



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)*

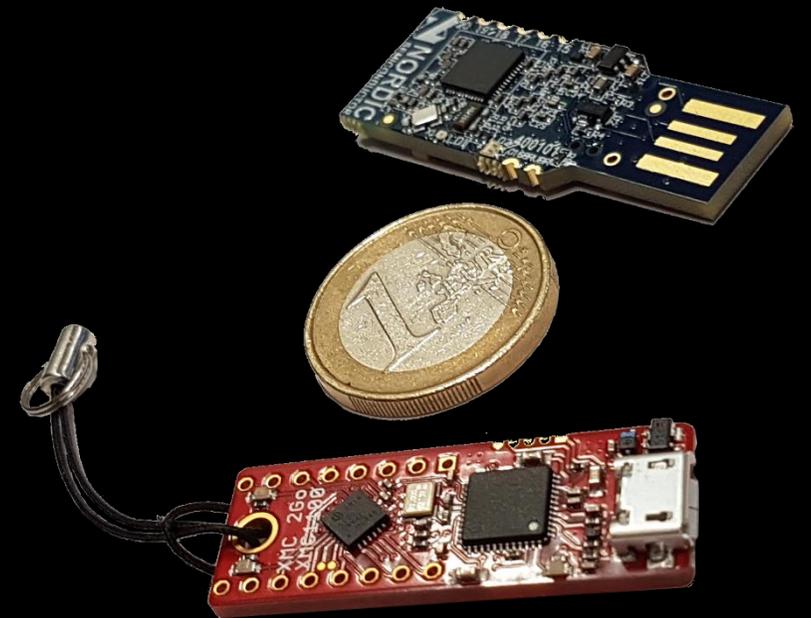
Key aspects:

- 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



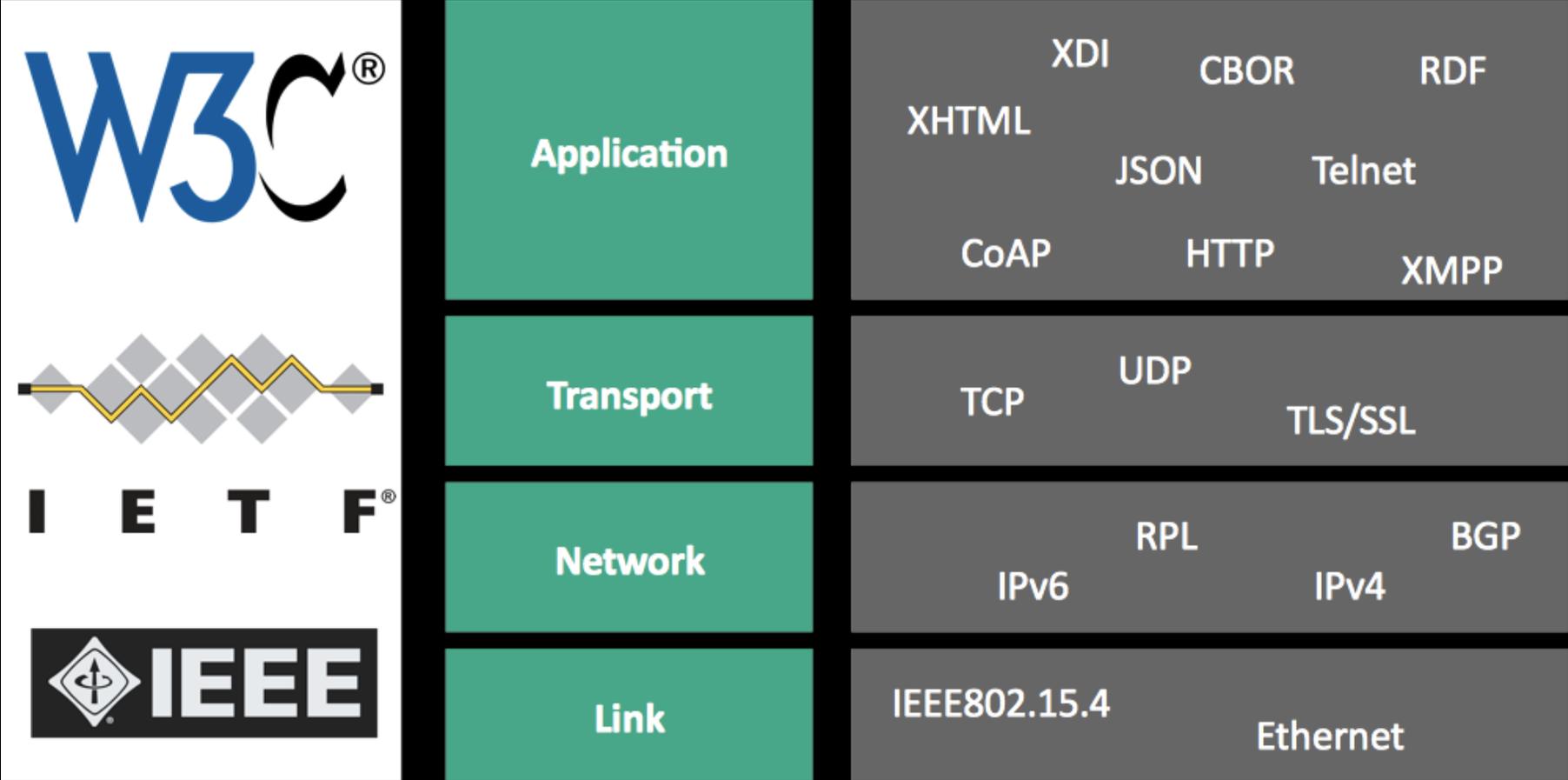
# IoT Challenges

The five key issue areas identified by ISOC:

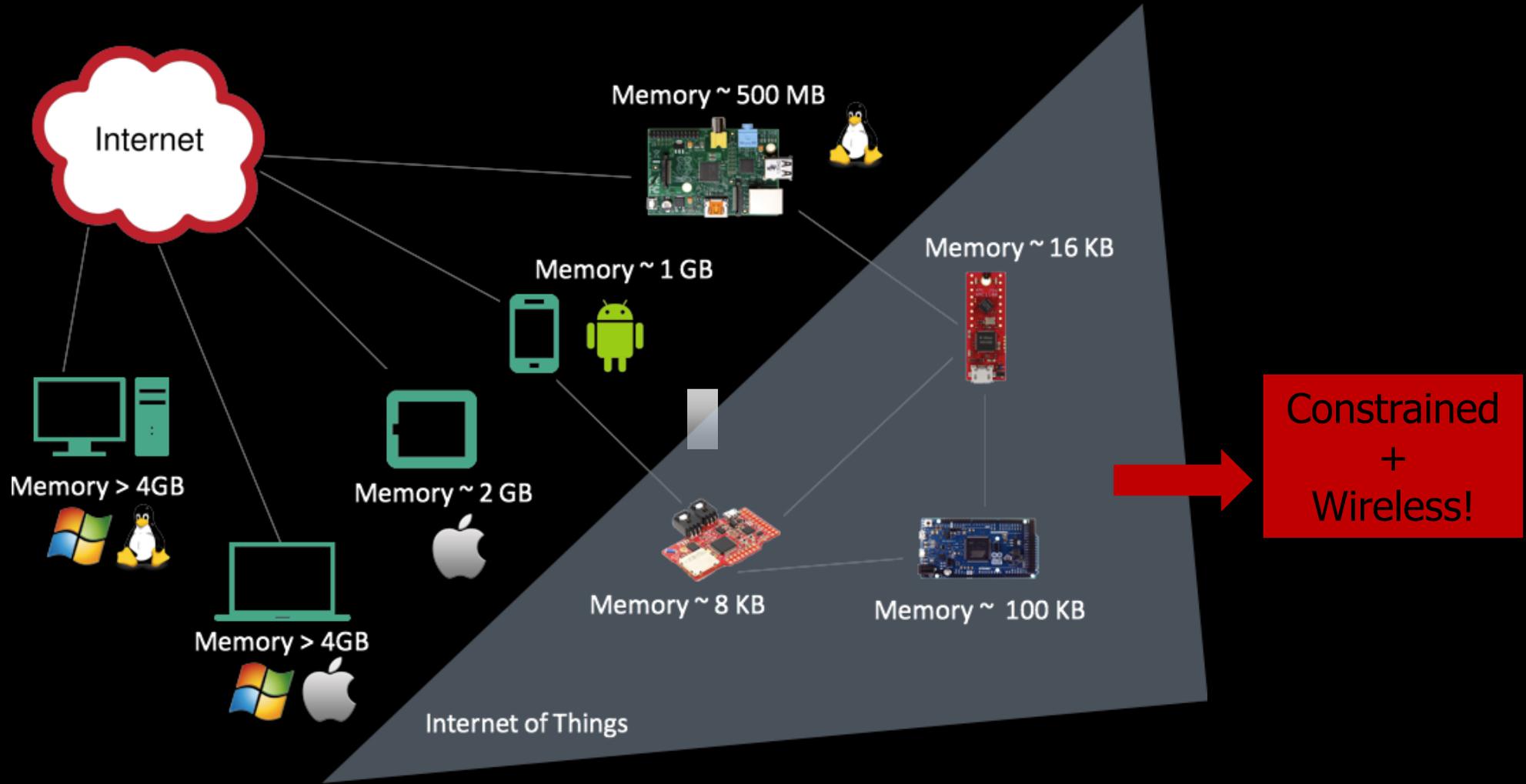
1. Security
2. Privacy
3. Interoperability and standards
4. Legal, regulatory, and rights
5. Emerging economies and development



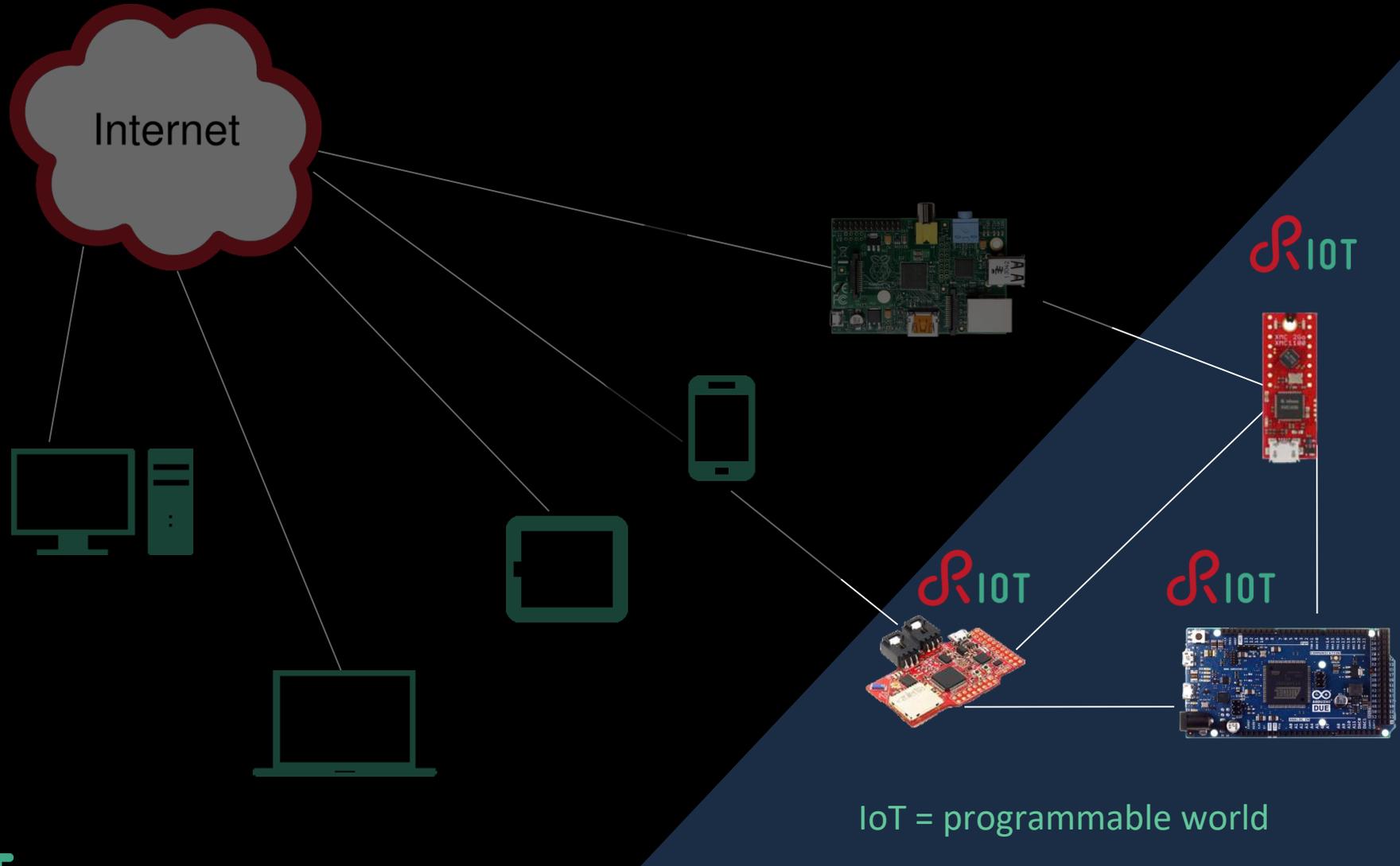
# No Internet without Open Standards



# The Constrained Internet of Things (IoT)



# RIOT: The Friendly OS for the IoT



# RIOT is the friendly OS for ...

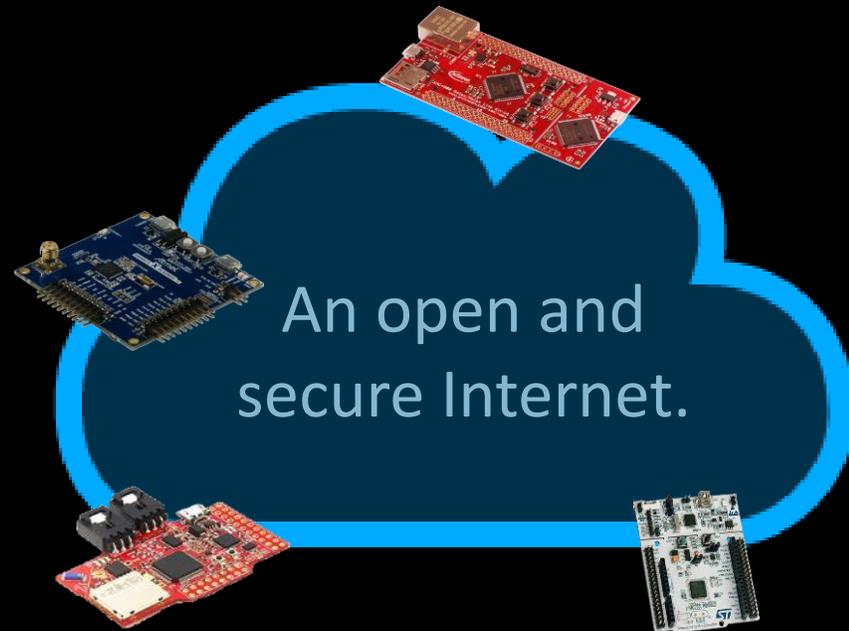
the smaller devices  
8, 16, 32 bit – 10+ kB RAM

the better hardware support  
~200 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, stylized red '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'.

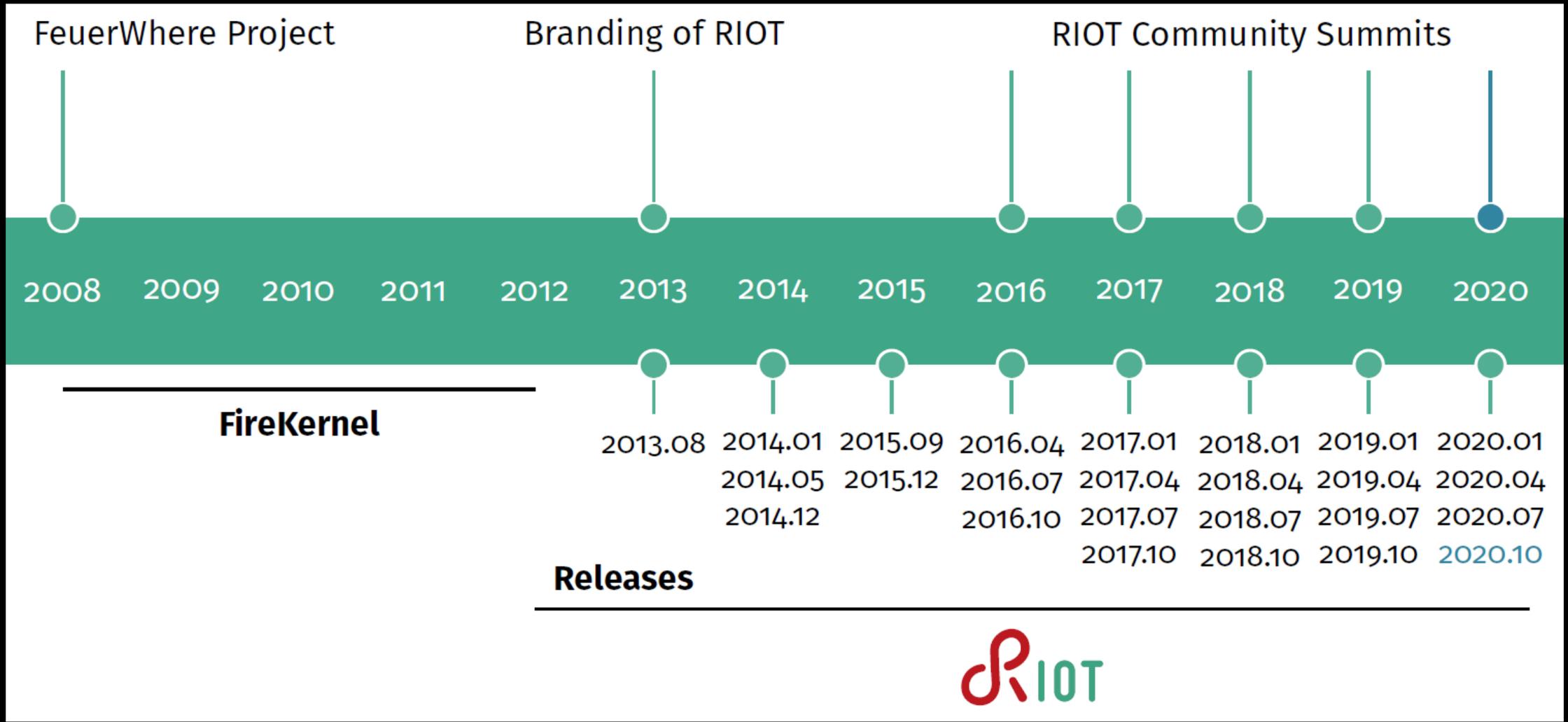
A smaller version of the RiOT logo, consisting of a red stylized 'R' followed by the letters 'IoT' in teal.

# 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



# The RIOT Ecosystem

Community follows the IETF spirit.

Rough consensus and running code!

- RIOT uses copyleft license (LGPLv2.1)
- 210 contributors worldwide
- 2000+ Pull Requests (last 12 months)
- Maintainer team of  $\approx$  30 people
- Many industrial opportunities & support



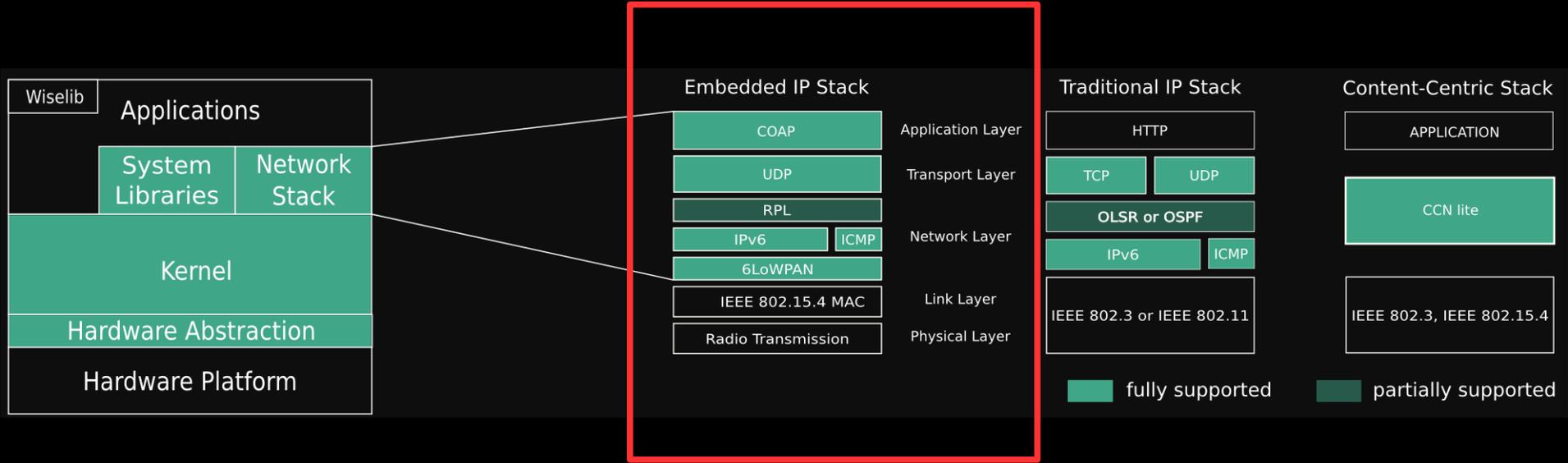
# Some commercial supporters



# An active and strong community



# 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

# Three Milestones

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

# Final Presentation Outdoors

