



on the Internet of Things

Software Project for Computer Science
and Electrical Engineering

What is the Internet of Things?

A system in which objects in the physical world can be connected to the Internet by sensors and actuators (coined 1999 by Kevin Ashton)

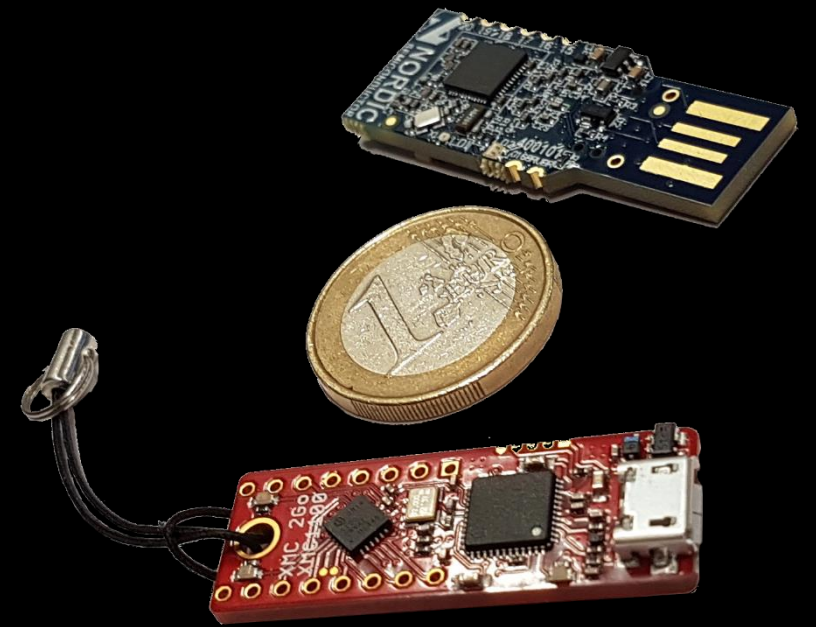
Key aspects:

- E2E communication via Internet standards
- Machine-to-machine communication
- Embedded devices, often constrained and on battery
- Typically without user interface
- Very large multiplicities, w/o manual maintenance



IoT Applications

- Facility, Building and Home Automation
- SmartCities & SmartGrids
- Personal Sports & Entertainment
- Healthcare and Wellbeing
- Asset Management
- Advanced Metering Infrastructures
- Environmental Monitoring
- Security and Safety
- Industrial Automation



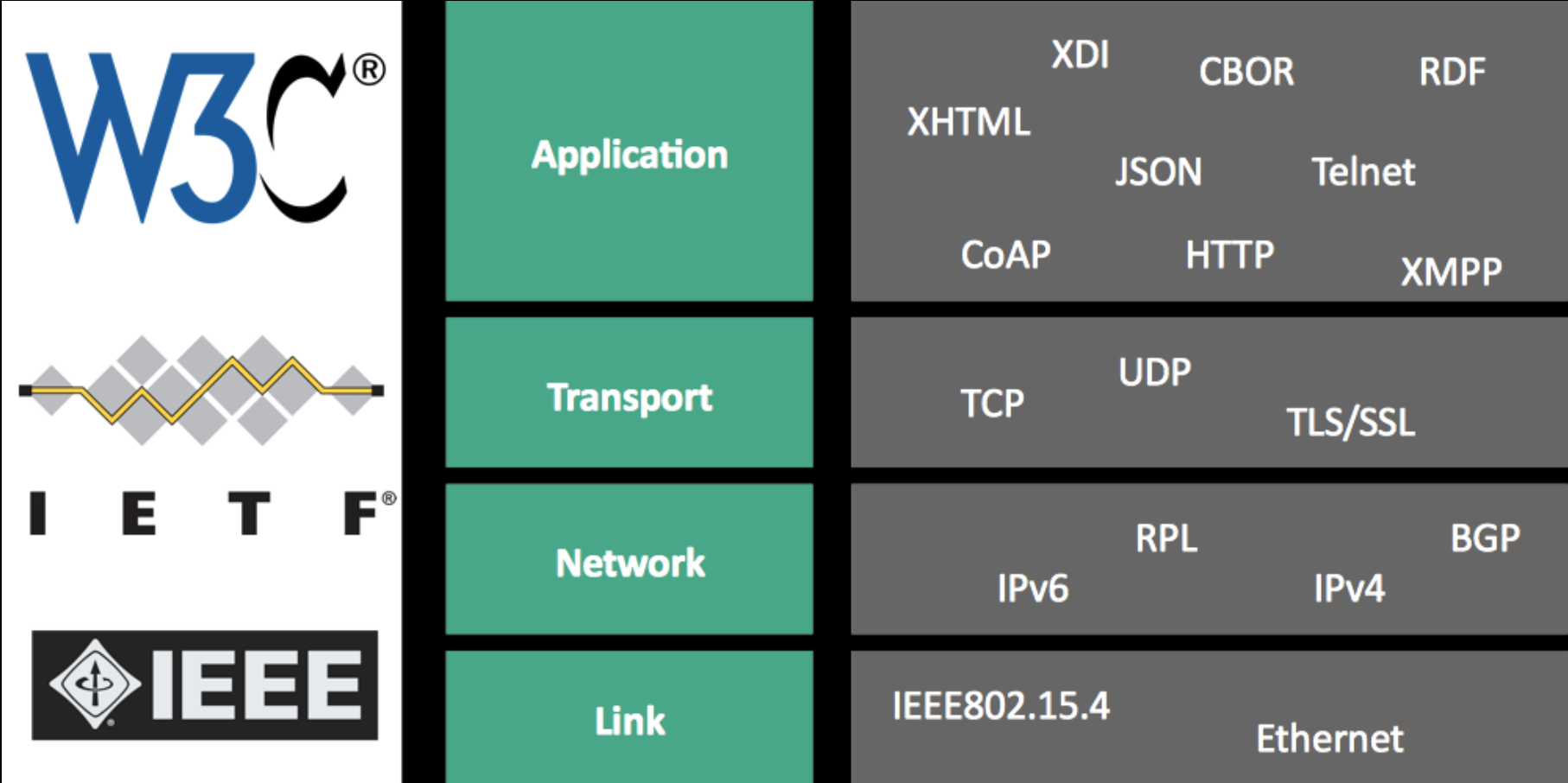
IoT Challenges

The five key issue areas identified by ISOC:

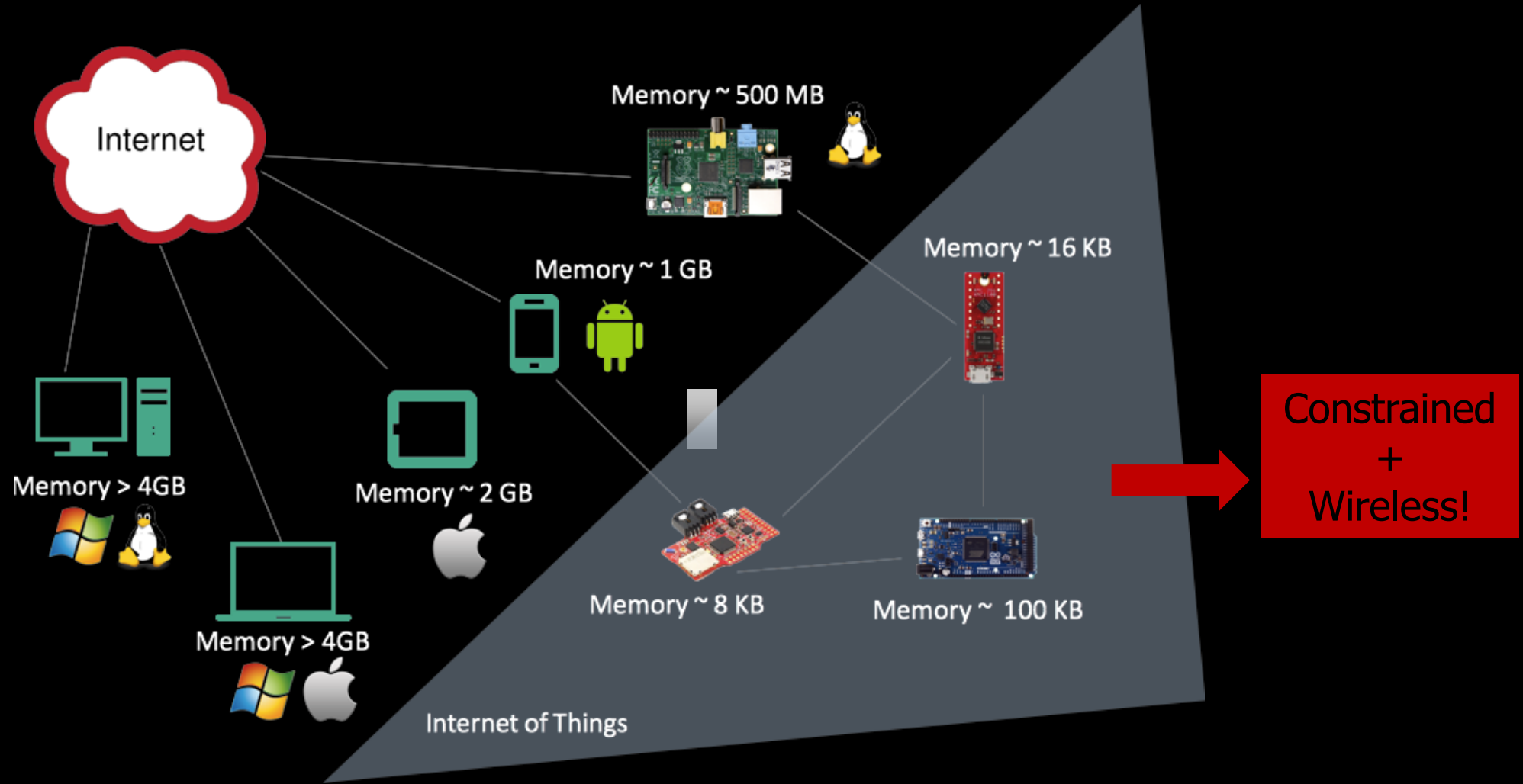
1. Security
2. Privacy
3. Interoperability and standards
4. Legal, regulatory, and rights
5. Emerging economies and development



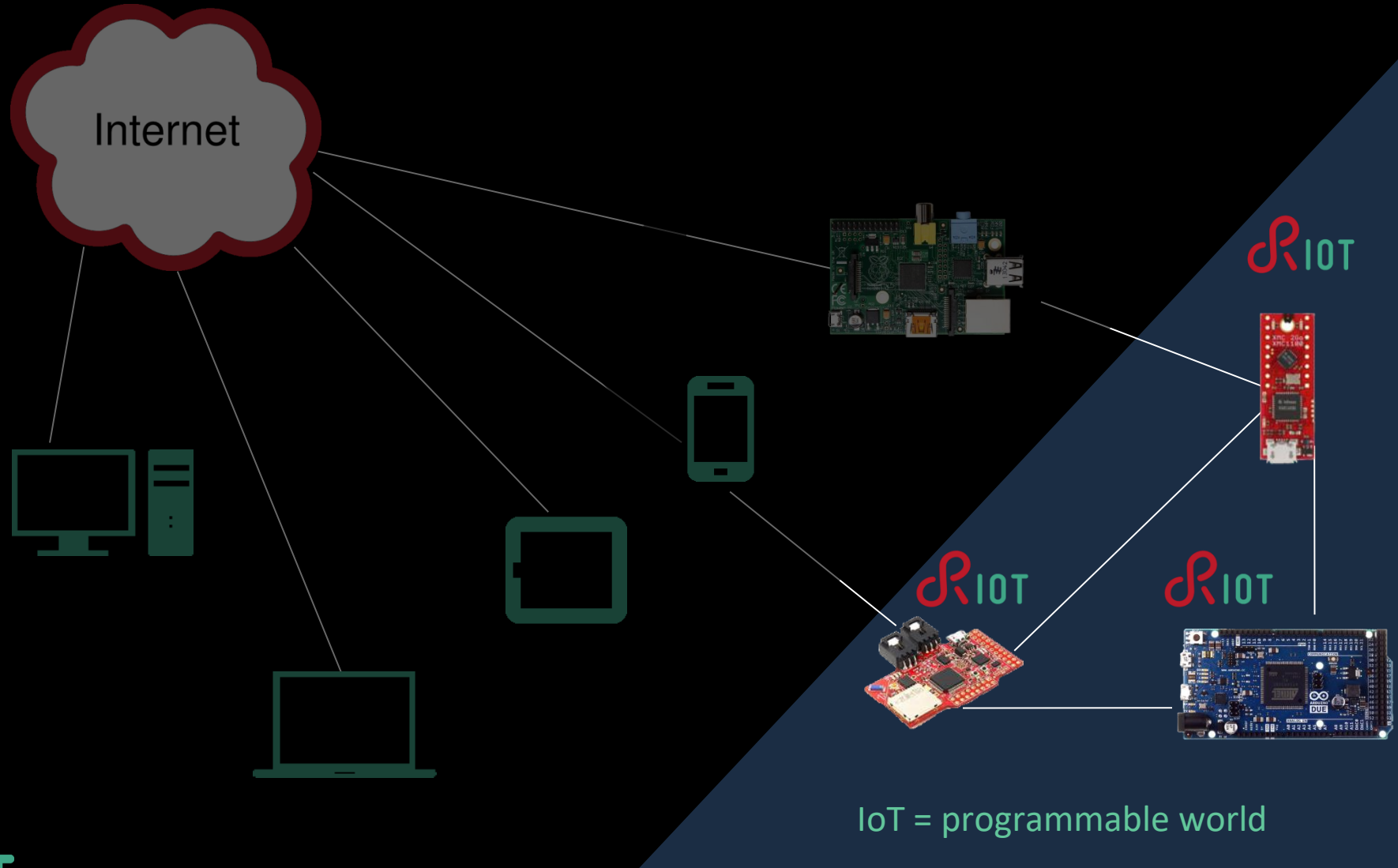
No Internet without Open Standards



The Constrained Internet of Things (IoT)



RIOT: The Friendly OS for the IoT



RIOT is the friendly OS for ...

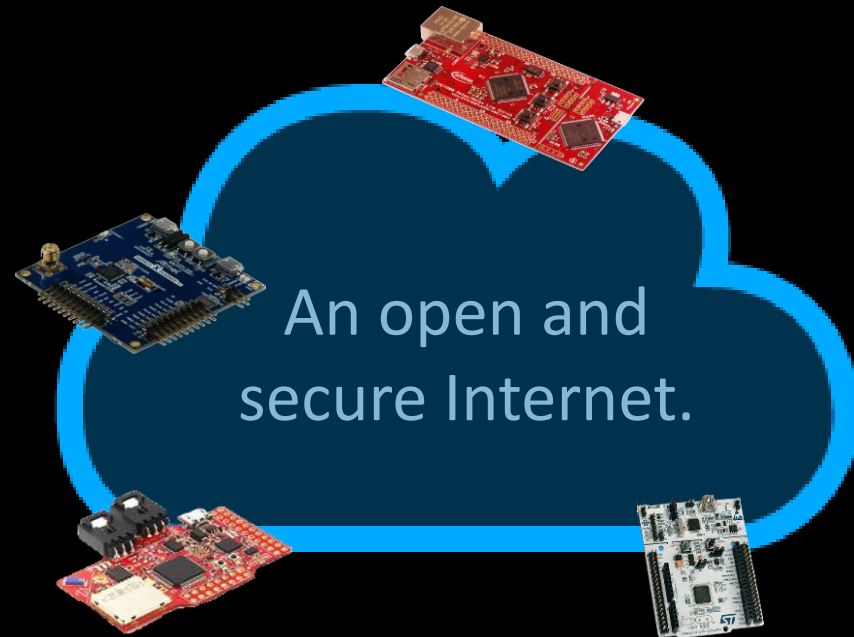
the smaller devices
8, 16, 32 bit – 10+ kB RAM

the better hardware support
> 250 boards run RIOT

full neutrality
no lock-in with vendor or hw architecture

a Linux-style open community + license
275 developers

a firm ground for your portable IoT solution



If your IoT device cannot run Linux,
then run

The logo features a large, red, stylized 'R' with a thick, rounded stroke. To its right, the letters 'IoT' are rendered in a teal, sans-serif font. The 'I' and 'O' are connected to the 'T'.

A smaller version of the RiOT logo, with the red 'R' and teal 'IoT' text.

RIOT: Facts sheet

- Microkernel architecture (for **robustness**)
 - The kernel itself uses ~1.5K RAM @ 32-bit
- Efficient hardware abstraction (for **portability**)
- Tickless scheduler (for energy **efficiency**)
- Deterministic O(1) scheduling (for **real-time**)
- Low latency interrupt handling (for **reactivity**)
- Modular structure (for **adaptivity**)
- Preemptive multi-threading & powerful IPC
- Appealing API

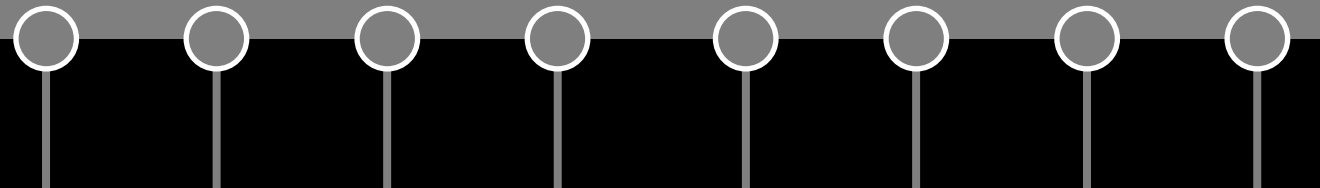
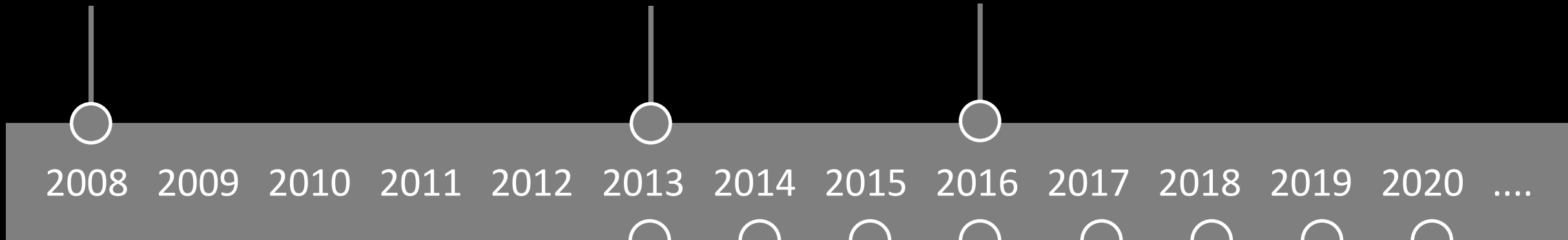


The History of RIOT

FeuerWhere Project

Branding of 

1st Community Summit



2013.08	2014.01	2015.09	2016.04	2017.01	2018.01	2019.01	2020.01
	2014.05	2015.12	2016.07	2017.04	2018.04	2018.04	2020.04
	2014.12		2015.10	2017.07	2018.07	2018.07	2020.07
				2017.10	2018.10	2018.10	2020.10

11 years of RIOT – 36 Releases – 8 RIOT Summits

The RIOT Ecosystem

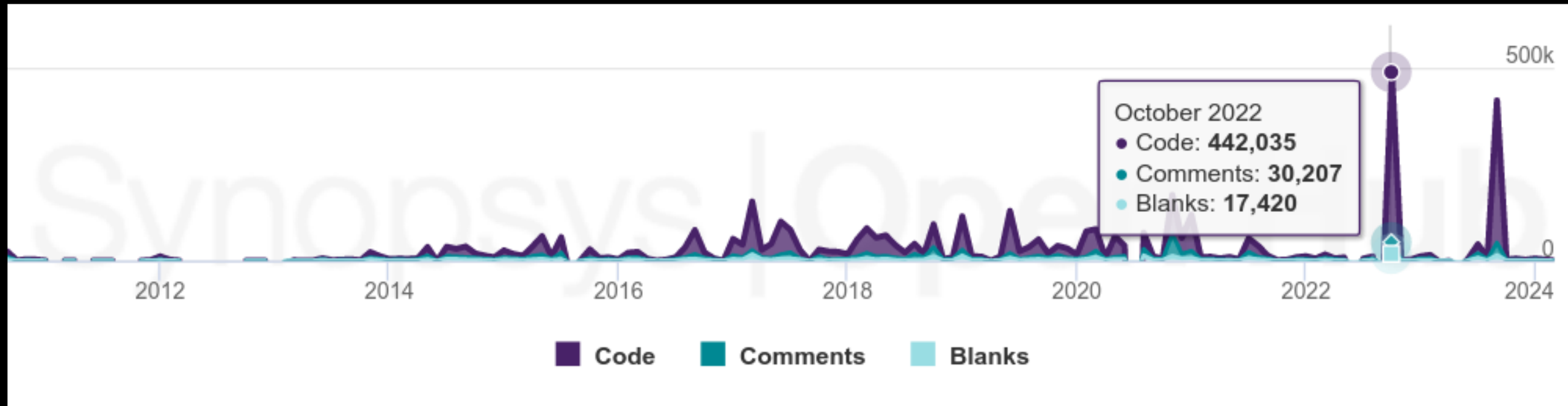
Community follows the IETF spirit.

Rough consensus and running code!

- RIOT uses copyleft license (LGPLv2.1)
- 210 contributors worldwide
- 2000+ merged PRs (last 12 months)
- Maintainer team of \approx 40 people
- Many industrial opportunities & support



Development of code on Github



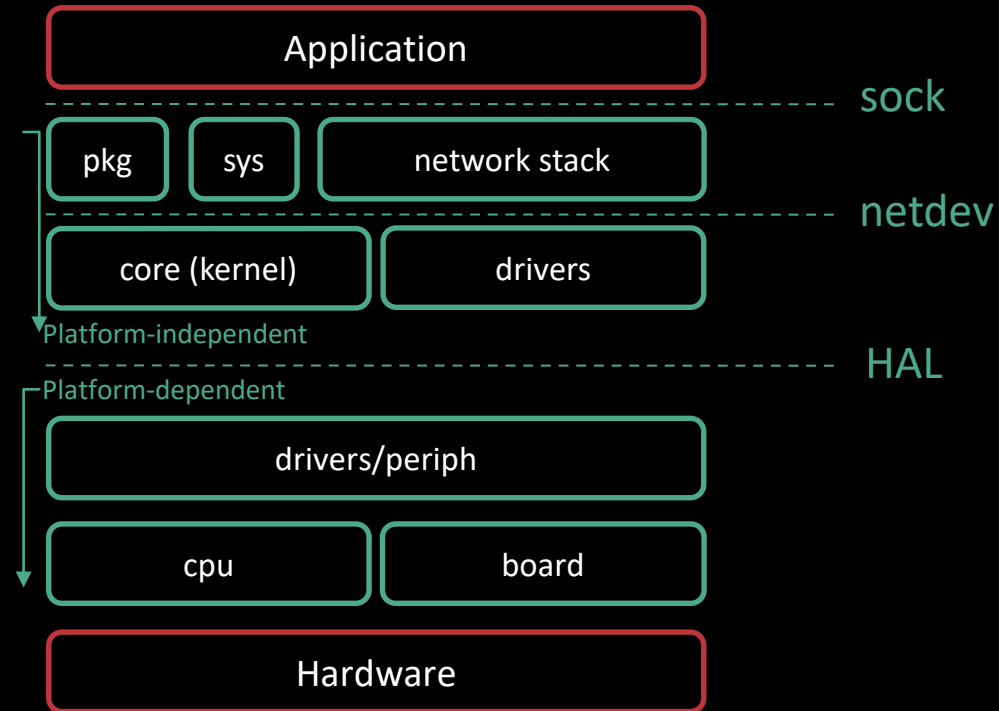
Some commercial supporters



An active and strong community

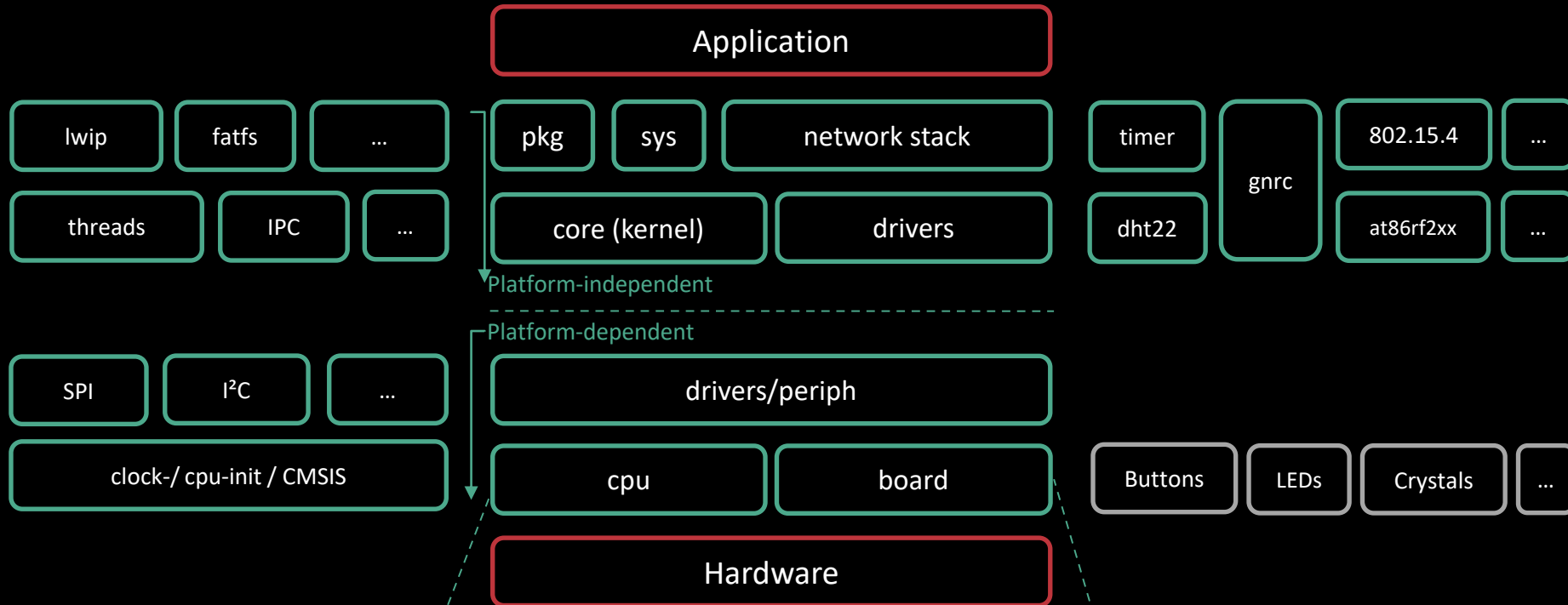


RIOT Software Components



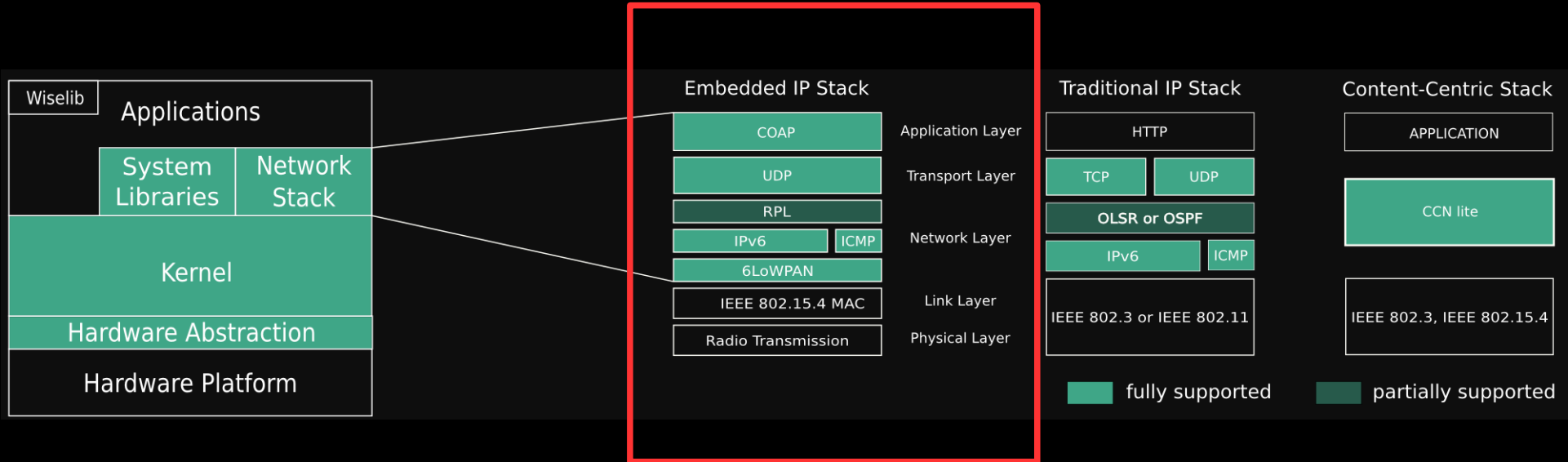
■ SW-module
■ non-OS

RIOT Software Components (2)



- SW-module
- non-OS
- config

RIOT: Built to connect



- Open-access protocols
 - e.g. 6LoWPAN, IPv6, CoAP, ...
- RIOT supports several network stacks
- On many wireless technologies and NICs



What this Project is About

- Get involved in building the IoT
- Find your team, work out your ideas
- Master IoT technologies and standards
- Collaborate with your team and others
- Build a multi-layered IoT solution
- Help making the world smarter with



17:00 - every last
Tuesday of the month

This Year's Theme: Teamagotchi

Connected home appliance:



Four Milestones

1. Present your project design:
Share the ideas of you and your group
2. Revise your architecture after feedback
3. First prototype: Show that it can work and how
4. Final project presentation: Make your results public

Final Presentation



Project Organization

Binding project plan:

<https://www.inet.haw-hamburg.de/teaching/ss-2024/riot-im-internet-of-things>

- May want to choose a project master
- Attendance in presence is mandatory at all times (if you are sick present a doctor's certificate)
- Presentation at milestones: Everybody presents
- We work on Github: All **Code** and **Docs** must be up prior to each milestone (this is part of our project assessment)

