Building Mozilla Webthings

Owning home automation via HTTP

Material: https://chrpaul.de/fosdem2020

CO₂ ▶ 635 PPM
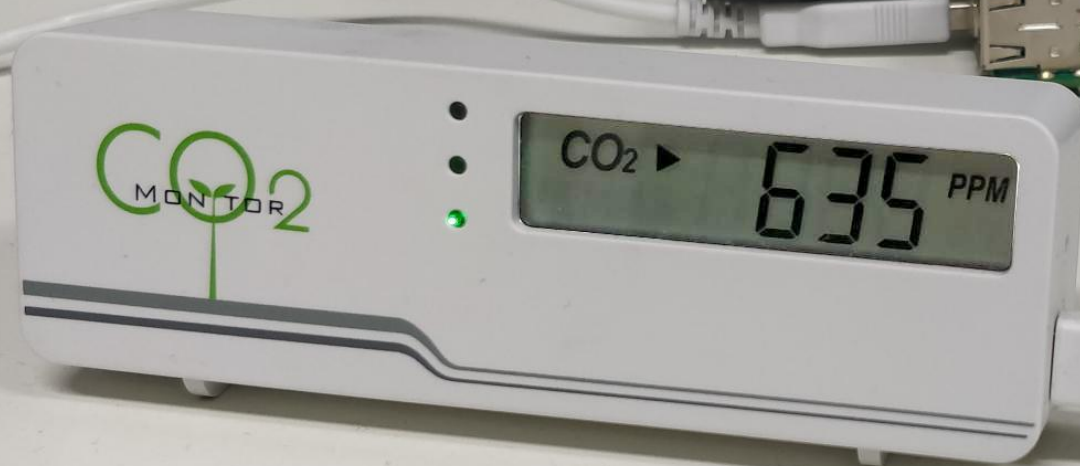
Learn from other adapters

Email Sender

0.2.0

Simple email sending actions. Needs to be configured with email and app password.

by Mozilla IoT *(license)*

⚙ Configure   ✕ Remove   ▶ Enable

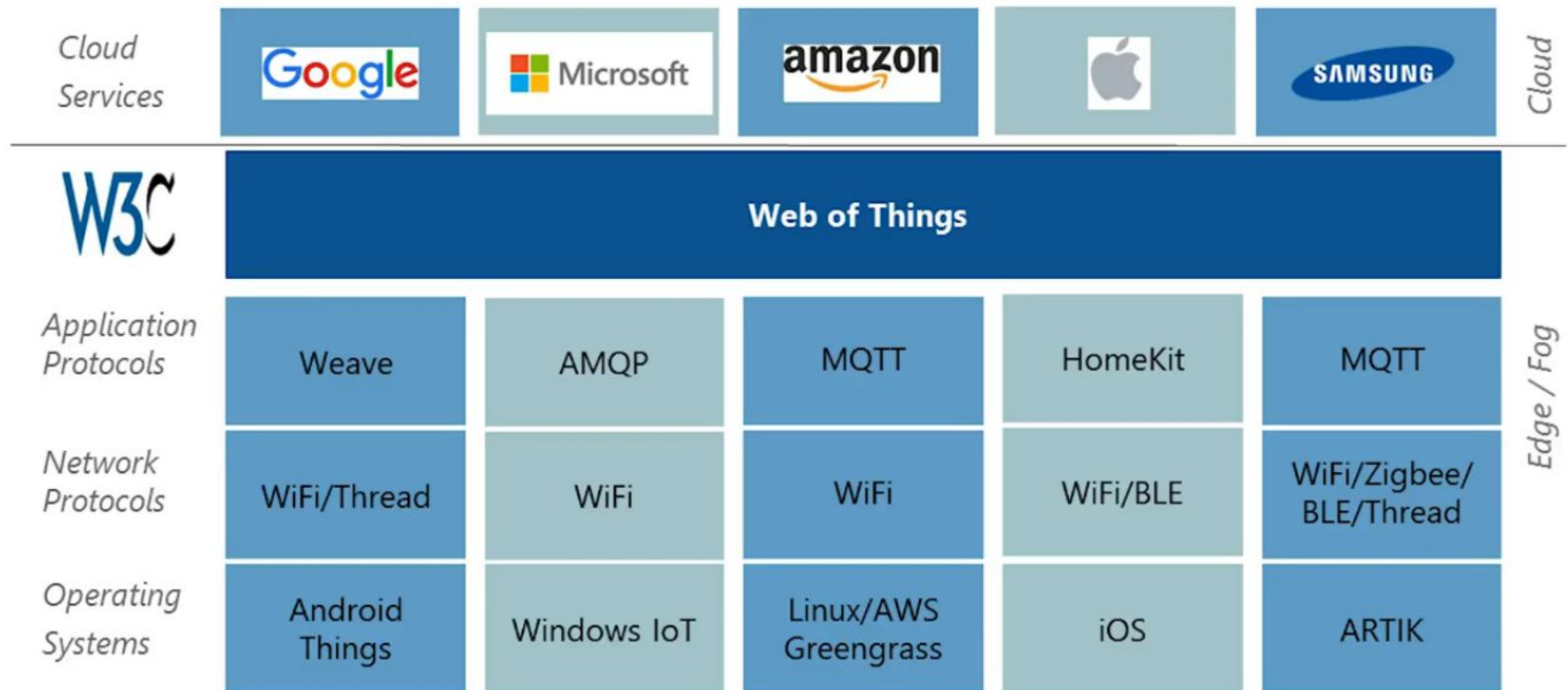# Using existing protocols

Transport

- IP stack
- HTTP
- HTTPS
- HTTP/2
- Websocket

Best practices and data formats

- Semantic web
- OAuth
- JSON (with JSON Schemas)
- REST API
- Websocket API
- DNS Service Discovery

Web of Things is about interoperability!

	Google	Microsoft	amazon	Apple	SAMSUNG	
Cloud Services						Cloud
W3C	**Web of Things**					
Application Protocols	Weave	AMQP	MQTT	HomeKit	MQTT	Edge / Fog
Network Protocols	WiFi/Thread	WiFi	WiFi	WiFi/BLE	WiFi/Zigbee/ BLE/Thread	
Operating Systems	Android Things	Windows IoT	Linux/AWS Greengrass	iOS	ARTIK	

What does the Thing do?

```
GET http://192.168.0.31/things

Authorization: Bearer eyJhbGciOiJFUzI1NiR5…

Accept: application/json
```

WebThings manifest

You MUST declare:

- `properties,`
- `actions` and
- `events`

Bedroom
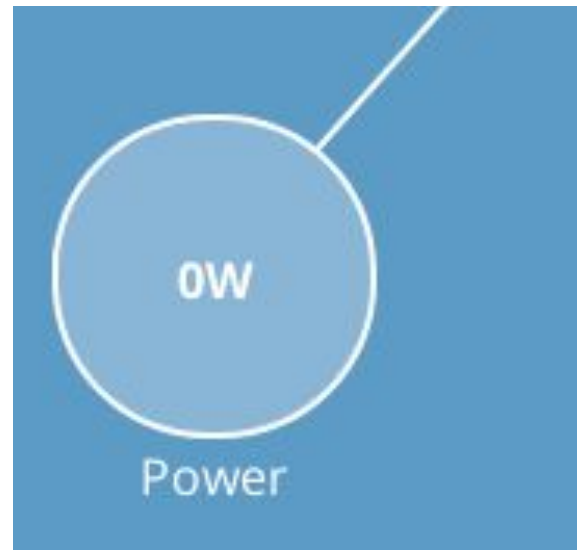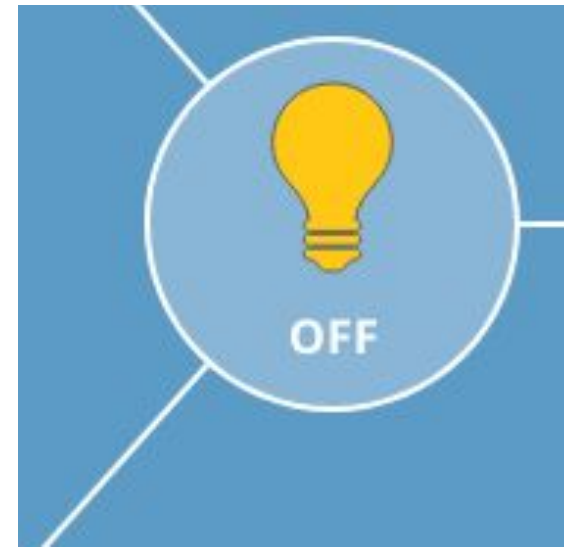
Color

OFF

On/Off

OFF

0W

Power

Properties

- MUST have a JSON Schema `type` ("integer", "number", "string", etc.)
- May have a semantic `@type` (e.g. "InstantaneousPowerProperty")
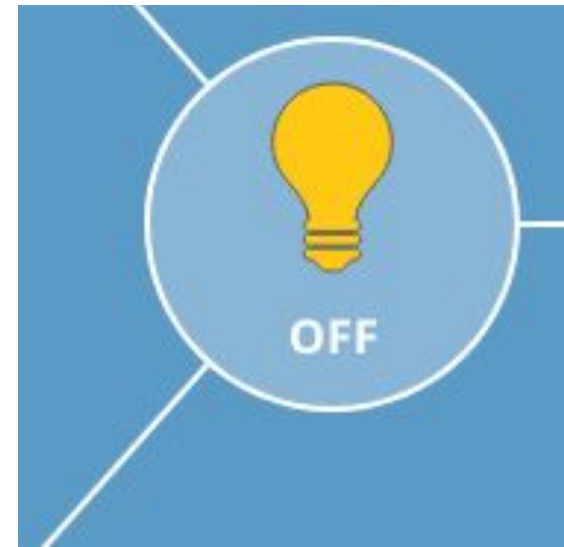- may be `readOnly: true`

Power

WebThings manifest

You MAY declare: @type (array of strings)

- e.g. Light, ColorControl, DoorSensor, TemperatureSensor
- Source: https://iot.mozilla.org/schemas/

WebThings manifest

- Actions
  - e.g. fade
- Events
  - e.g. overheated

WebThings manifest

```json
{
  "@context": "https://iot.mozilla.org/schemas/",
  "@type": ["Light", "ColorControl"],
  "id": "https://mywebthingserver.com/things/lamp",
  "Name": "Lamp",
  "description": "A web connected lamp",
  "properties": {
    "color": {
      "@type": "ColorProperty",
      "type": "string",
      "title": "Color",
      "description": "The color of light",
      …
```

Kitchen Light

23h

DateTime

OFF

Bedroom

Lights in the morning

If the time of day is 08:30 and DateTime is not Weekend, set Bedroom On/Off to true

Benefits of a gateway

- Automation with rules
- Privacy / access control
- Bridging protocols / interfaces
- Remote access
- Logging
- Configuration hub

Email Sender

0.2.0

Simple email sending actions. Needs to be configured with email and app password.

by _Mozilla IoT_ *(license)*

⚙ Configure   ✕ Remove   ▶ Enable

Configure email-sender-adapter

email*

password*

host*

smtp.gmail.com

port*

465

✓ Apply

CO₂ Monitor
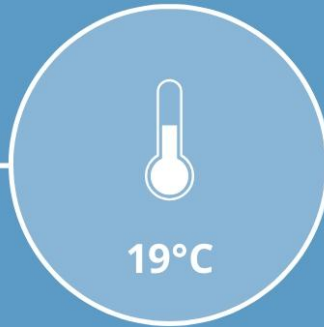0.1.0
CO₂ Monitor Adapter
by *Christian Paul* (*license*)

✕ Remove   ▶ Enable

CO₂ Monitor
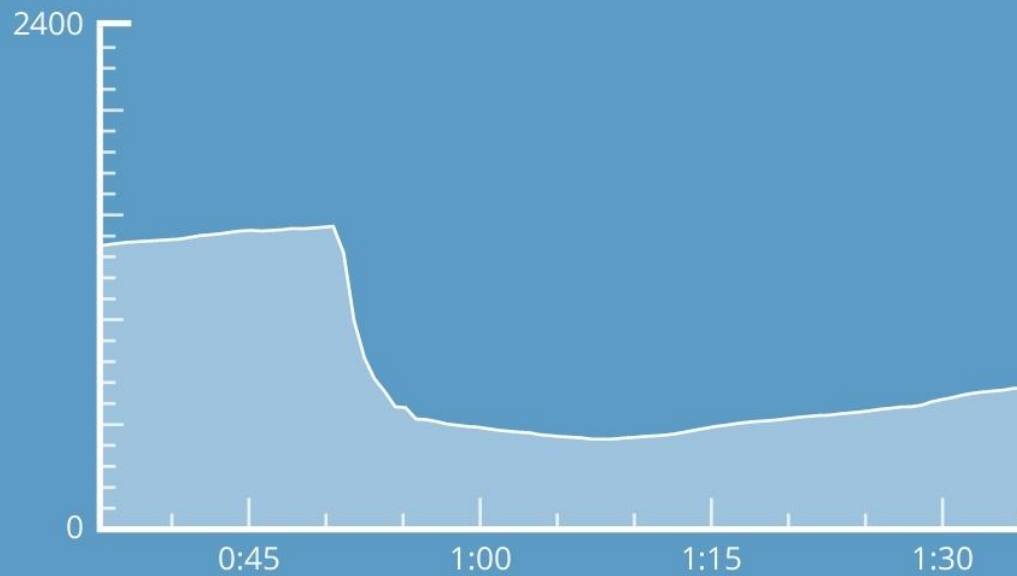
973

CO₂ (ppm)

19°C

19°C

Temperature

🌡 CO₂ Monitor CO₂ (ppm)   Day ▼

2560

er million

0

12:00   5

◀ ▬▬▬▬▬▬▬▬▬▬▬ ▶
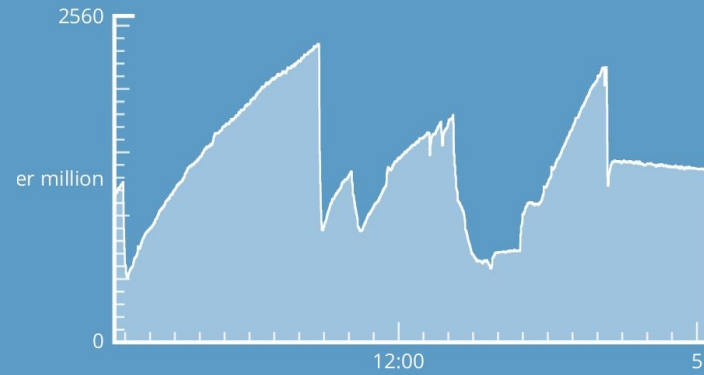
🌡 CO₂ Monitor Temperature   Day ▼

24

°C

13

12:00   5

◀ ▬▬▬▬▬▬▬▬▬▬▬ ▶

＋
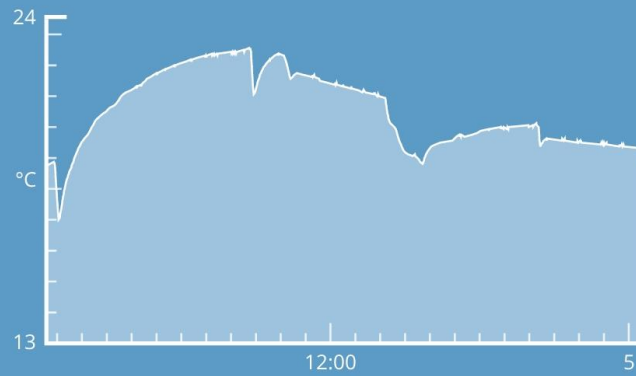
Six lessons learned

1

Automate pushing code to your Raspberry Pi

Also restart the gateway service at the same time

0x02

Use `setCachedValueAndNotify` for debugging

Use `setCachedValue` to avoid disk writes

III

Access the logs via SSH

The access tokens for logs in the front-end get reset
on every restart

0b0100

A .git folder disables the checksum test

For each production release you'll need to generate

SHA256SUMS

Prepare for separate releases, if you have

architecture-dependent code

The common license of addons is the MPL-2.0

It helps contributing to your project because there's already a lot of similar code under that license

https://chrpaul.de/fosdem2020

Further questions/ suggestions:

christian@chrpaul.de

Also, I'm looking for an awesome

open-source job!

Get Involved

Build a Web Thing

Build your own IoT device which uses the Web Thing API

Create an Adapter

Create an adapter add-on to bridge an existing IoT device to the web

Hack on Project Things

Help us develop our Web of Things implementation

Bonus slides

For answering questions or other curious minds

WebThings

moz://a

An open platform for monitoring and controlling devices over the web.
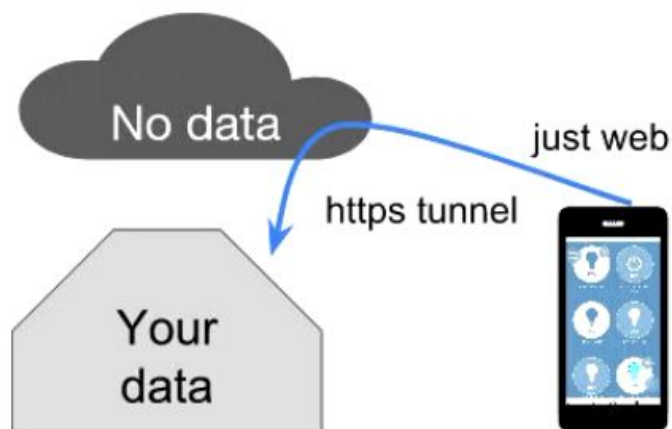
Learn More

WebThings Gateway

A software distribution for smart home gateways focused on privacy, security and interoperability

WebThings Framework

A collection of re-usable software components to help developers build their own web things

Mozilla's Decentralized WoT Approach Improves Privacy, Security, Interoperability

Your data stored in many IoT vendor data centers

No data

Your data

just web

https tunnel

apps galore

"Your" data

Your devices

Mozilla gateway is in your home

Vendor gateways send data to cloud

Enabling IoT devices to be discoverable on the web ≠ *Connecting IoT device data to the cloud*

moz://a

Tips for developing an addon

- Adding a .git folder disables the check of checksums.
- Develop on your computer, push to your Raspberry Pi.
  - Add scripts to push the code and restart the gateway to increase your productivity
- Access the logs via SSH
- Use setCachedValueAndNotify for debugging of values.
  - Use setCachedValue in a release to avoid disk writes.
- Prepare for separate releases, if you have architecture-dependent code.
- The common license of addons is the MPL-2.0.

Pre-defined things (Mozilla's schema)

OnOffSwitch, MultiLevelSwitch, BinarySensor, MultiLevelSensor, ColorControl, EnergyMonitor, SmartPlug, Light, MotionSensor, DoorSensor, TemperatureSensor, LeakSensor, PushButton, Camera, VideoCamera, Alarm

Source: https://iot.mozilla.org/schemas/

The issues of IoT

- Varying network protocols
- Varying application protocols
- Varying apps per vendor
- Most apps are only available for Android and iOS
- Most apps are only available on the main app stores
- The vendor's cloud stores all events
- Price is high; Resale value is low
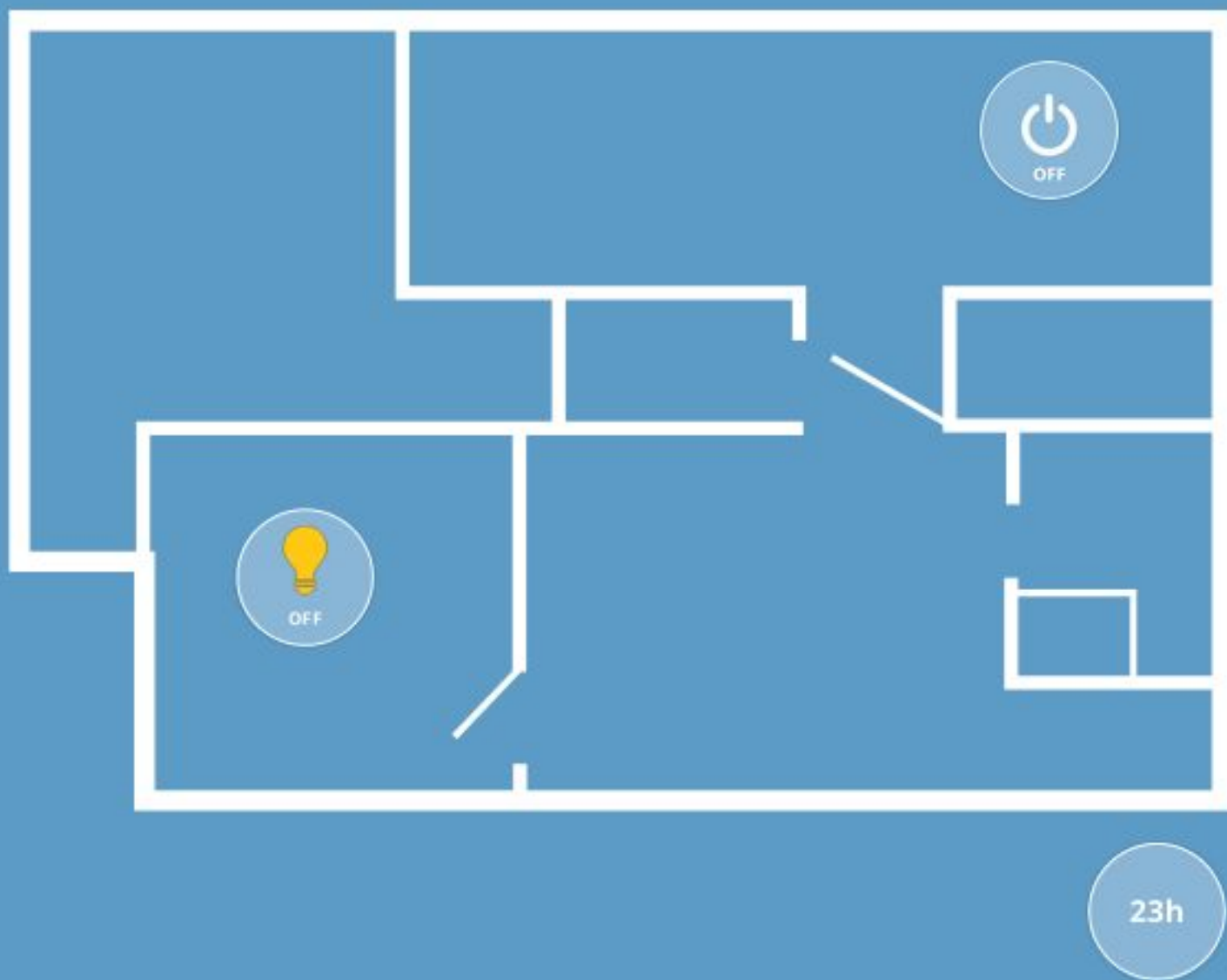
Thanks

Christian Paul

- Open source enthusiast
- Web developer
- Care about data security a[...]
  accessibility
- Not a Mozilla employee