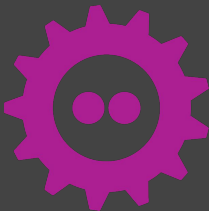


moz://a



Project Things

A secure gateway to connect your things to Internet

February 2, 2019

[<https://fosdem.org/2019/schedule/event/project_things>](https://fosdem.org/2019/schedule/event/project_things)

Speakers

Dipesh Monga
@ Mozilla Techspeakers

Philippe Coval
@ Samsung OpenSource

The hidden dangers of uploading our physical lives to the cloud.

```
=====UPDATE=====
> You have 15 pairs of underwear left.
  [Ok] [buy more underwear] [find help online]
> Your cat checked in at the litterbox.
> Your microwave just heated a lasagna.
> Record: You stared out the window for 23 minutes.
  [Ok] [post your score]
> Your couch likes your microwave's status update.
> It's raining again.
  [Ok]
> 15 of your things are broken.
> You haven't left the house in 5 days.
  [Ok]
=====
```

Shodan: The scariest search engine on the Internet

The search engine for the Internet of Things

Shodan is the world's first search engine for Internet-connected devices.

Create a Free Account

Getting Started



Explore the Internet of Things

Use Shodan to discover which of your devices are connected to the Internet, where they are located and who is using them.



See the Big Picture

Websites are just one part of the Internet. There are power plants, Smart TVs, refrigerators and much more that can be found with Shodan!



Monitor Network Security

Keep track of all the computers on your network that are directly accessible from the Internet. Shodan lets you understand your digital footprint.



Get a Competitive Advantage

Who is using your product? Where are they located? Use Shodan to perform empirical market intelligence.



Shodan: Potential Targets

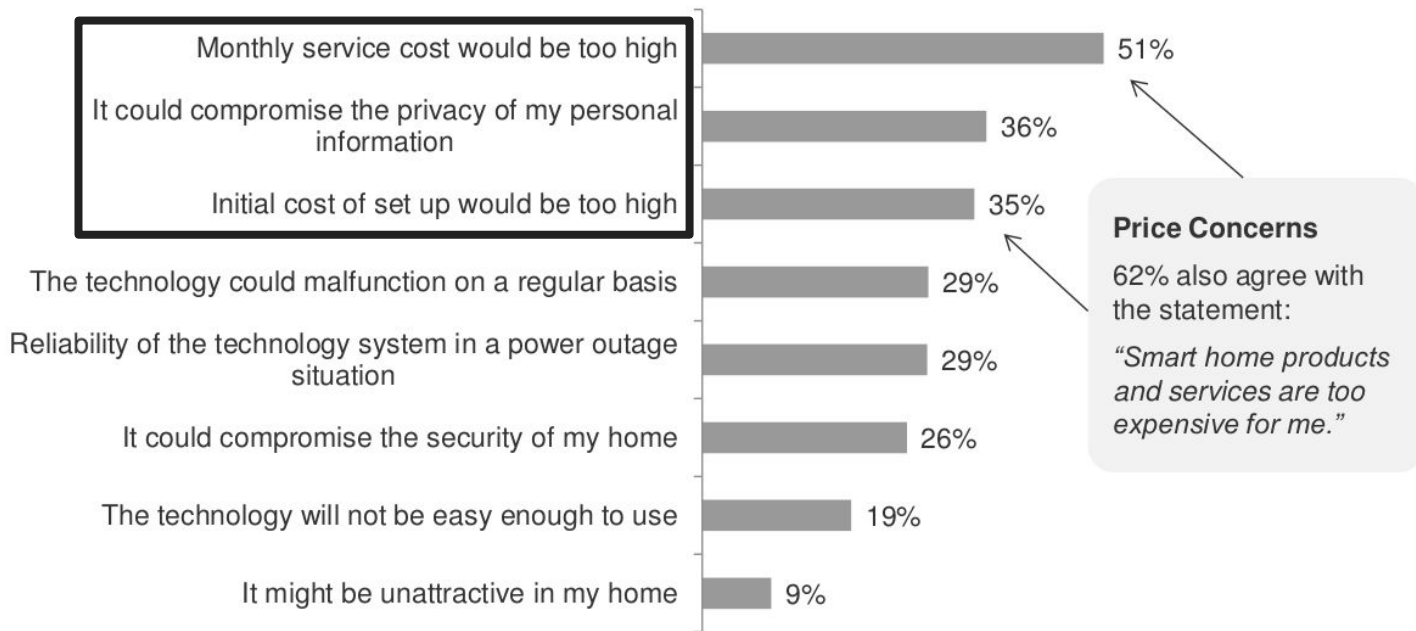
- Routers
- Webcams
- SCADA systems
- Traffic Lights
- Wind farms
- Refrigerators
- Printers
- Gas station pumps, Power Grids



Project Things by Mozilla



Mozilla Solution Addresses Biggest Smart Home Concerns



Source: Forrester. Based on North American Consumer Technographics Consumer Tech, Media, & Telecom Online Benchmark Recontact Survey 2, Q3 2016. Base: US Online Adults 18+ (Online Weekly or More); n= 4,515

The background features a light blue circular gradient. Overlaid on this are faint, white line-art illustrations of various IoT-related items: a laptop on the left, a tablet above it, a lightbulb in the upper center, a camera lens on the right, a power outlet in the lower center, a speaker on the bottom right, and a coin with the number '75' on the bottom left.

Mozilla Project Things

Vision

We envision an open and **decentralized** Internet of Things that **puts people first**, where individuals can shape their own experience and are empowered, safe and independent.

Mission

Our mission is to create an open source Web of Things implementation which embodies Mozilla's values and helps drive IoT standards for **security, privacy, and interoperability**.



Directly monitor and control your home over the web, without a middleman

- Affordable one-off purchase, no monthly subscription
- Private data stays in your home by default
- Expand with devices from multiple manufacturers

Things Gateway - Use Cases



Turn appliances on and off remotely and monitor power consumption.

Turn a light on, sound an alarm or be alerted if motion is detected.



Be alerted on your smartphone if smoke is detected.



Check what time the kids got home.

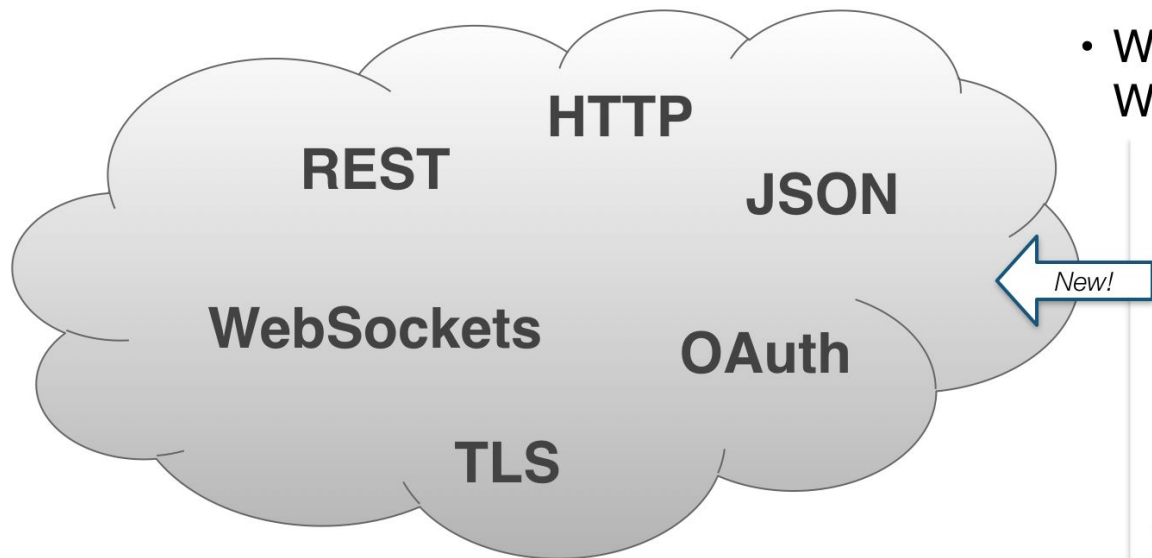


Expand your smart home with existing smart home devices, without the need for additional apps.

Authorize third party apps & services to access your home monitoring data.

W3C Web of Things Cuts Across Silos

- Mature and secure web technologies



- Web Thing Description (plain JSON serialization)
- Web Thing API (REST + WebSockets API)

Member Submission

W3C

Web Thing API

W3C Member Submission 08 December 2017

This version:
<https://www.w3.org/Submission/2017/Member-SUBM-WoT-20171208/>

Latest published version:
<https://www.w3.org/Submission/WoT/>

Latest editor's draft:
<http://iot.mozilla.org/wot/>

Editor:
Ben Francis, Mozilla Corporation

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Abstract

This document describes a common data model and API for the Web of Things. The [Web Thing Description](#) provides a vocabulary for describing physical devices connected to the

iot.mozilla.org/wot

Web of Things Smart Toaster

EXAMPLE

```
{
  "@context": "http://iot.schema.org",
  "@type": "Toaster",
  "name": "Acme Toaster",
  "description": "A web connected toaster",
  "properties": {
    "on": {
      "type": "boolean",
      "description": "Whether the toaster is currently heating bread",
      "href": "/properties/on"
    },
    "timeRemaining": {
      "type": "number",
      "unit": "seconds",
      "href": "/properties/timeRemaining"
    }
  },
  "actions": {
    "pop": {
      "description": "Pop up the toast"
    }
  },
  "events": {
    "ready": {
      "description": "Your toast is ready!"
    }
  },
  "links": {
    "properties": "/properties",
    "actions": "/actions",
    "events": "/events",
    "websocket": "wss://toaster.smith.home"
  }
}
```



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IoT

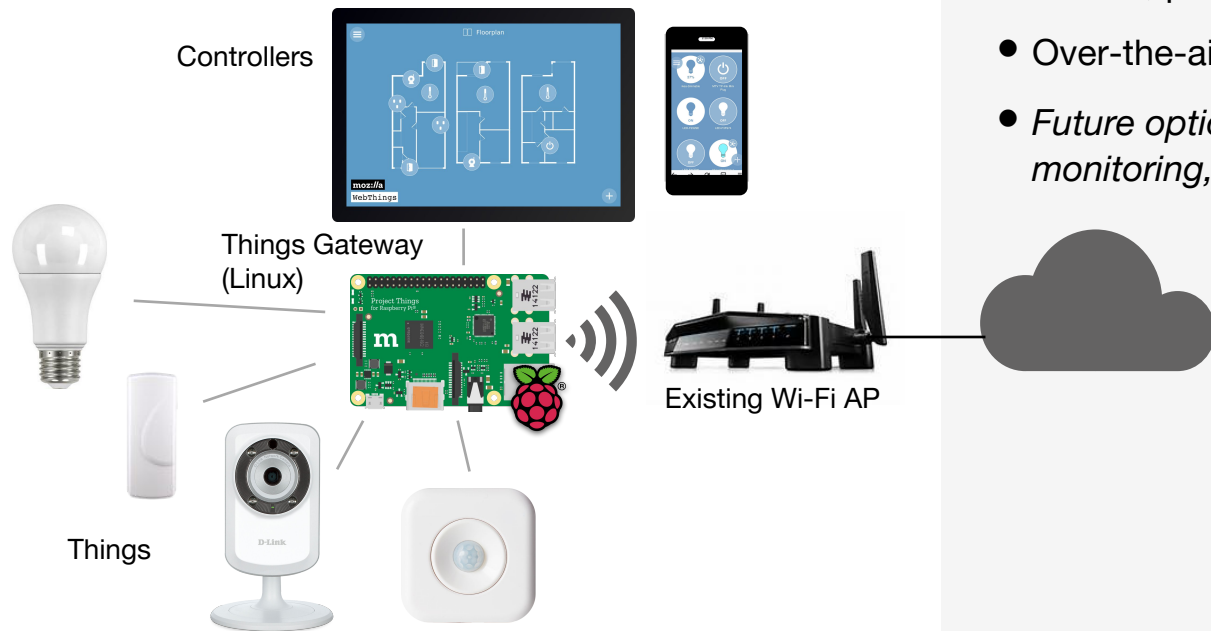
The Web of Things means addressing Things via URLs and following standard APIs. Using a web framework makes things discoverable and linkable, and provides web developers with an opportunity to let users interact via a wide range of interfaces: screens, voice, gesture, augmented reality...

It works even without an Internet connection.

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Things Gateway 0.7 (2019-01)

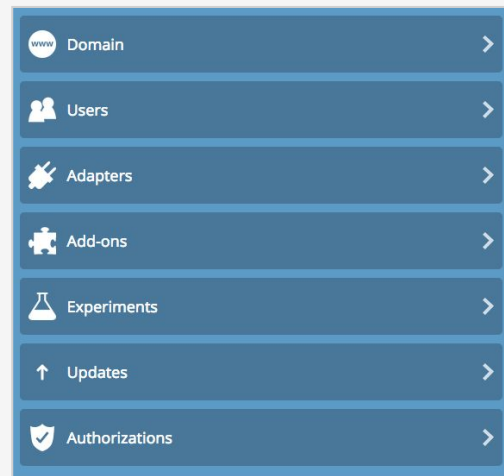
Build your own gateway with a Raspberry Pi



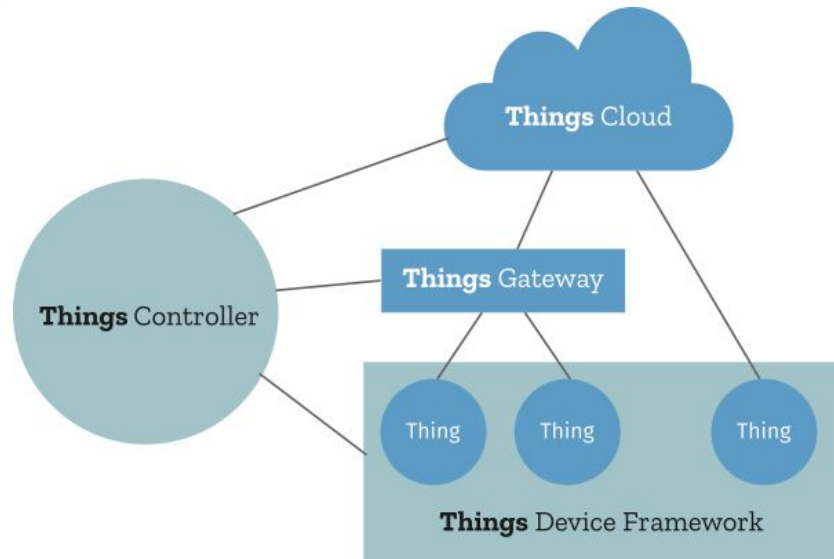
What Goes on in the Cloud?

Gateway OEM product support

- Secure, private remote access tunnels
- Over-the-air software updates
- *Future options: Encrypted backups, security monitoring, 3rd party web services (via OAuth)*



Mozilla Project Things Framework



- **Cloud:** support for setup, backup, updates, 3rd party apps and services integration, and remote encrypted tunneling
- **Gateway:** always on IoT connectivity hub in the home
- **Controllers:** smart speakers, tablets/phones, AR headsets...
- **Devices:** sensors and actuators (“things”) to instrument your smart home

Things Gateway - Security

- HTTPS via mozilla-iot.org tunnelling service TCP tunnel uses PageKite (no need to open ports on your router).
- Unique subdomains with LetsEncrypt TLS certificates: (Optionally configure your own NAT, DNS & TLS)
- JSON Web Tokens used for authentication
- OAuth to authorise third party apps & services

Things Gateway

- Downloadable OS image for Raspberry Pi
- Perfect for hackers and makers

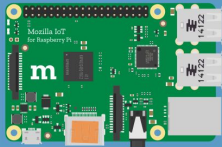
iot.mozilla.org/gateway

[moz://a](#)
IoT

ABOUT | [GATEWAY](#) | SPECIFICATION | GET INVOLVED


Build your own Web of Things Gateway

Things Gateway by Mozilla




- 1 Raspberry Pi**


Get your hands on a **Raspberry Pi**® single board computer. The latest **Raspberry Pi 3** has WiFi and Bluetooth support built in, as well as access to GPIO ports for direct hardware connections. This is not essential as you can use alternative developer boards, or even your laptop or desktop computer, but it will currently provide the best experience.


- 2 USB Dongles**

To use your Web of Things gateway with other wireless protocols like **ZigBee** and **Z-Wave** you will need **USB dongles**. See the wiki for a list of compatible USB dongles and smart home devices.


- 3 Flash an SD card**

Download the **pre-built Raspberry Pi OS image from Mozilla** and flash it onto an SD card. Please note that this is experimental pre-release software and at this prototype stage is not ready for production use. It is intended as an early preview for hackers, makers and web developers to get their hands on with the Web of Things.



DOWNLOAD

Alternatively, if you'd prefer to just try out the software on your PC you can follow the instructions on [GitHub](#) to checkout the code and build it yourself.

For a more detailed **How-To guide** and a **tour of the gateway's features**, see our [blog post on Mozilla Hacks](#).

from the Emerging Technologies team at

[moz://a](#)

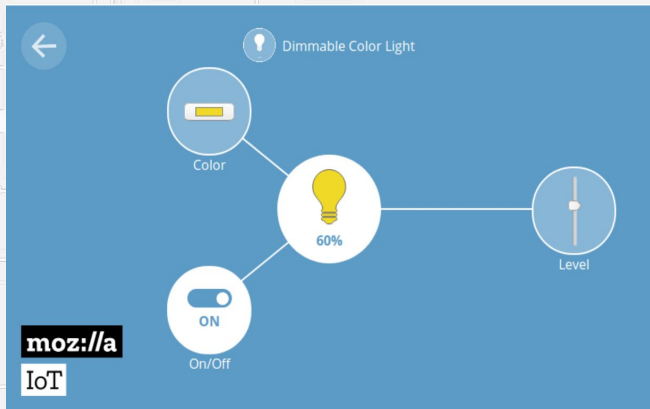
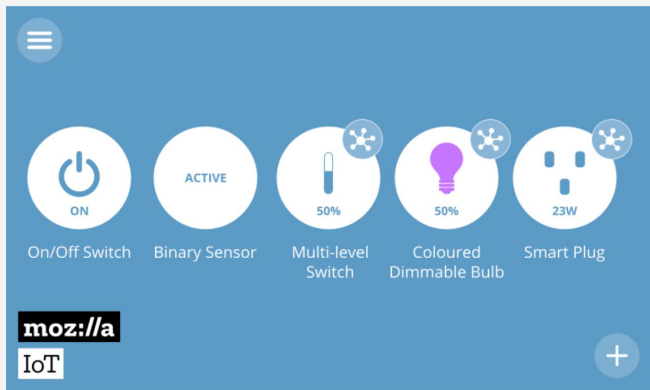
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Tech details 🤖



Setup: Things Gateway







- Download gateway
 - Dump supported image to SDcard for RPi
 - or rebuild srcs for desktop or other boards
- Connect to it using web browser
 - Optionally: Setup WiFi, domain
- Install addons (ie: Virtual WebThings)
- Add more things to dashboard
- Automate conditions from **sensors** to **actuators**
 - Use rules engine from GUI



What are WebThings?



- Webthings are just HTTP servers
 - Connected to gateway (star topology, not P2P)
- Specified by MozIot schema (Described in JSON) 
- Easy to implement (JS, Python, C/C++, Rust...): 
 - for  runtime:
 - npm install webthing
 - for **IoT.js** alt runtime: webthing-iotjs (fork)
 - IoT.js uses JerryScript engine (ES 5.1)
 - Develop on POSIX OS (GNU/Linux)
 - Deploy on MCU:  **TIZEN** RT
 - More: “Bring JS to IoT” (Sun 14h JS room)

Implementing WebThings

```
var webthing = require('webthing-iotjs');
function SomeProperty(thing) {
  webthing.Property.call(this, thing,
    'SomeProperty',
    new webthing.Value(42),
    {'@type': 'LevelProperty'});
});
var thing = new webthing.Thing('SomeThing');
thing.addProperty(new SomeProperty(thing));
var server = new webthing.WebThingServer
  (new webthing.SingleThing(thing), 8888);
server.start();
```

```
$ curl http://localhost:8888/properties/SomeProperty
{"SomeProperty":42}
```

```
$ curl http://localhost:8888
{
  "name": "SomeThing",
  "href": "/",
  "@context":
    "https://iot.mozilla.org/schemas",
  "@type": [null],
  "properties": {
    "SomeProperty": {
      "links": [
        {
          "rel": "property",
          "href": "/properties/SomeProperty"
        }
      ]
    },
    "links": [
      {
        "rel": "properties",
        "href": "/properties"
      }
    ]
  }
}
```




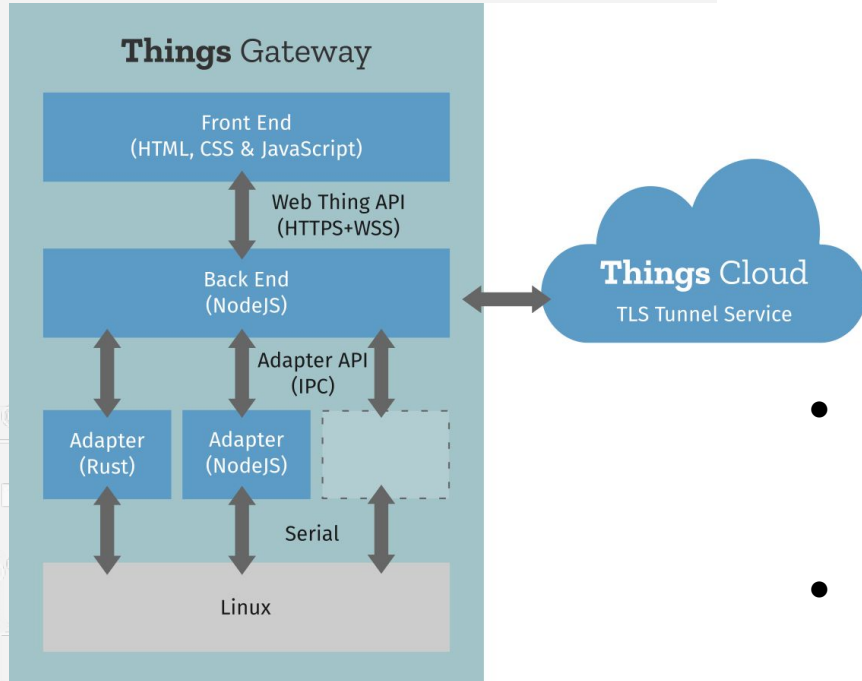
Protocol Interoperability using REST

```
var mqtt = require('mqtt'); // IoT.js builtin module
function MqttProperty(thing) { var self=this;
  webthing.Property.call(this,thing,
    'Humidity', new webthing.Value(0),{'@type':'LevelProperty'});
  thing.client.subscribe('workgroup/$MACHINE_ID/air/humidity');
  thing.client.on('message', function(data) {
    var update = JSON.parse(data.message.toString())['humidity'];
    self.value.notifyOfExternalUpdate(update);
  });
}

var thing = new webthing.Thing('MqttSensor');
thing.client = new mqtt.connect({host: 'iot.eclipse.org', port: 1883},
  function(){ thing.addProperty(new MqttProperty(thing));
    (new webthing.WebThingServer(...)).start();
  });
```


Extends gateway With addons

- Adapters to bridge:
 - Other IoT devices (or protocols)
 - E.g: Onvif Cameras...
 - Or online services: 
 - E.g: ActivityPub/Mastodon, EMail
 - I/O: Generic Sensors (I2C), GPIO, USB?
- Can be implemented in any language
 - IPC is used for Node.JS using nanomsg
- Community supported



Live demo



moz://a

TIZEN™

W3C®



ActivityPub

Get Involved

Build a Web Thing



Build your own web things with the Things Framework

Create an adapter



Create a Things Gateway adapter add-on to bridge an existing IoT device or protocol to the web

Hack on Project Things



Help us develop our Web of Things implementation

Find Out More

iot.mozilla.org

#iot on IRC

@MozillaIoT on Twitter

Mozilla IoT on Discourse



Thank you

#mozilla

#moztechspeakers



@diipeshmonga



@RzrFreeFr <irc://irc.mozilla.org/iot>
<https://social.samsunginter.net/@rzt/>
<https://github.com/rzt/webthing-iotjs/wiki>

