



Tux-EVSE, an open-source EV charger



IoT.bzh at a glance

Location: Lorient,
Brittany, France



Our product

redpesk®: SaaS platform (or On Prem) Linux for
industrial IoT (auto, mil-aero, energy...)



+30 years of embedded SW expertise

WIND RIVER

Vannes, France 1990
1st Wind River european R&D center

Open Source contributions



OS open source, Samsung TVs
Intel Vannes (2011-2015)



Some customers



THALES

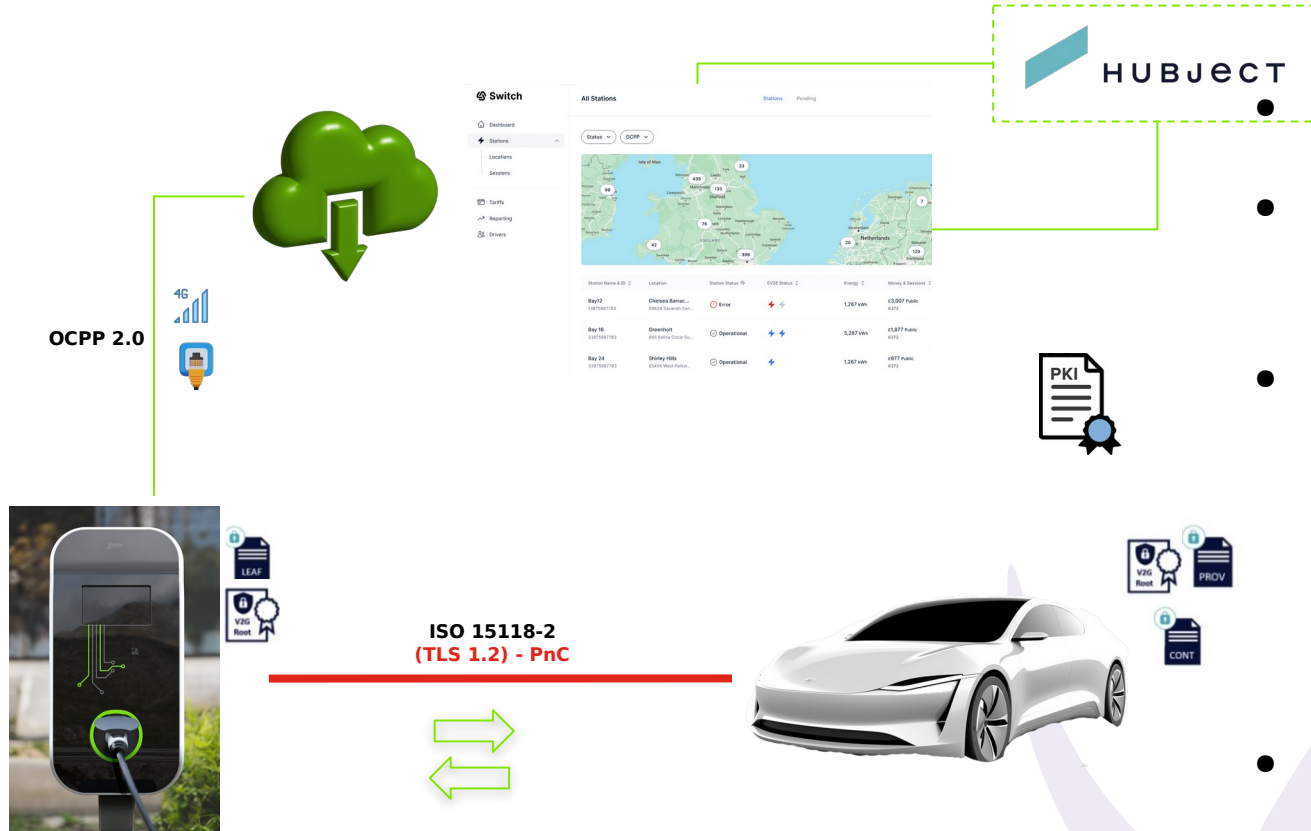
saft



Tux-EVSE, an open-source EV charger

- Work in collaboration with Valeo 
 - Demo of an EV charger
- Integration of third-party commercial mobility stacks

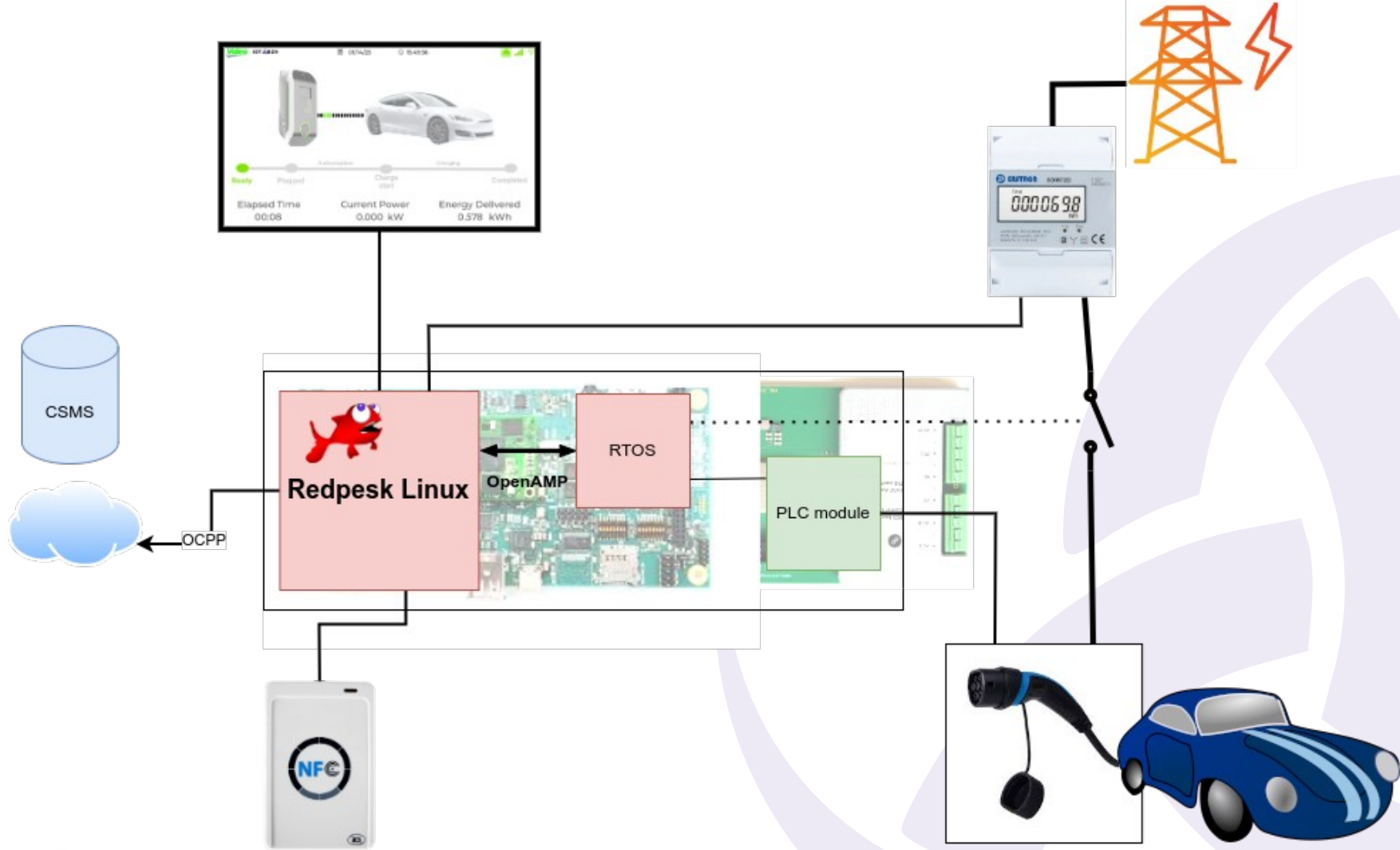
ISO-15118-2x



HUBJECT

• TCP/TLS

- Authentication by RFID card
- Or “Plug and Charge”: online verification of signed contract through a trust chain (PKI)
- “Vehicule to Grid”: ability to discharge

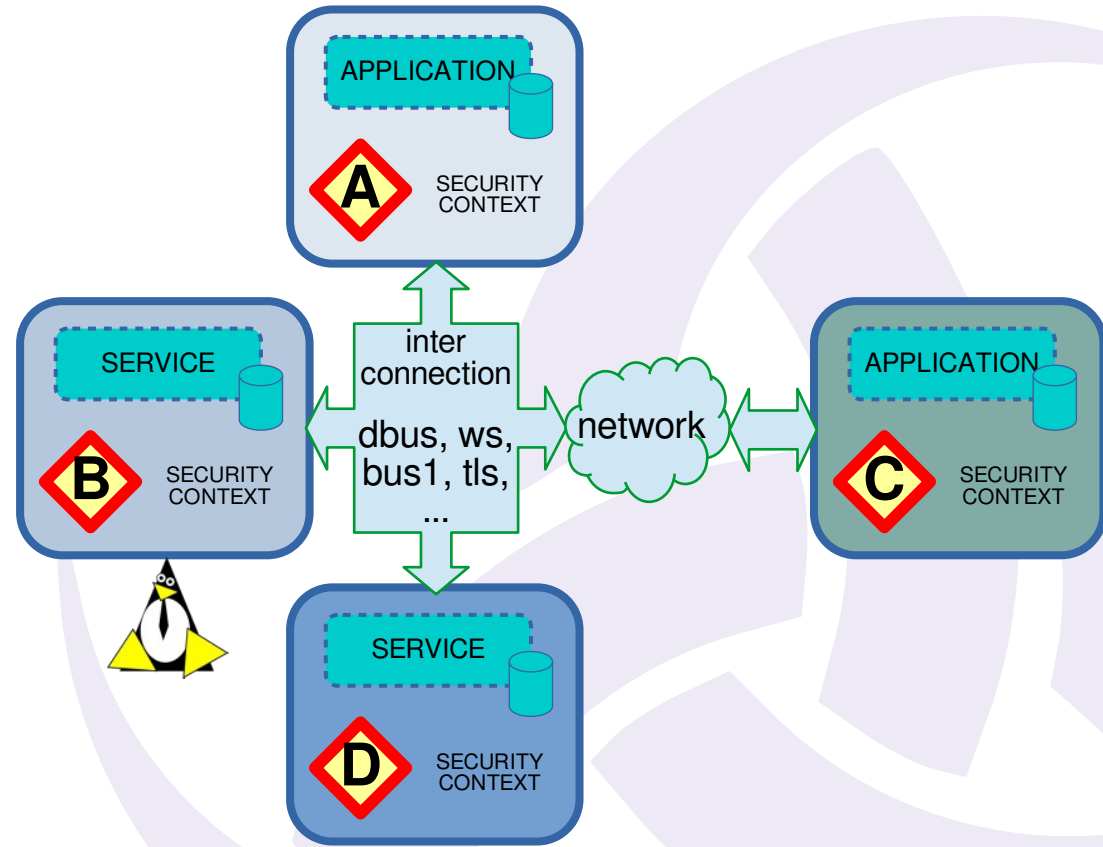


Security issues

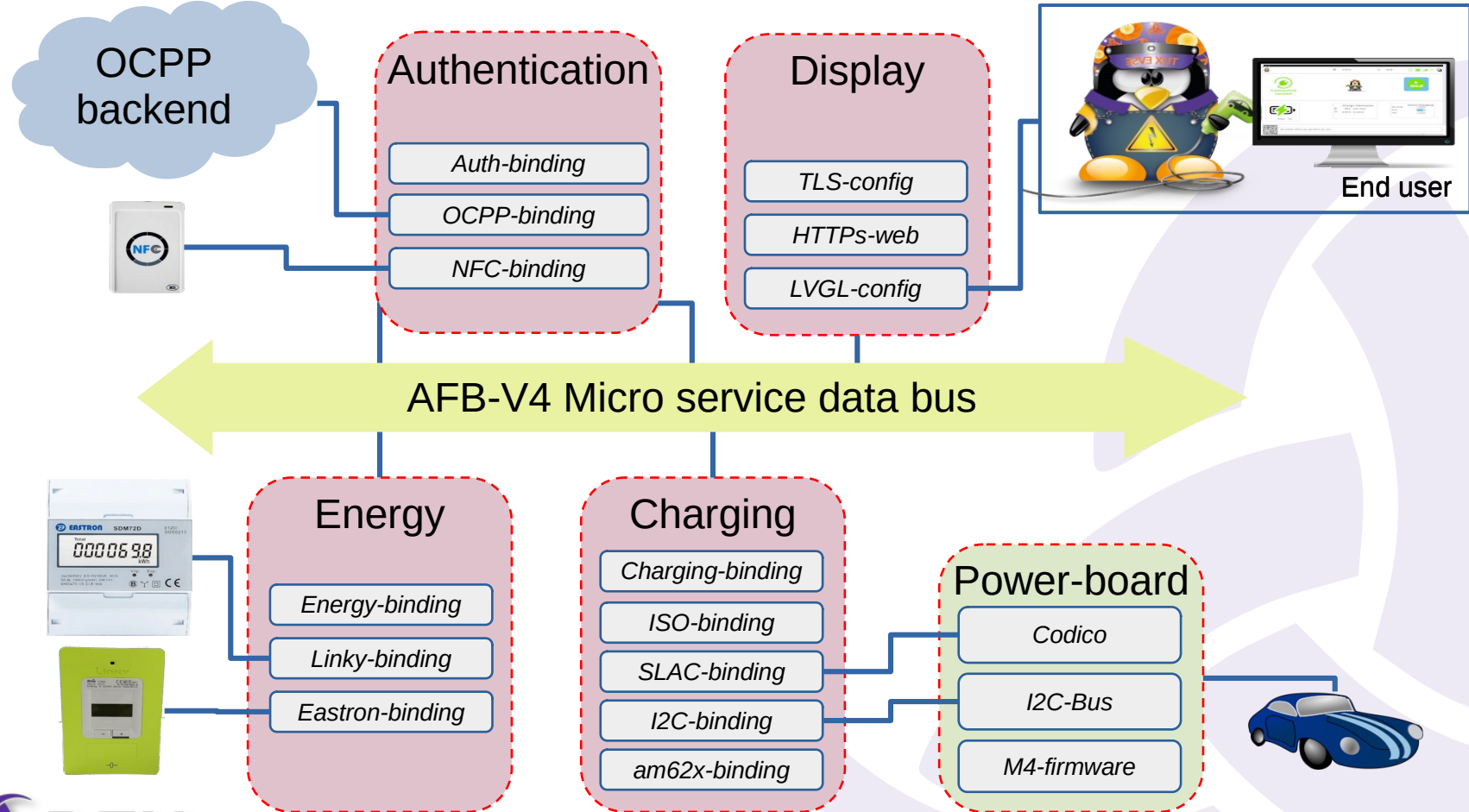
- Large surface of attack
 - Internet: payment, authentication, etc.
 - PLC: vehicle
 - Complexity of protocols (ISO-15118, OCPP, PKI)
- Threats
 - Free riding
 - Compromission of station's or car's network
 - Electrical risk

AFB: a micro-service framework for security

- Coming from Tizen (Samsung TV)
 - Reused in Automotive Grade Linux
- Micro-services communicate through RPC (api, verbs, events)
- Security isolation with network transparency
- Linux Security Module: SMACK
 - “embedded” SELinux
- Permission database: cynagora



Micro services



In Rust we trust

- Memory safety without performance sacrifice
- Core part in C with Rust wrapping
 - <https://github.com/redpesk-common/afb-librust>
 - FFI with “unsafe” parts
- All services written in Rust



ISO15118-2 debugging

- Trialog ComboCS
- Open-source ISO-15118 simulator / injector
 - <https://github.com/tux-evse/iso15118-simulator-rs/>



Screens

Valeo IOT BZH

01/14/25

15:49:33



**Charger is ready
Plug your vehicle**



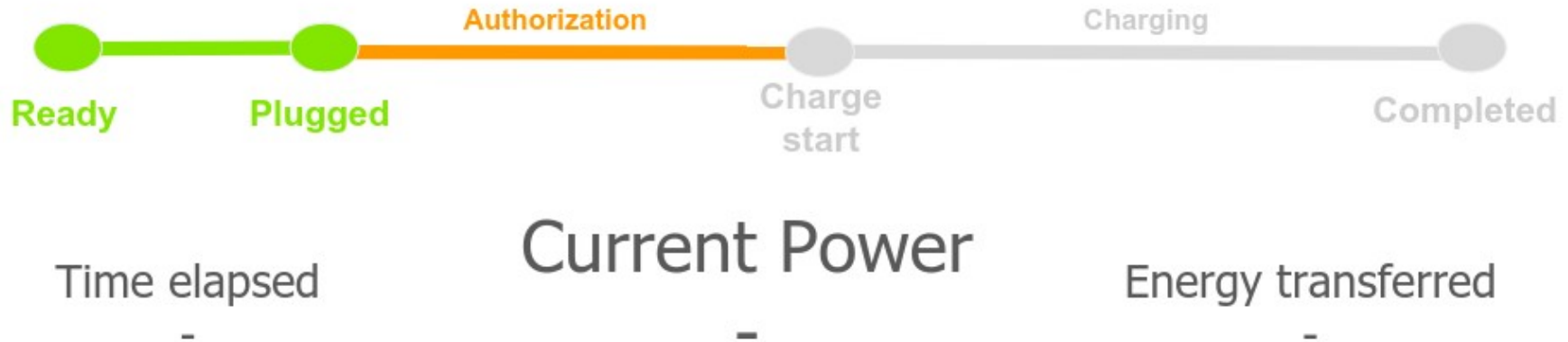
Elapsed Time
00:00

Current Power
0.000 kW

Energy Delivered
0.578 kWh



Plug&Charge not available
Please present your NFC card





Authentication done Ready to charge



Time elapsed

Current Power

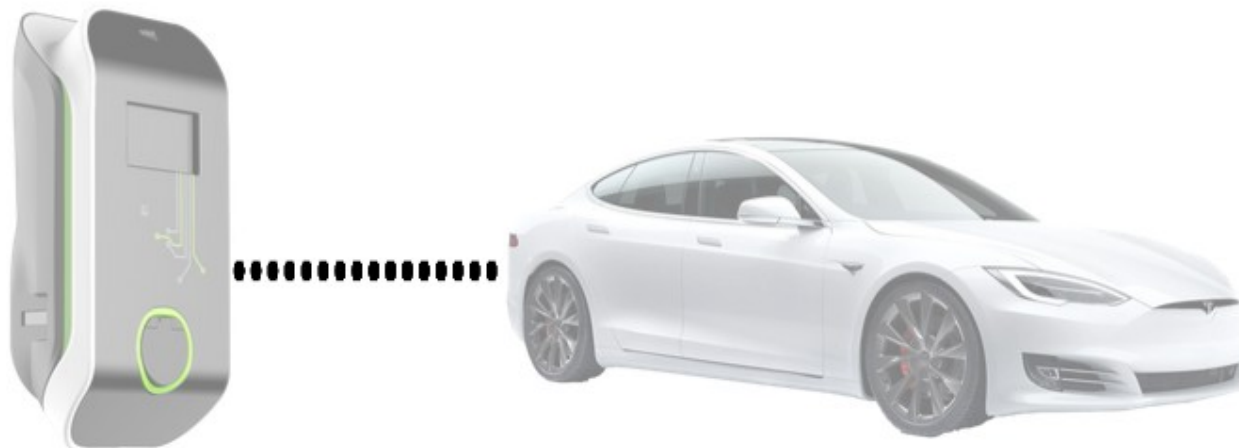
Energy transferred



Time elapsed
2h15min

Current Power
6.5 kW

Energy transferred
13 kWh



Time elapsed
2h15min

Current Power
6.5 kW

Energy transferred
13 kWh



Session summary



- Protocol used: Plug&Charge (ISO15118-2)
- Charging time: 2h15min
- Energy transferred: 22.36 kW.h
- Total session cost: 16.45 €

Thank you. See you soon!

Conclusion

- <https://github.com/tux-evse>
 - Apache v2 AND (GPL v3 OR Commercial)
- Challenges
 - Debugging ISO-15118-x ? => SW and HW simulators helped
 - Understanding ISO-15118-2x PKI
 - Synchronization between different “state machines” (SLAC, ISO15118-2, OCPP)
- Next steps
 - ISO-15118-**20** support in simulator
 - Open-source ISO-15118-2x logic

Q&A



This picture is an original picture taken by Jack Manelet in 2006. It is under the GNU Free Documentation License and the Creative Commons Attribution.

Lorient Harbour, South Brittany, France

Appendices

Basic Charging

- Car → charger: voltage levels
- Charger → car: PWM duty cycle



IEC 61851 (PWM)

