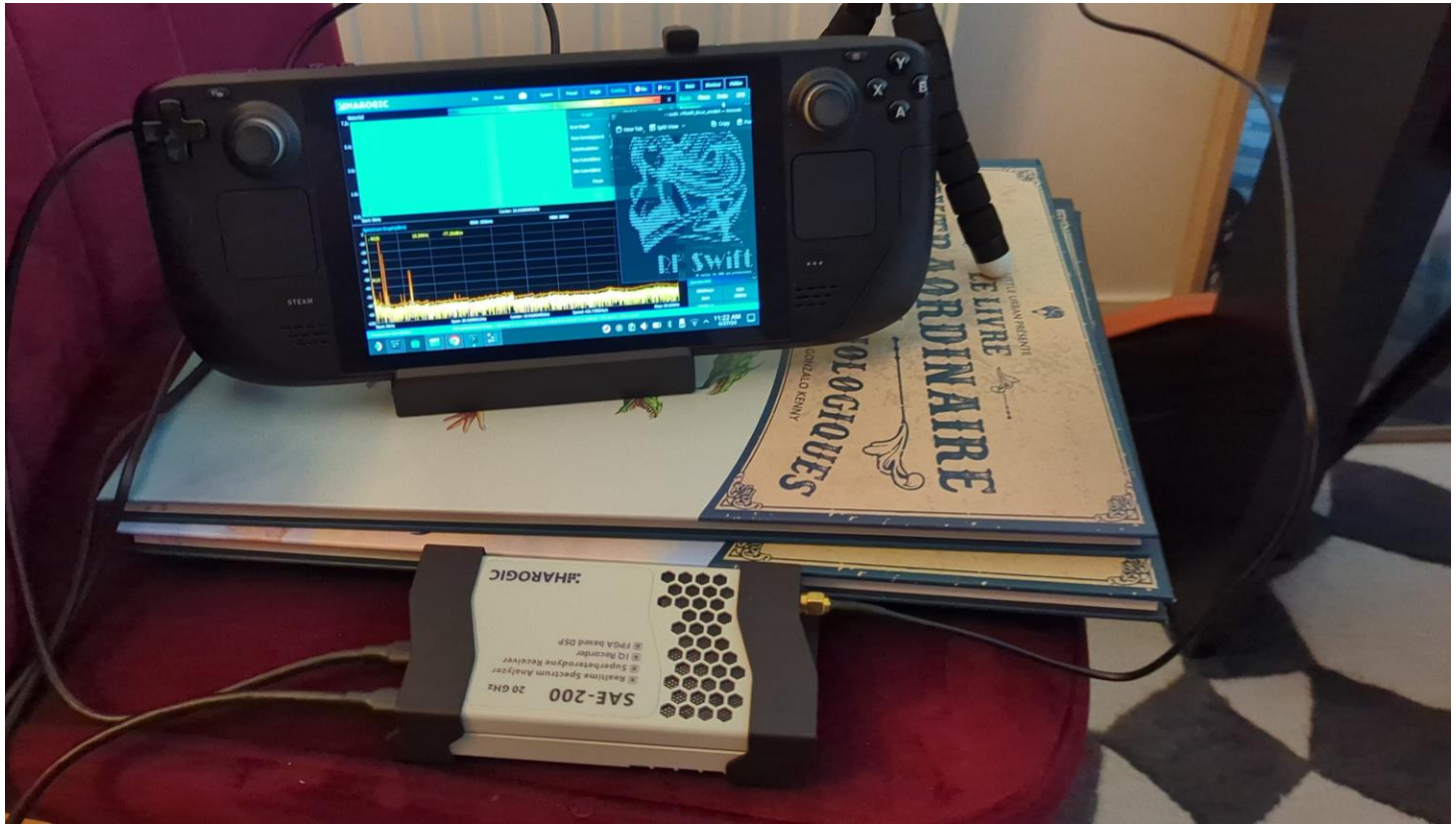
- A mission needs a dedicated container:
  - More reproducibility + scalability
  - Avoid mixing "client 1" traces with "client 2"
  - You can mess inside a container -> destruct it there after

Let me introduce you RF Swift!

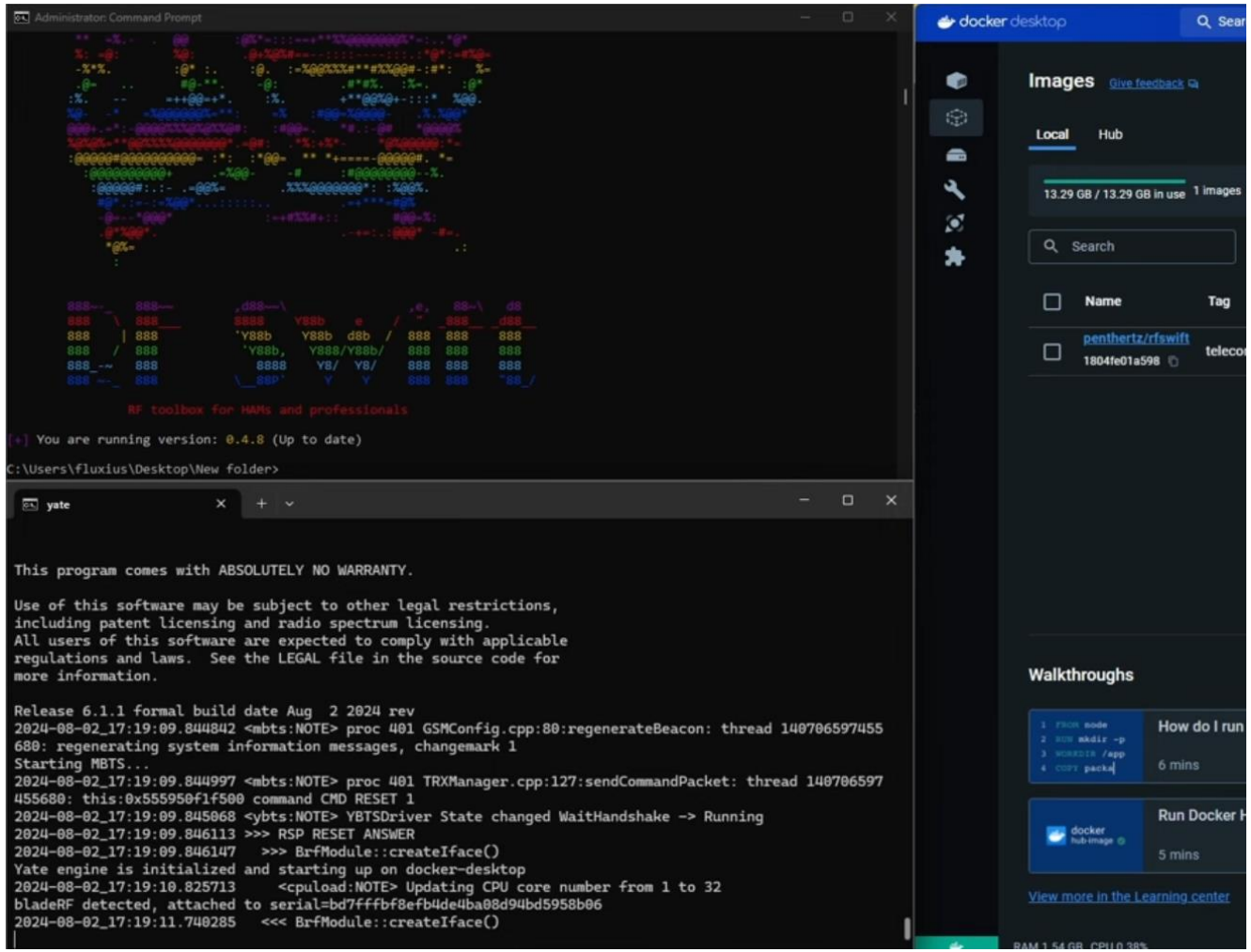
What is it?

- Tool made in Go --> Instrumenting Docker + host
    - Inspirated from Exegol project ;)
- Docker files "recipes"
- Registry with built images
- Scripts for automating installations of various tools
- Supported and tested architectures: x86_64, ARM64, and RISC-V 64
- Supported and tested OSes: Linux and Windows

Assessments on a Steam Deck

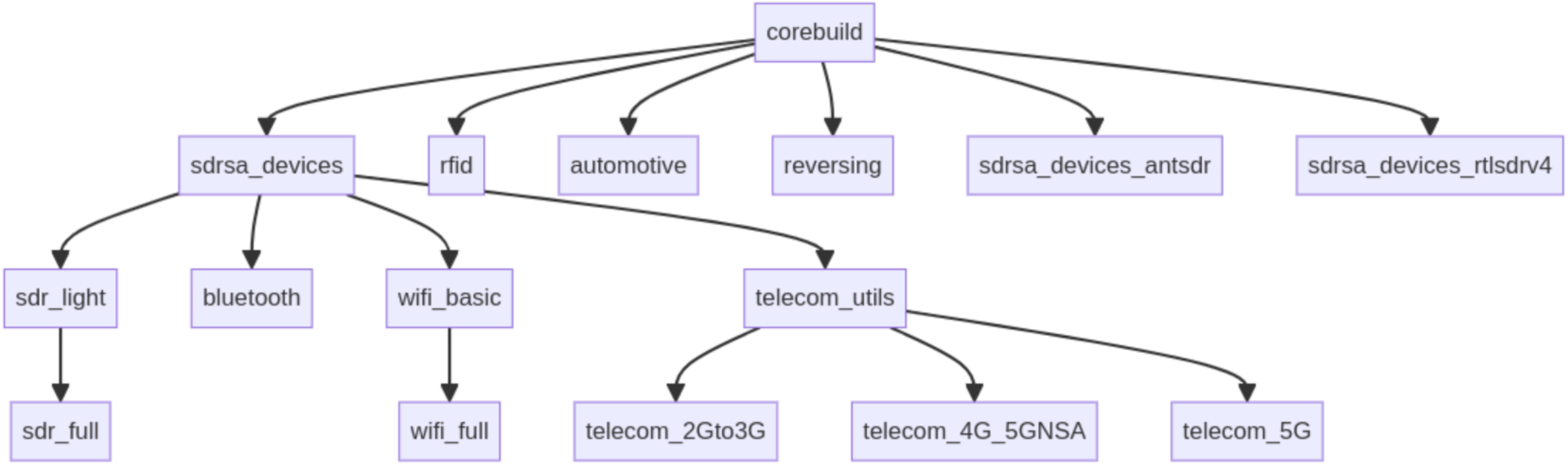


Windows GPRS stations (in few minutes)



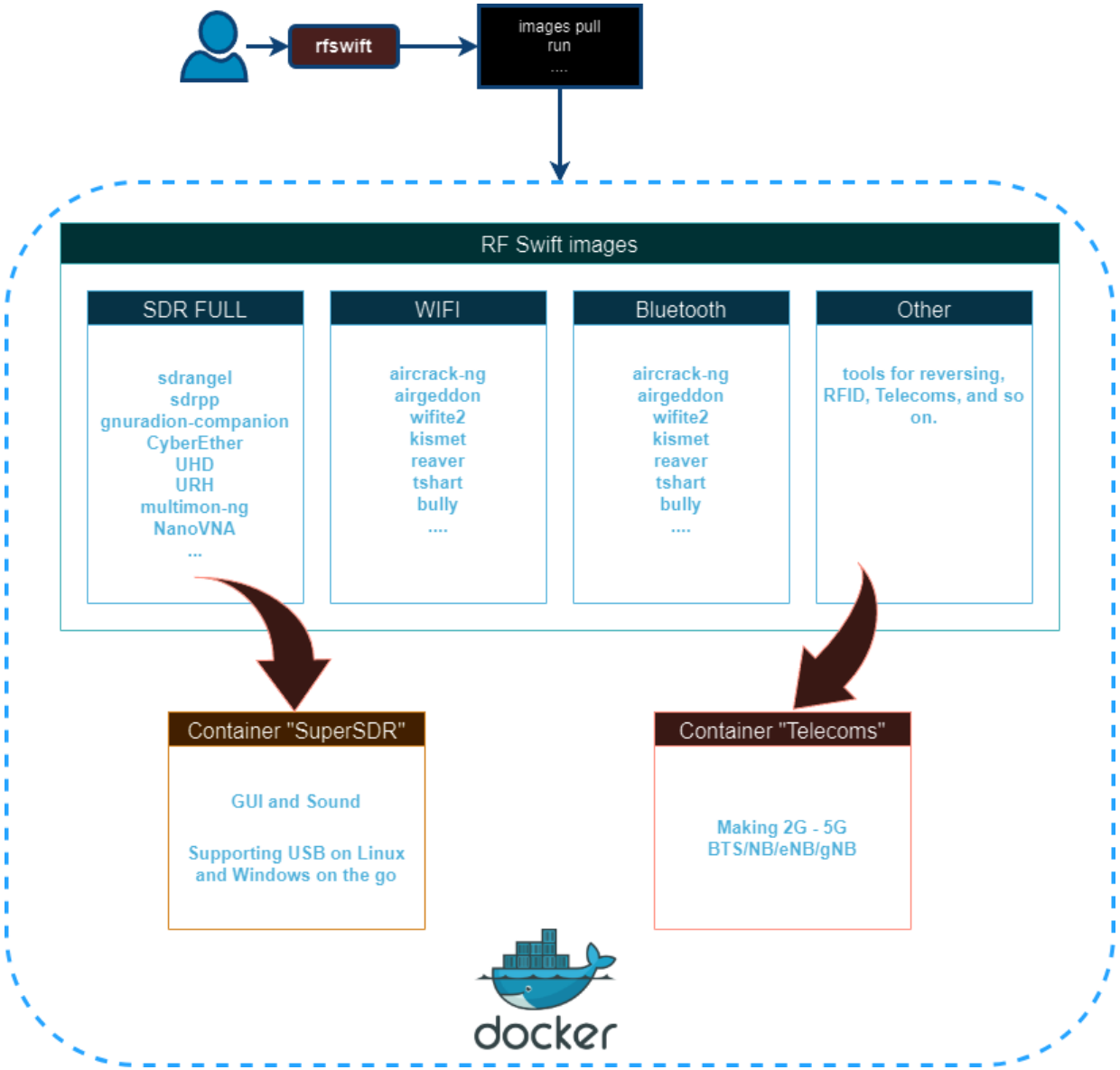
Images' hierarchy

- Following Docker images layers concept: reuse of layers -> speed and space saving



Architecture

- Each created container has tools included in dedicated images
- Each container represent a "mission"
  - Perfect for assessments separation: client1 and client2 are not in the same space
  - Messing with one container -> throw it and run a new container!



Key commands

- Impatient to make your images? Pull one from our registry:

```
$ sudo ./rfswift images pull –i <reference> -t <tag name to apply>
```

- Run a container:

```
$ sudo ./rfswift run –i <image name> –n <container name>   [-e <command>]
 [-b <extra volumes>]
```

- Shoot! I kill my terminal!! shhNOO problem:

```
$ sudo ./rfswift exec [–c <container name>]  -e <command>
```

- Let’s discover what’s inside!

Demo time!

Conclusion

To conclude

- You can travel and assess devices safely with RF Swift
  - e.g. -> my computer that was just erased and used for traveling
- Keep you setup light based on your own "recipes"
- RF Swift is 1y old -> still a lot to do!
- Need also contributors:
  - Documentation: https://rfswift.io/
  - Go binary for instrumentation and user experience
- Our discord: https://discord.com/invite/NS3HayKrpA

penthertz

Thank You

Please contact us:

contact@penthertz.com

+33 1 73 13 82 77

penthertz.com

Watch us on YouTube