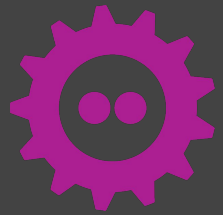


Project Things

A secure gateway to connect your things to Internet

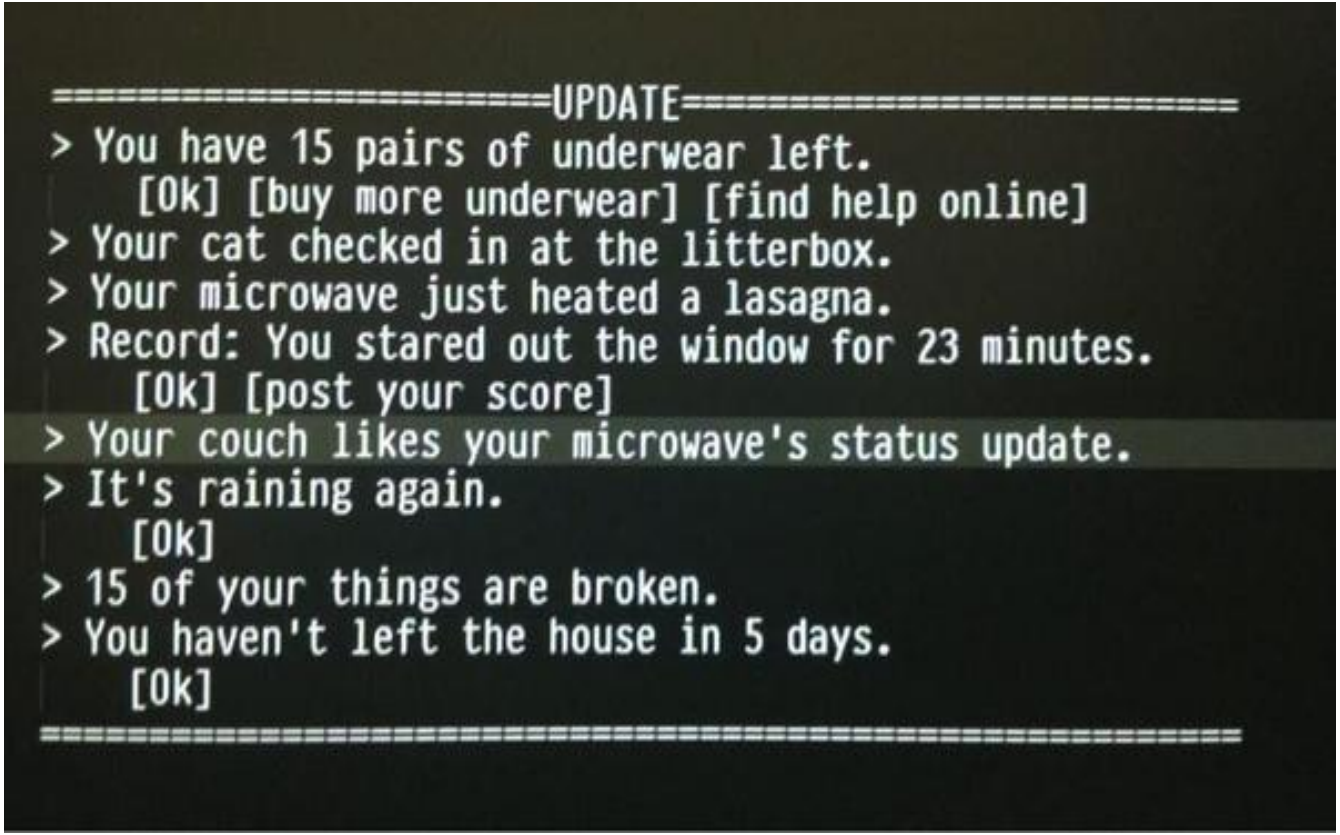
February 2, 2019
<https://fosdem.org/2019/schedule/event/project_things>

Speakers

Dipesh Monga
@ Mozilla Techspeakers

Philippe Coval
@ Samsung OpenSource

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



Shodan: The scariest search engine on the Internet

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.


2016-01-09 02:07:23

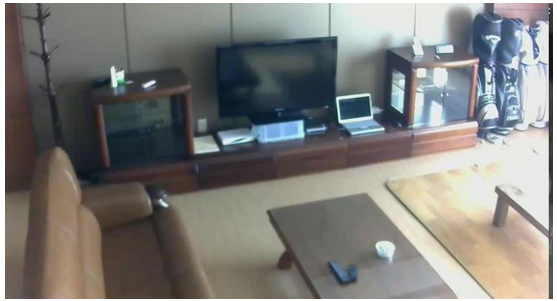

IP Camera
2016-01-08 22:08:56


Camera
2016-01-10 02:54:29


IP Camera
2016-01-10 14:07:43


Camera
2016-01-10 18:36:27


Joker HD cam
1970-01-12 13:23:

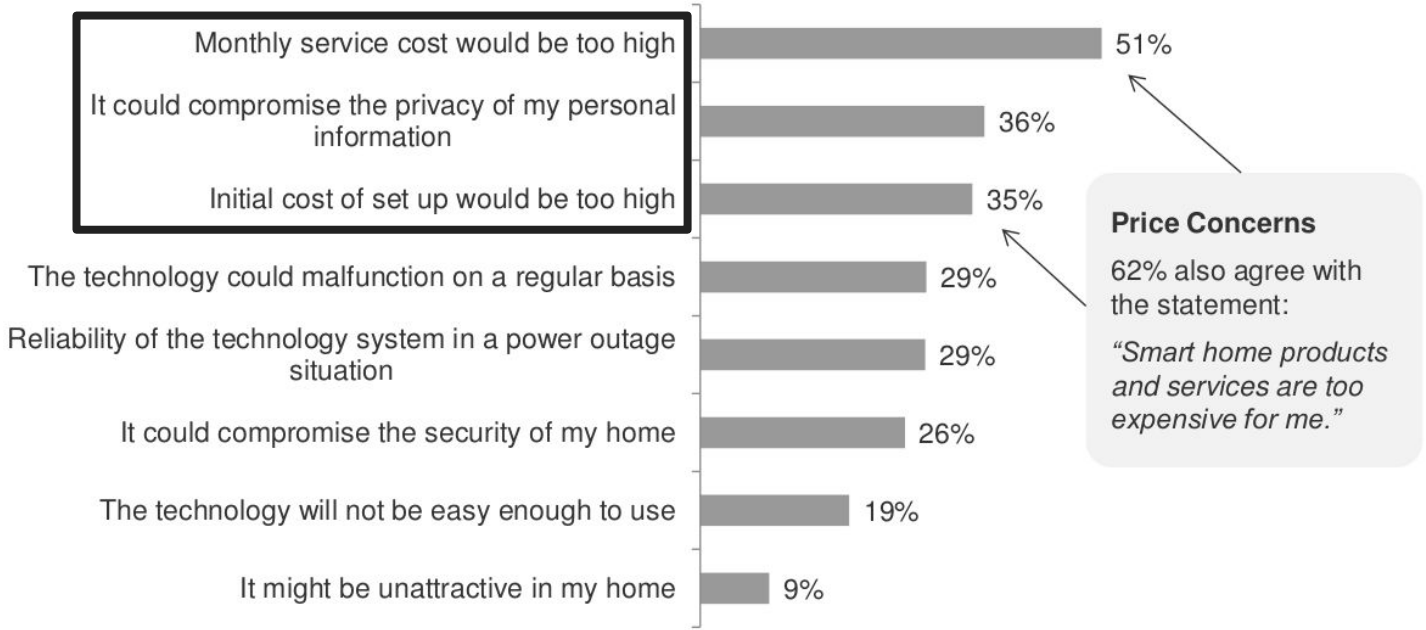


Shodan: Potential Targets

- 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

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

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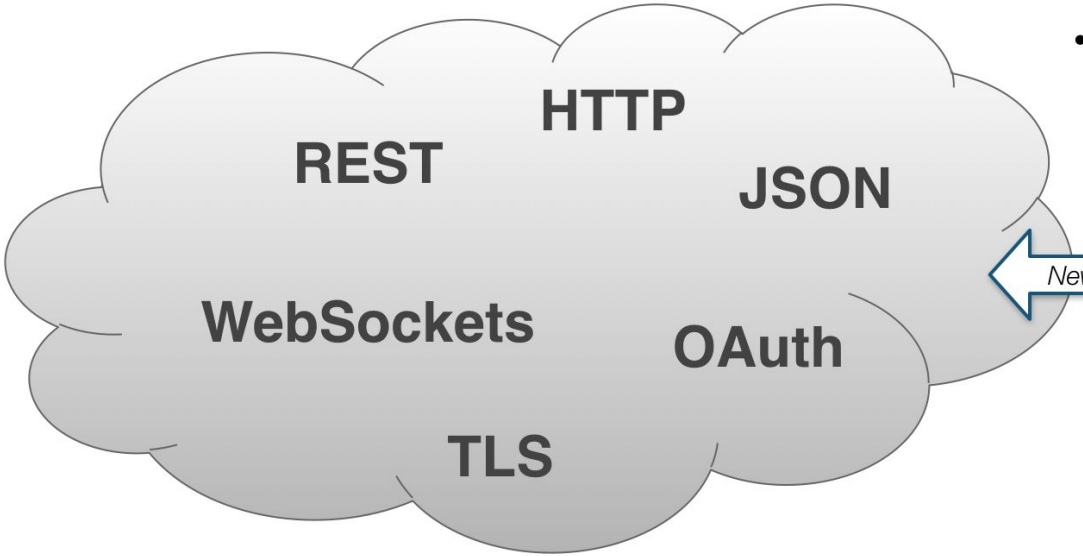
W3C Web of Things Cuts Across Silos

- Mature and secure web technologies



New!

- 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

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"
  }
}
```

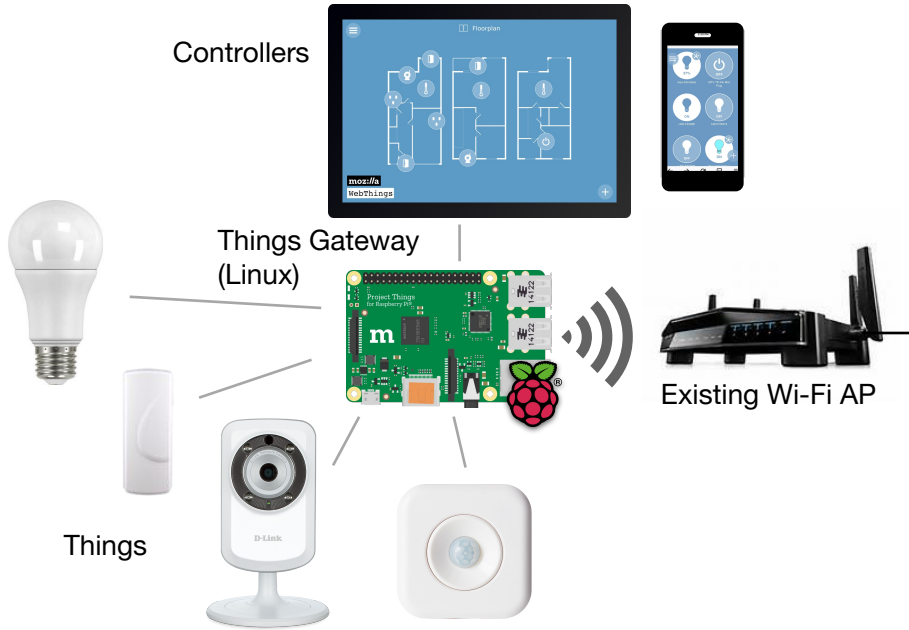
moz://a
IoT

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.

Things Gateway 0.7 (2019-01)

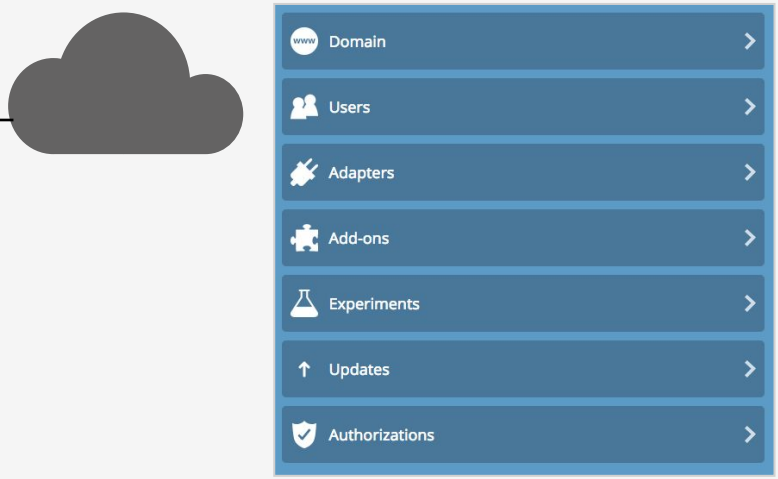
Build your own gateway with a Raspberry Pi



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)*



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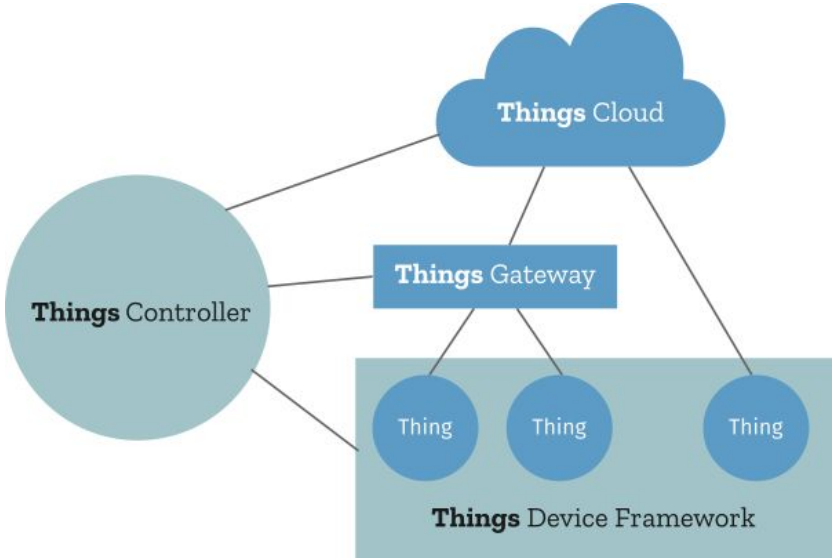
Mozilla Project Things Framework



- **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

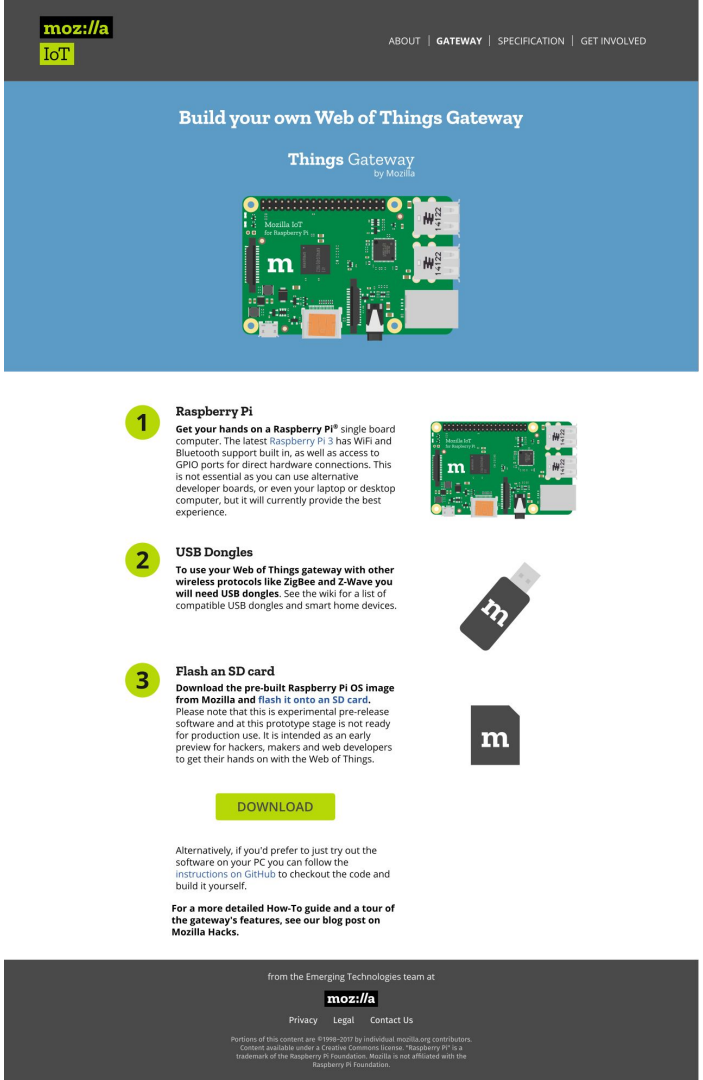
Things Gateway - Security

- 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

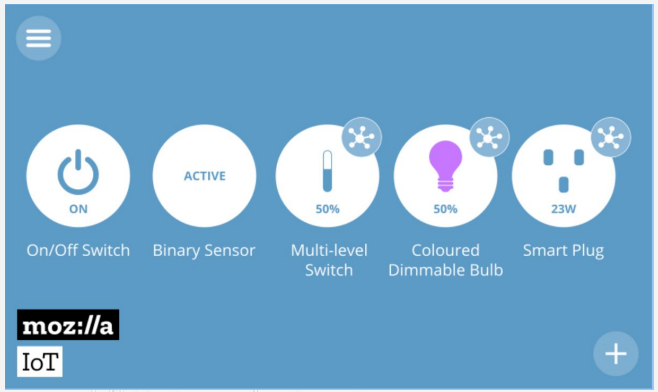
- Downloadable OS image for Raspberry Pi
- Perfect for hackers and makers

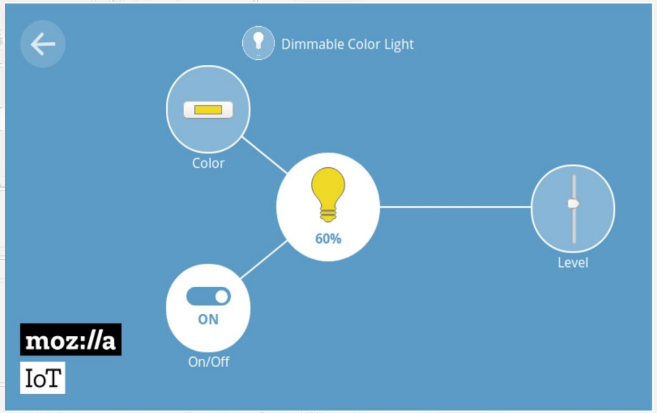
iot.mozilla.org/gateway



Tech details

Setup: **Things** Gateway





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- 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 ?

Web Thing IoT.JS

SAMSUNG Open Source Group

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- Webthings are just HTTP servers
  - Connected to gateway (star topology, not P2P)
- Specified by MozIot schema (Described in JSON) W3C
- Easy to implement (JS, Python, C/C++, Rust…): ARDUINO
  - for node.js 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)

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

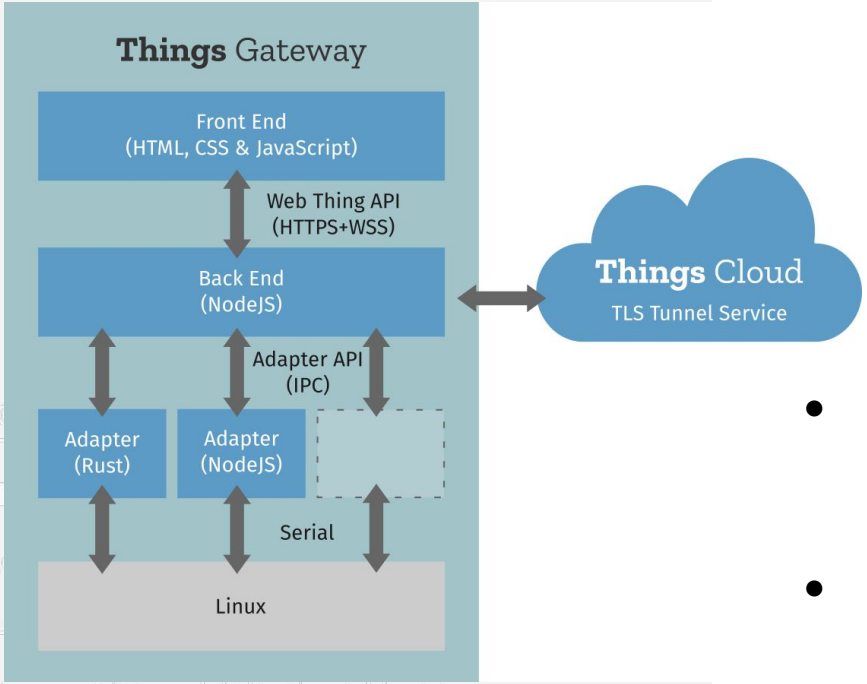
```
$ curl http://localhost:8888/properties/SomeProperty
{"SomeProperty":42}
```

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

https://youtu.be/OT0Ahuy3Cv4#webthing-iotjs-opendata-20190202rzr

mozilla

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

iot.mozilla.org/contribute

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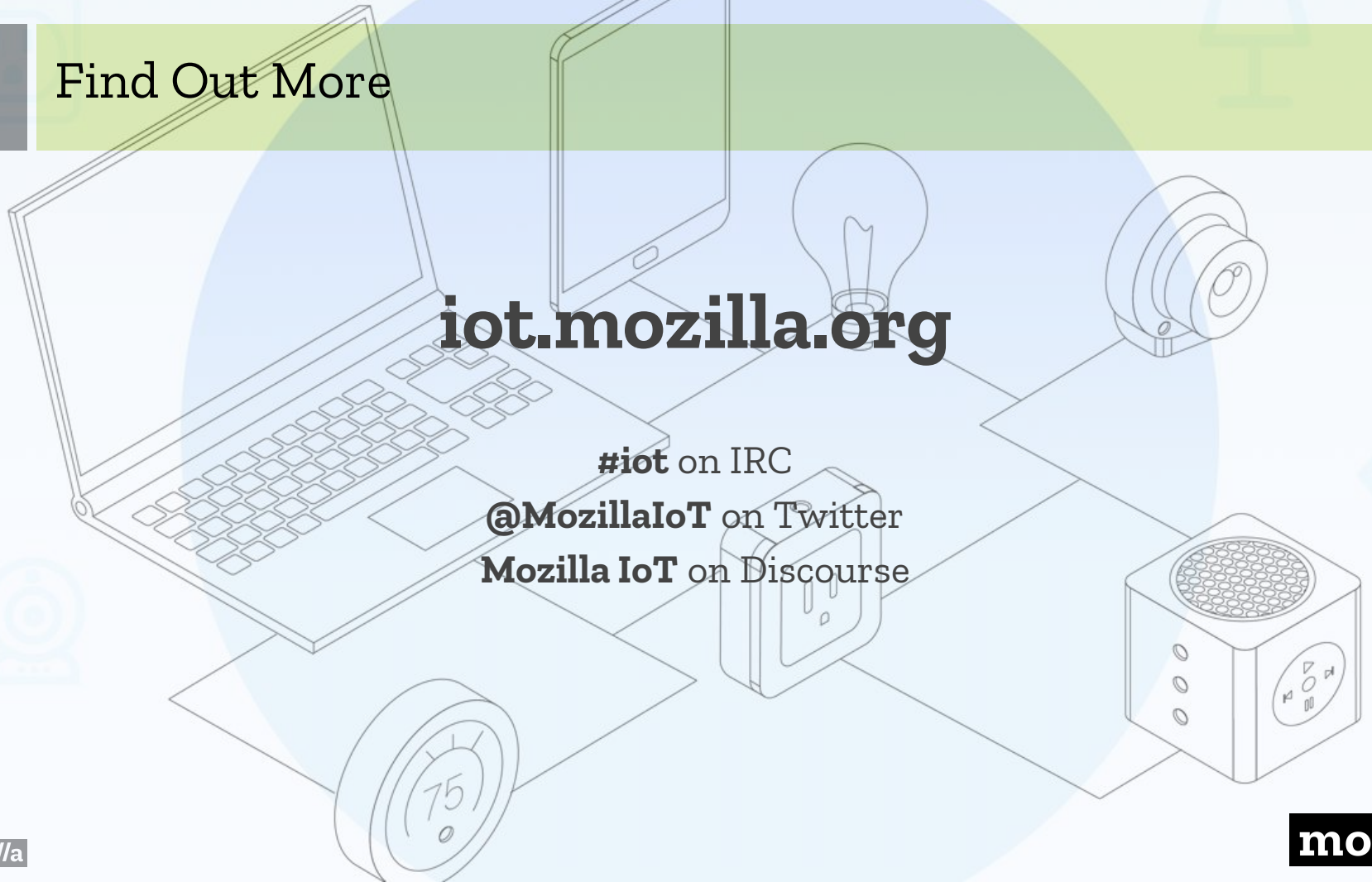
Find Out More



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Mozilla IoT on Discourse

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© Jon Carter • cartertoons
APPARENTLY OUR SMART HOUSE DECIDED IT DIDN'T NEED US ANYMORE.
LET US IN!
CARTOONSTOCK .com
Search ID: jcen1642


Sale
Connected Appliances
klossner
"CAN I INTEREST YOU IN A FIREWALL FOR YOUR TOASTER?"

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https://github.com/rzr/webthing-iotjs/wiki