

Securing the Internet of Things

Elmer Lastdrager

10 september 2021





.nl stats and data

This site provides current statistics and forecasts about the use of the .nl domain, which is managed by SIDN. With over 1.4 million registered domain names, it is the 10th largest TLD in the world.



Stichting Internet Domeinregistratie Nederland (SIDN)

Critical infrastructure services

- Lookup IP address of a domain name (almost every interaction)
- Registration of all .nl domain names
- Manage fault-tolerant and distributed infrastructure

Increase the value of the Internet in the Netherlands and elsewhere

- Enable safe and novel use of the Internet
- Improve the security and resilience of the Internet itself



.nl = the Netherlands
17M inhabitants
6.2M domain names
3.4M DNSSEC-signed
2.5B DNS queries/day
8.6B NTP queries/day



SIDN Labs



SIDN Labs
Thymen Wabeke
Research engineer



SIDN Labs
Moritz Müller
Research engineer



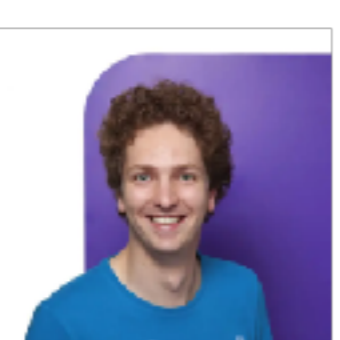
SIDN Labs
Marisca van der Donk
Managementassistent



SIDN Labs
Marco Davids
Research engineer



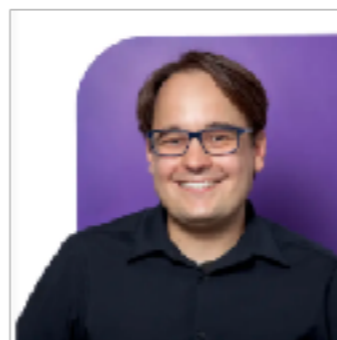
SIDN Labs
Maarten Wullink
Research engineer



SIDN Labs
Elmer Lastdrager
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SIDN Labs
Jelte Jansen
Research engineer



SIDN Labs
Giovane Moura
Data Scientist



SIDN Labs
Caspar Schutijser
Research engineer



SIDN Labs
Cristian Hesselman
Directeur SIDN Labs



SIDN Labs
Thijs van den Hout
Research Engineer



SIDN Labs
Christiaan Scholten
Student (UT)

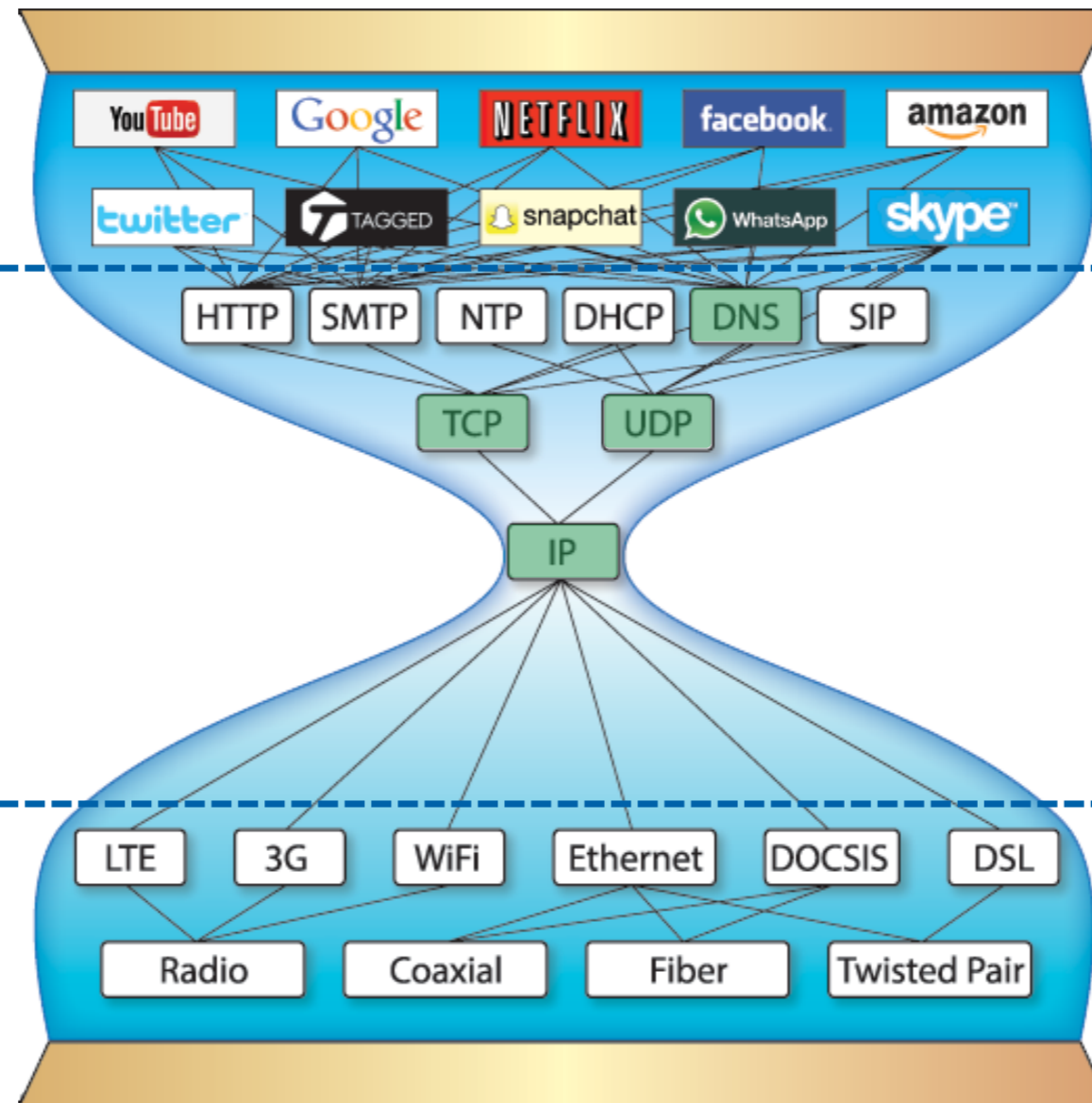
- Technical experts, divers in seniority and nationality
- Help SIDN teams, write open-source software, analyze large amounts of data, conduct experiments, write articles, collaborate with universities
- M.Sc students help us advance specific areas

Most people

Services

Us

Transmission





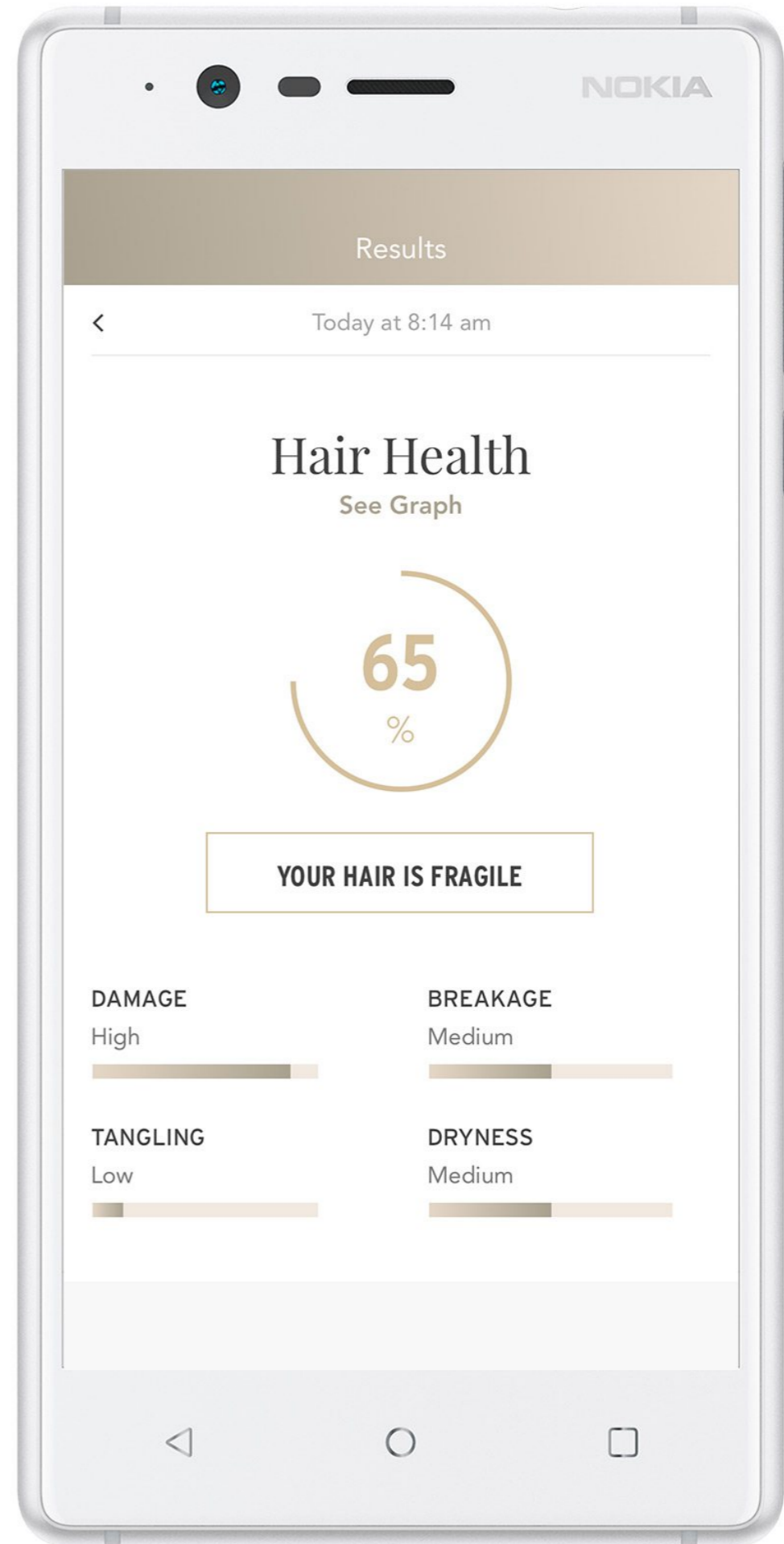
Internet of Things



Smart Devices

“A smart device is an electronic device, [snip], that can operate to some extent interactively and autonomously.”

According to Wikipedia





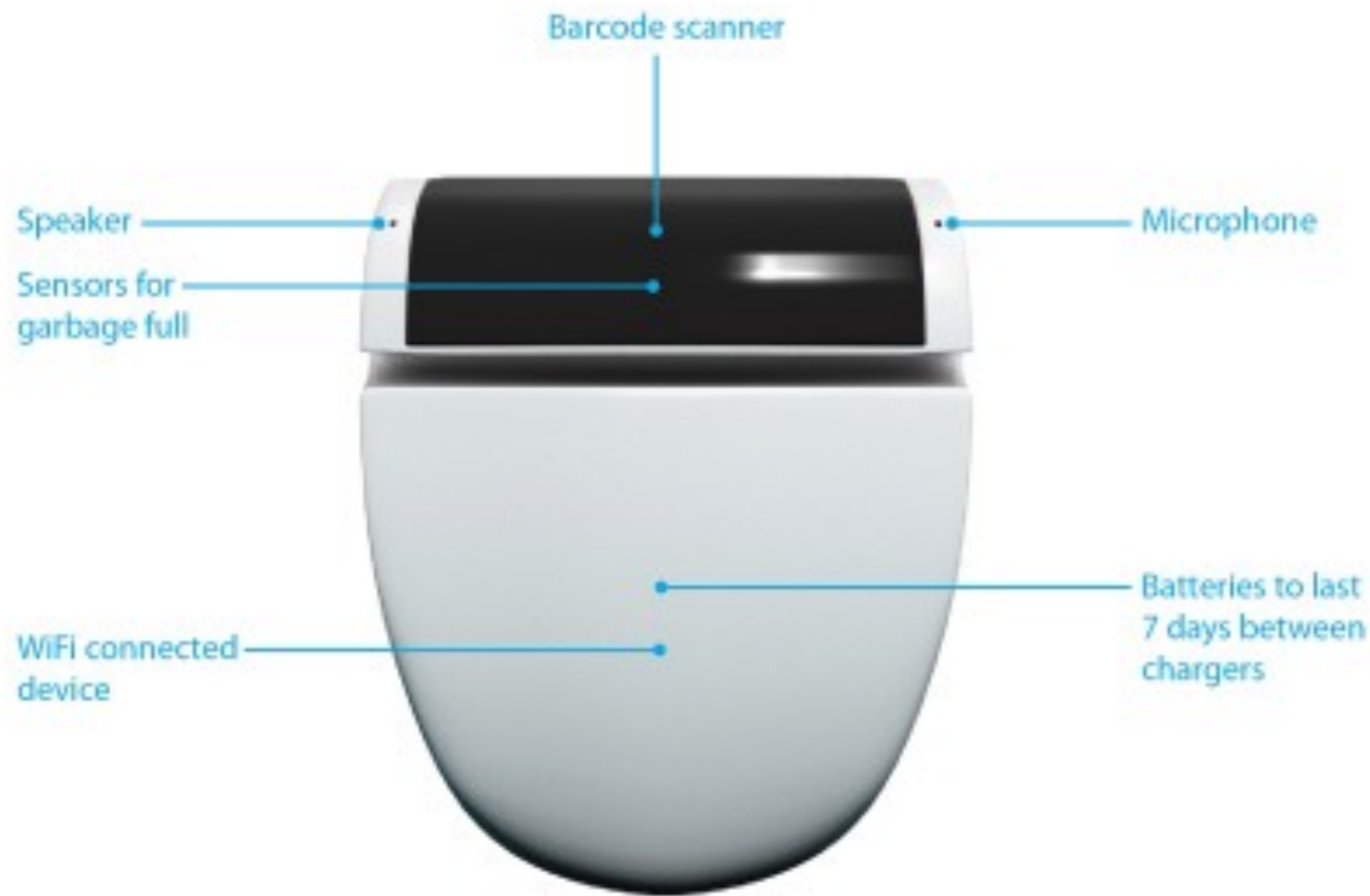
Success!



Get started



12:30



This is GeniCan.





Como Huggies TweetPee funciona

Design ergonômico

O design busca o conforto e segurança do bebê. Fácil de instalar e retirar para utilizar na próxima fralda.



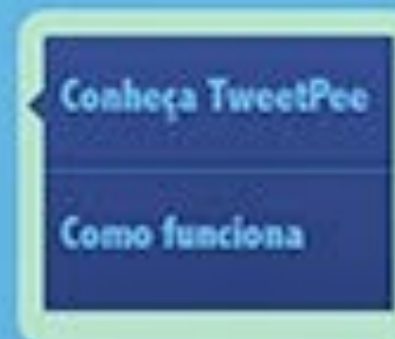
O sensor da fralda monitora a umidade e envia um sinal quando o bebê faz xixi



Todos que têm a permissão para acompanhar a atividade do bebê são notificados

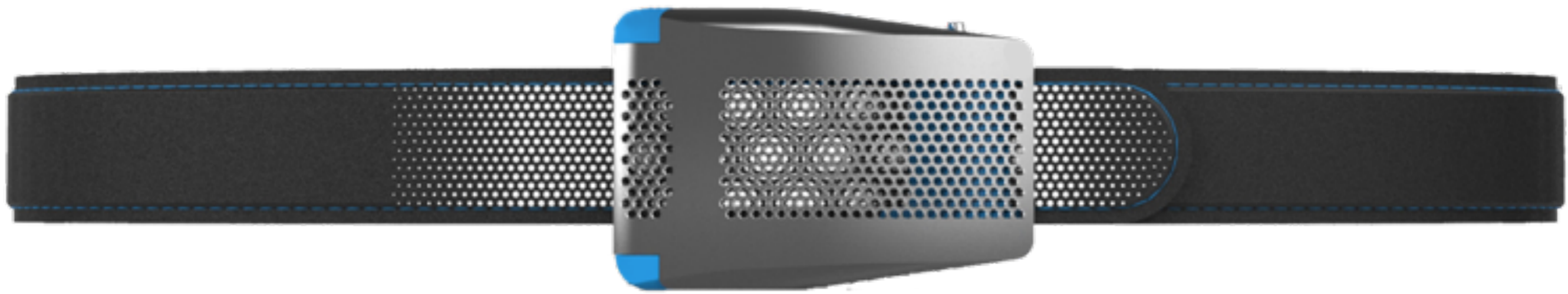


Através do APP mães e papais conseguem comprar fraldas sem sair de casa.

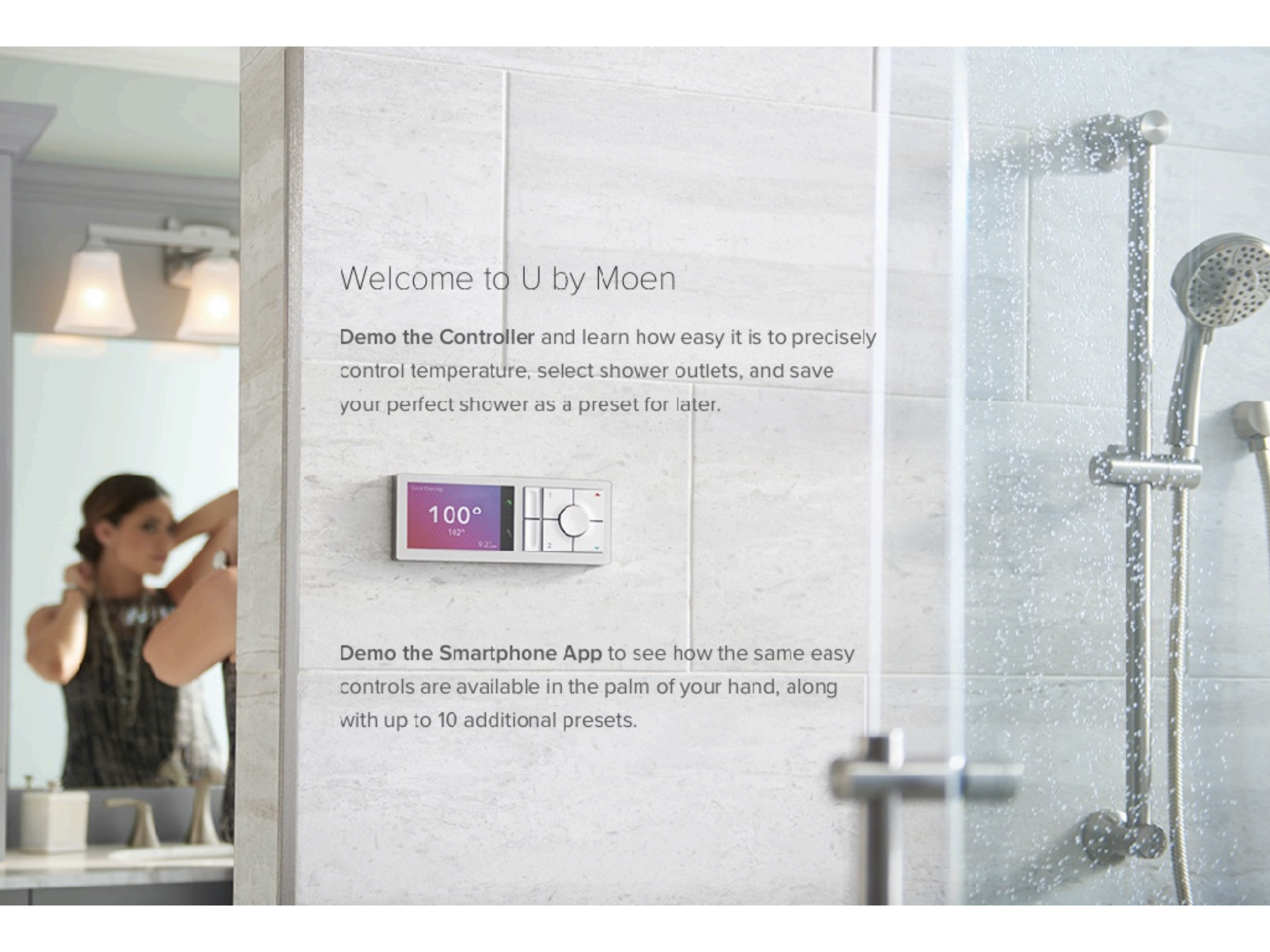


Pelo histórico de troca de fraldas do bebê, você acompanha a quantidade usada por dia

Histórico de trocas	
Jan	
28	6 trocas
29	9 trocas
30	4 trocas
31	6 trocas
Fev	





A woman in a dark sleeveless top is looking into a large mirror in a bathroom. The mirror reflects her adjusting her hair. In the foreground, a Moen shower controller is mounted on a light-colored tiled wall. The controller has a digital display showing '100°' and '102°', and a control panel with a central dial and two buttons labeled '1' and '2'. To the right, a shower glass door is visible with a showerhead and a vertical bar.

Welcome to U by Moen

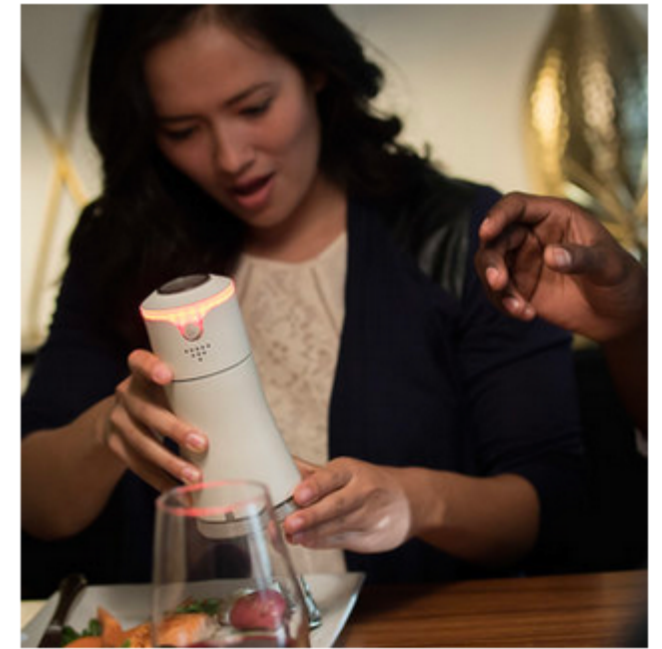
Demo the Controller and learn how easy it is to precisely control temperature, select shower outlets, and save your perfect shower as a preset for later.

Demo the Smartphone App to see how the same easy controls are available in the palm of your hand, along with up to 10 additional presets.



SMALT with voice

Connect SMALT with Amazon Echo and simply say "Alexa, dispense half a teaspoon of salt".



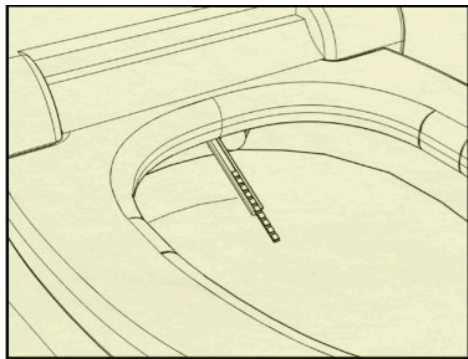
Bring the flavor

SMALT dispenses salt with a shake/pinch of your smartphone screen or simply turning the dial manually.

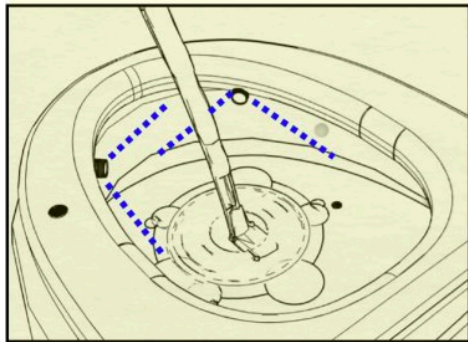
What does i.Con do with its data? Can I use it anonymously?

“Absolutely! All data will be kept anonymous but users will have the option to share their recent data with friends, or, indeed the world. You will be able to anonymously access stats that you can compare with i.Con users worldwide.”

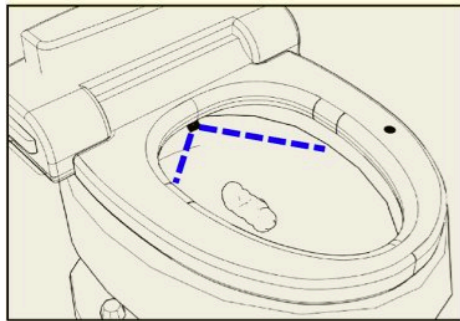




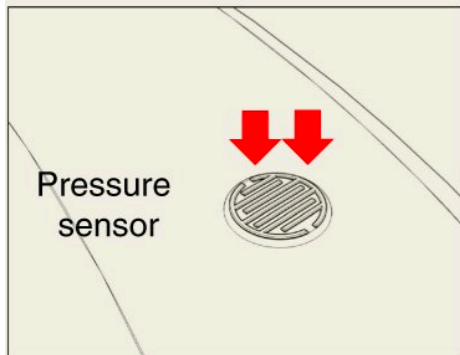
Urinalysis



Uroflowmetry



Bristol stool form scale

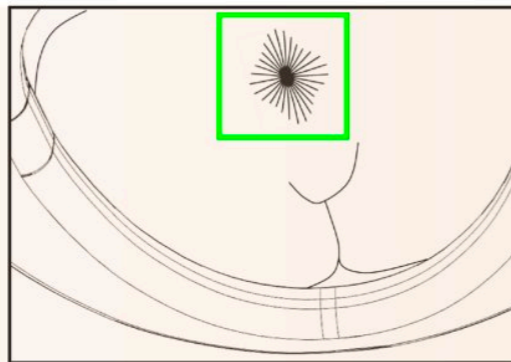


Pressure sensor

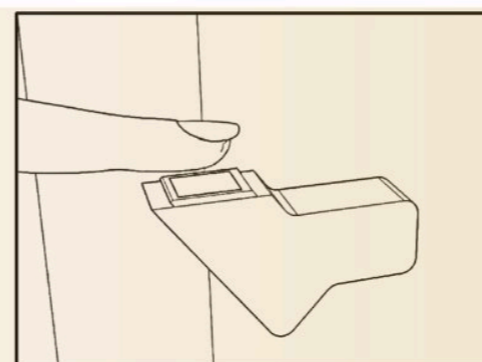
Seating time
defecation time

- (i) Pressure sensor
- (ii) Motion sensor (PIR)
- (iii) Urinalysis strip

- (iv) Stool camera
- (v) Anus camera
- (vi) Uroflow camera



Analprint scan



Fingerprint scan



Cloud-based
health portal

YOU GET CONNECTED!

AND YOU GET CONNECTED!

EVERYTHING GETS CONNECTED!



What is the IoT?

Wikipedia definition:

“The Internet of things (IoT) is the inter-networking of physical devices, vehicles (also referred to as “connected devices” and “smart devices”), buildings, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to collect and exchange data.”

Global Standards Initiative definition:

“a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies” [3] and for these purposes a “thing” is “an object of the physical world (physical things) or the information world (virtual things), which is capable of being identified and integrated into communication networks” .”



Towards a definition of the Internet of Things (IoT)

Revision 1 – Published 27 MAY 2015

A simpler definition:

“Stuff that did not use to be networked”

┌ HOW LONG YOU'VE HAD YOUR SMART APPLIANCE ─┐

6 MONTHS

1 YEAR

5 YEARS

10 YEARS

BEST-CASE



YOU'RE CONSTANTLY
BEING RESCUED FROM
PERIL BY A FACELESS
TEAM OF ENGINEERS
WHO COULD WANDER
AWAY AT ANY TIME

YOUR APPLIANCE IS
PART OF A BOTNET RUN
BY ORGANIZED CRIME

WORST-CASE

[Home](#) > [Data Protection](#) > [Internet of Things](#)

SLIDESHOW

The internet of insecure things: Thousands of internet-connected devices are a security disaster in the making



By [Josh Fruhlinger](#), CSO | Oct 12, 2016 4:00 AM PT



The "S" in IoT
stands for
SECURITY

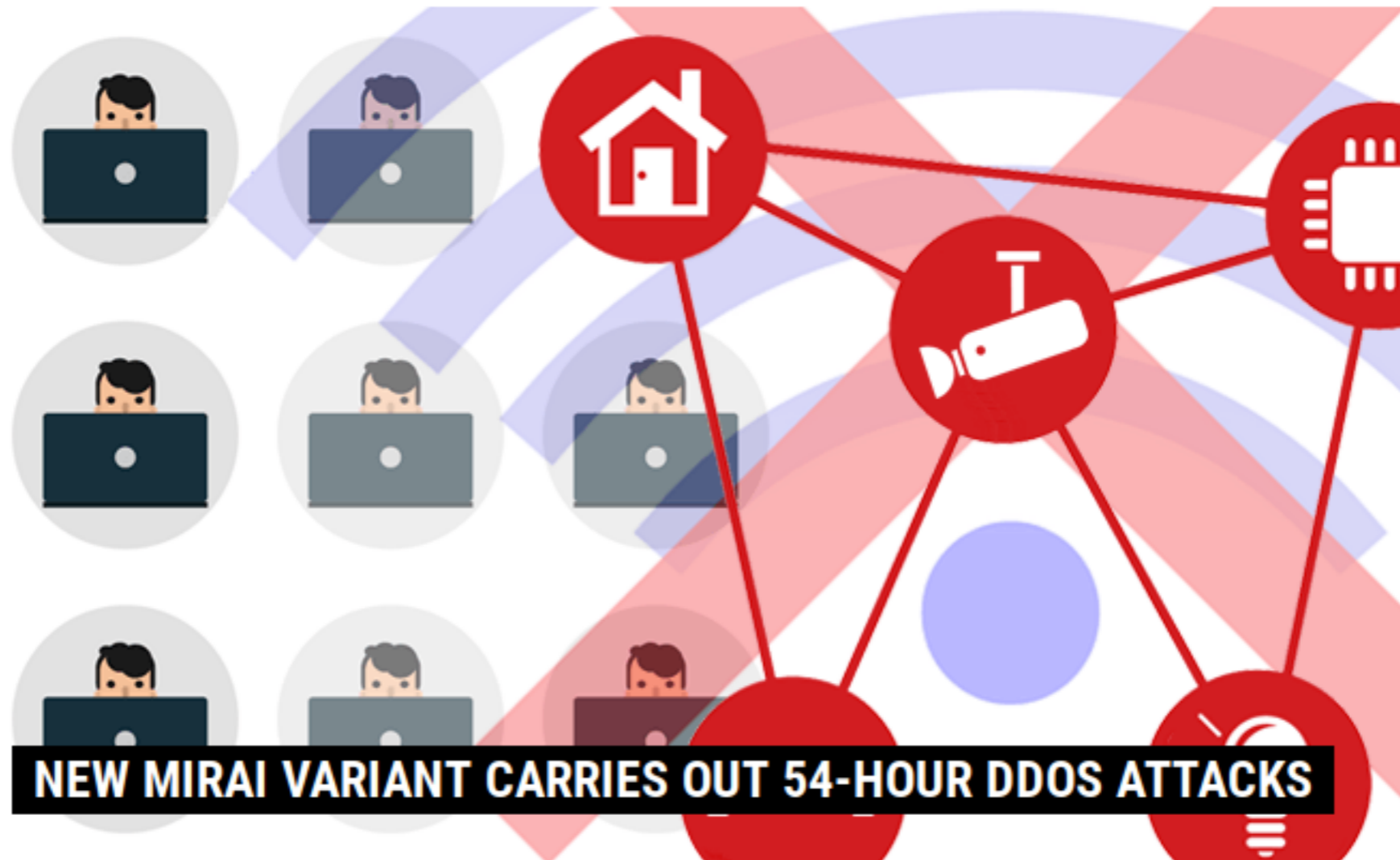


Why?

- ▶ Security is hard
- ▶ Security is expensive
- ▶ In some cases: security is not ‘user-friendly’
- ▶ Security is not a feature that sells devices
 - ▶ But time to market and price are
- ▶ Security is invisible



[Welcome](#) > [Blog Home](#) > [Hacks](#) > [New Mirai Variant Carries Out 54-Hour DDoS Attacks](#)



by [Tom Spring](#)

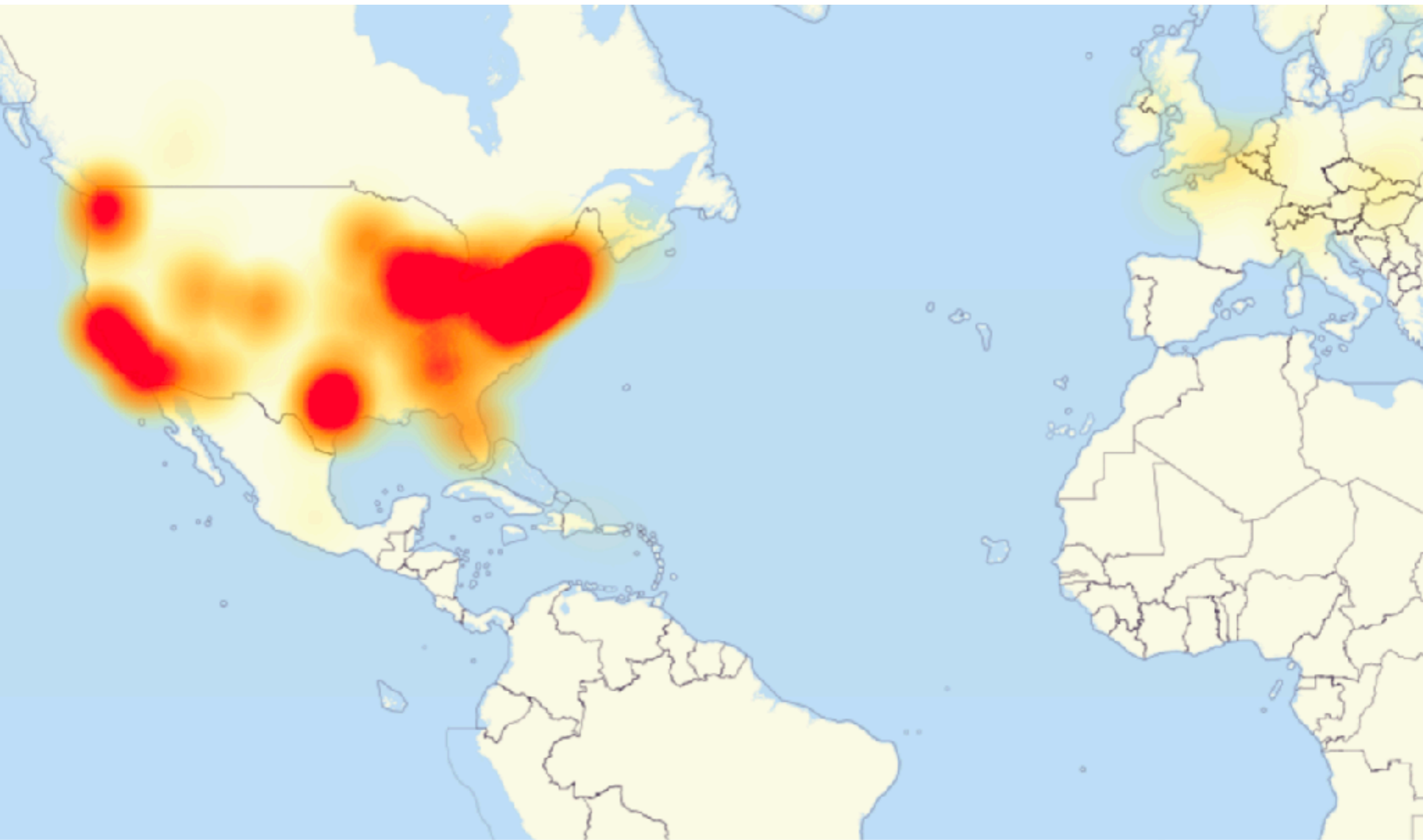
March 30, 2017 , 2:50 pm

A variant of the Mirai malware pummeled a U.S. college last month with a marathon 54-hour long attack. Researchers say this latest Mirai variant is a more potent version of the notorious Mirai malware that made headlines in [October](#), targeting DNS provider [Dyn](#) and the [Krebs on Security](#) website.

Mirai vs  **Dyn**SM

1.2 Tbps

From 'only' 100.000 devices



**The
Economist**

The Pearl river delta: a special report

Hospitals of the future

Jacob Zuma must go

Parking, wrong on so many levels

ISSN 0950-0804

Why computers will never be safe



Computers will never be secure. To manage the risks, look to economics rather than technology

A: Market (vendors)

B: Government

C: Consumers



This guy's light bulb performed a DoS attack on his entire smart house



Kashmir Hill

3/03/15 9:41am · Filed to: REAL FUTURE ▾



182



RISK ASSESSMENT —

BrickerBot, the permanent denial-of-service botnet, is back with a vengeance

New botnet squadrons wage fiercer, more intense attacks on unsecured IoT devices.

DAN GOODIN - 4/24/2017, 10:43 PM



Home > Security > Cybercrime & Hacking



SECURITY IS SEXY

By Darlene Storm, Computerworld | FEB 2, 2015 12:09 PM PT

About

Most security news is about insecurity, hacking and cyber threats, bordering on scary. But when security is done right, it's a beautiful thing...sexy even. Security IS sexy.

NEWS ANALYSIS

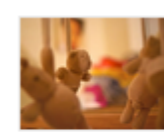
Hacker hijacks wireless Foscam baby monitor, talks and freaks out nanny

This is the third time news has circulated about some jerk hijacking a wireless Foscam camera/baby monitor and made his virtual intrusion known by talking. Please change the default password!



MORE LIKE THIS

Hacker strikes again: Creep hijacks baby monitor to scream at infant and...

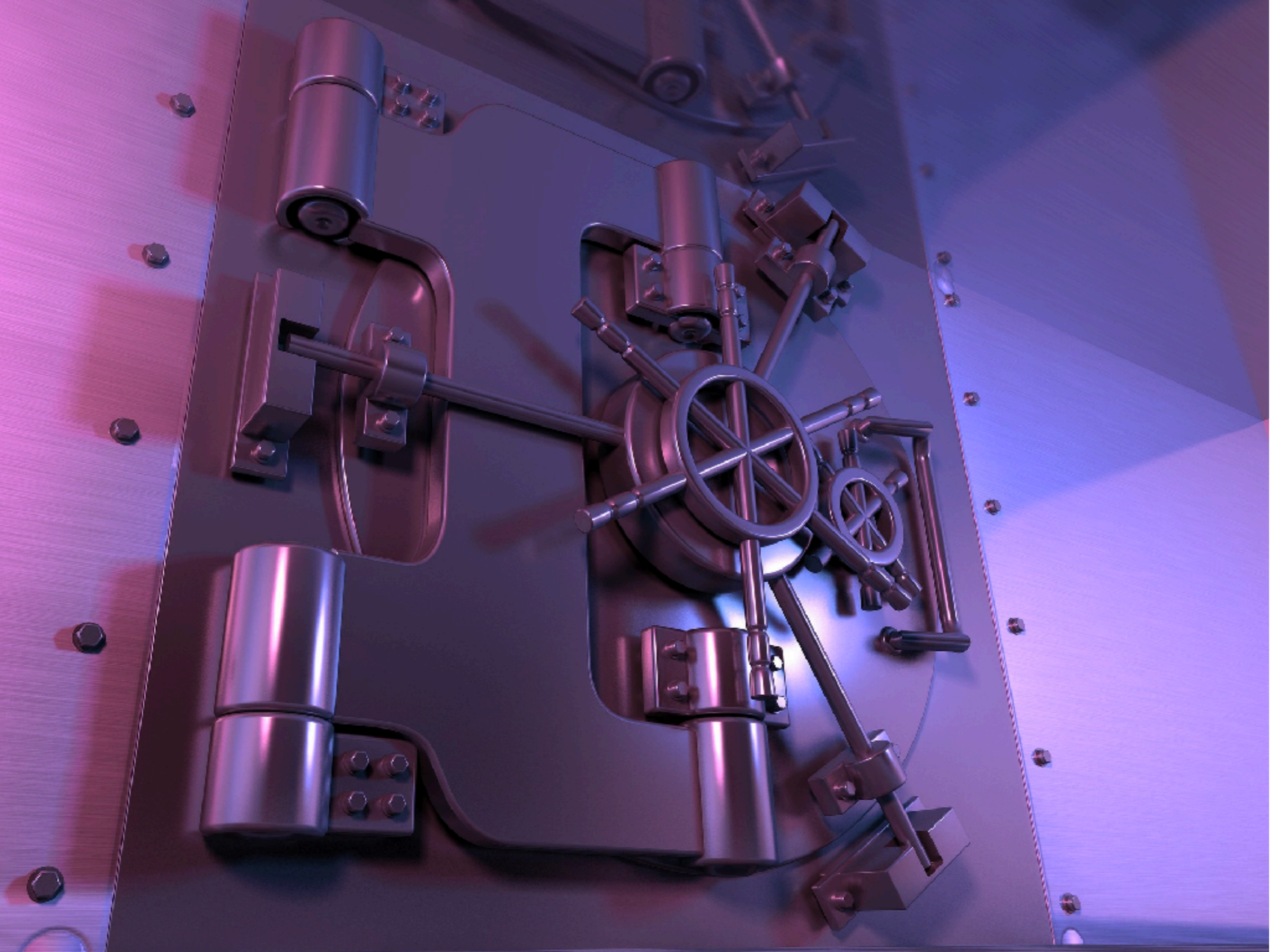


2 more wireless baby monitors hacked: Hackers remotely spied on babies and...



Eerie music coming from wireless baby cam; is it a







DETECT SMOKE AND CO

CONTROL SWITCHES AND OUTLETS

CONTROL LIGHTING

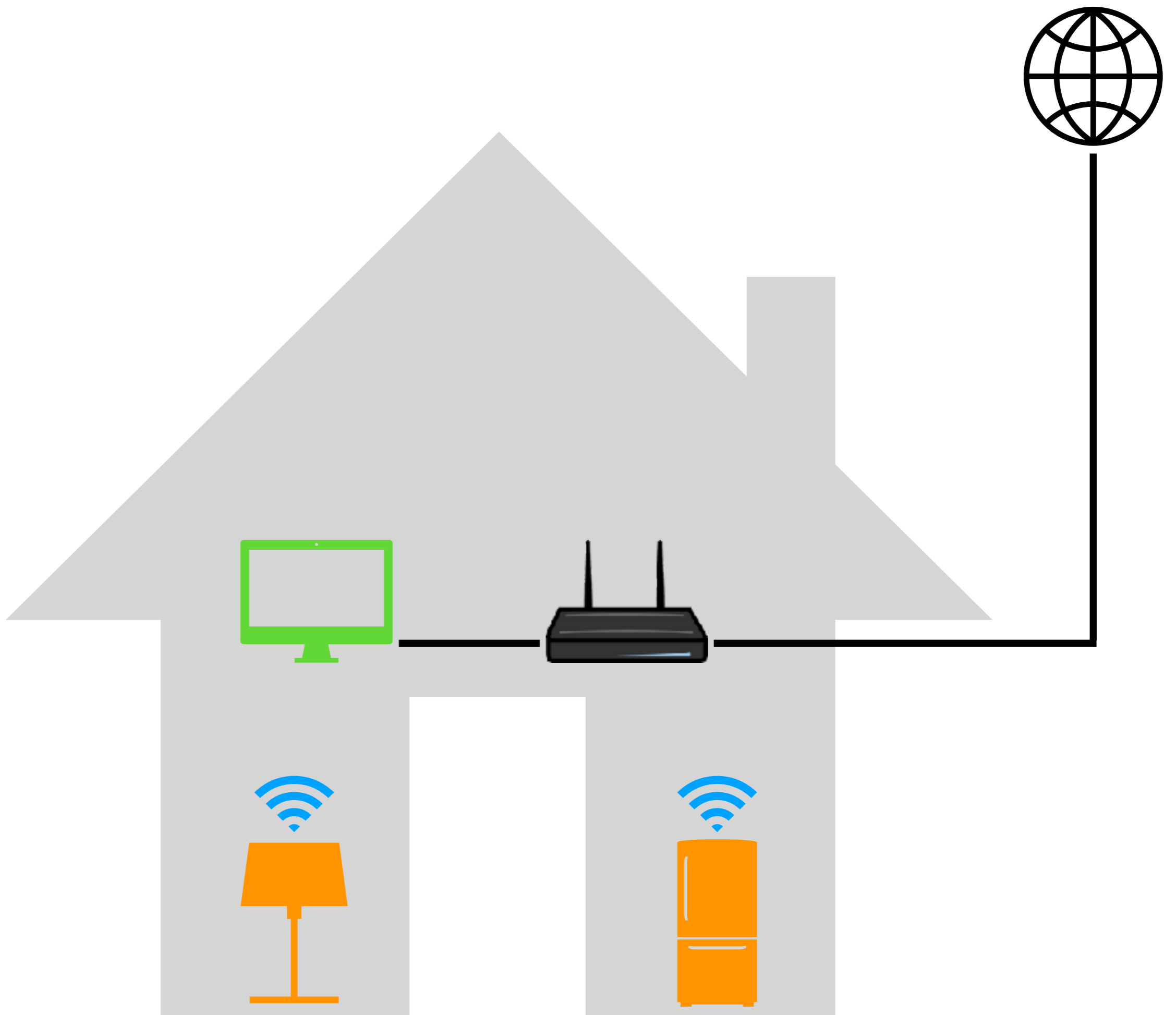
CONTROL SHADES AND BLINDS

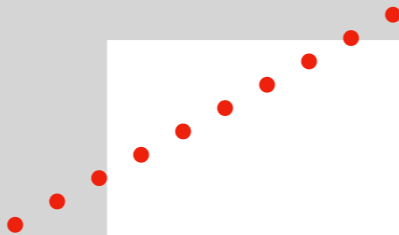
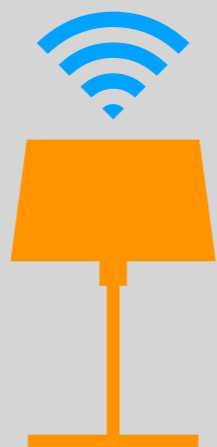
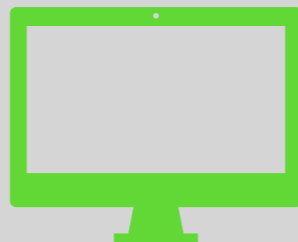
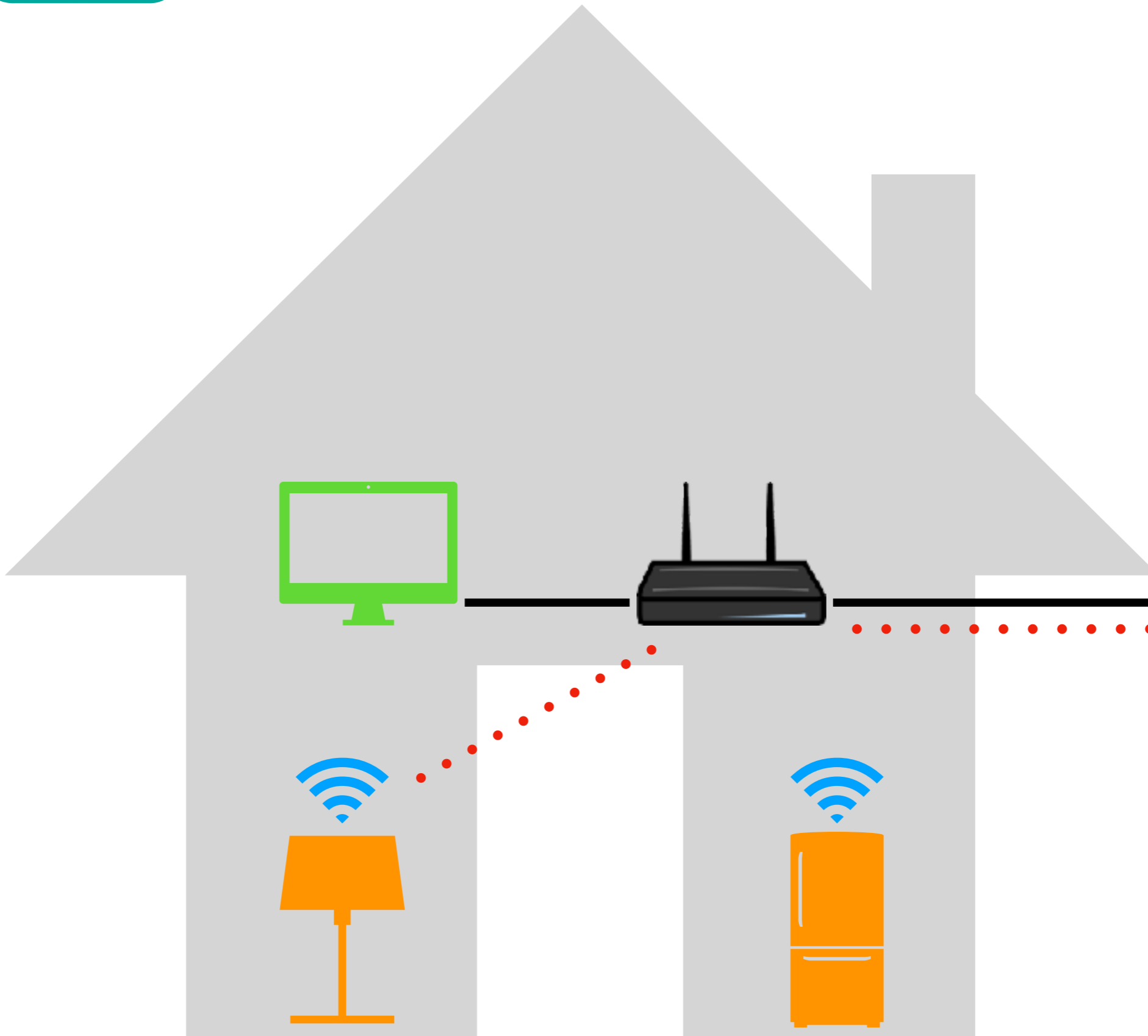
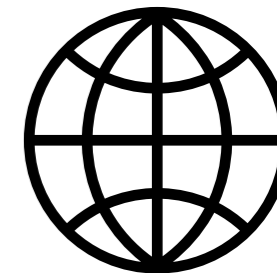
ADJUST CLIMATE

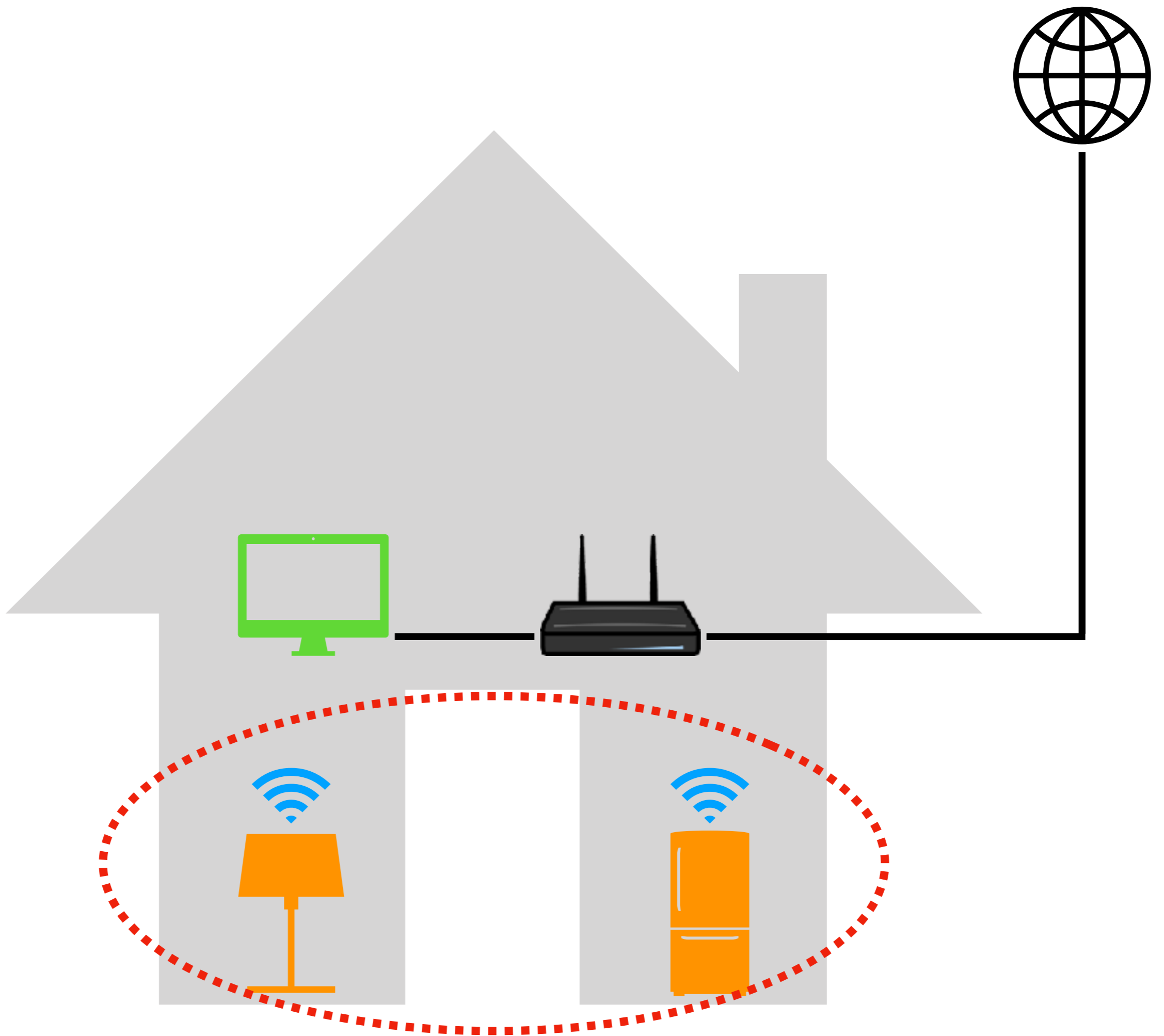
UNLOCK AND LOCK DOORS

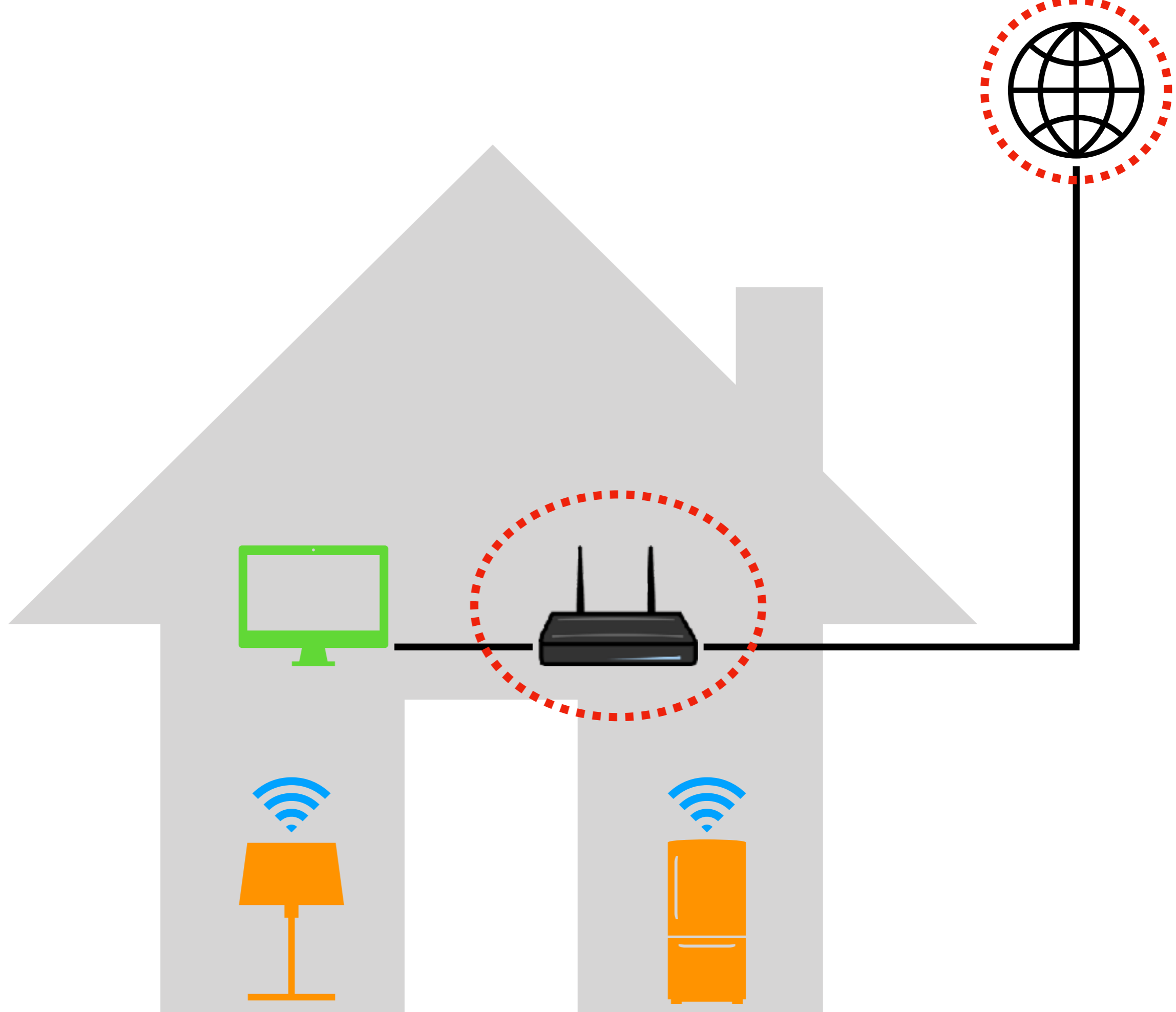
OPEN AND CLOSE GARAGE DOORS

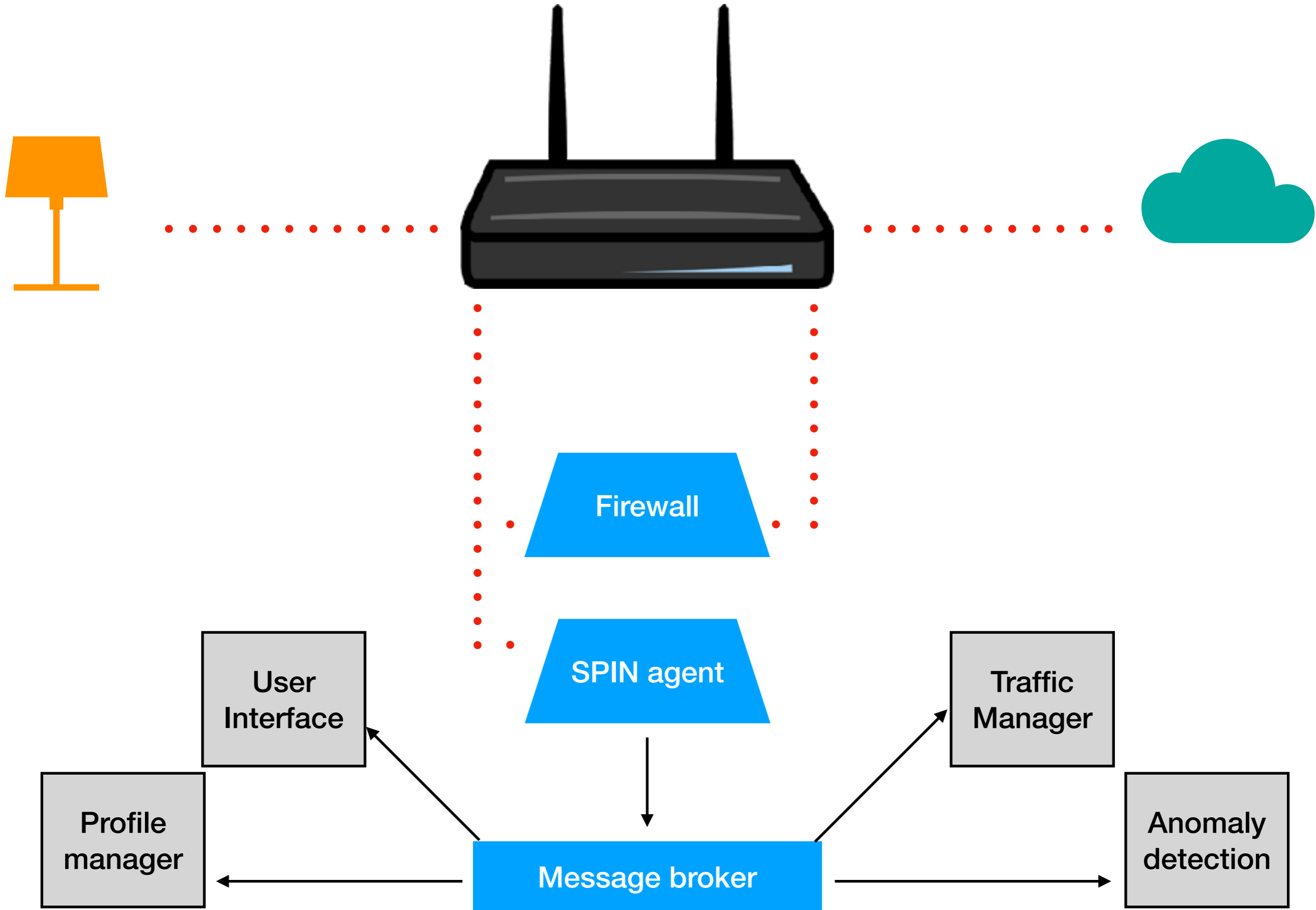
MONITOR YOUR HOME

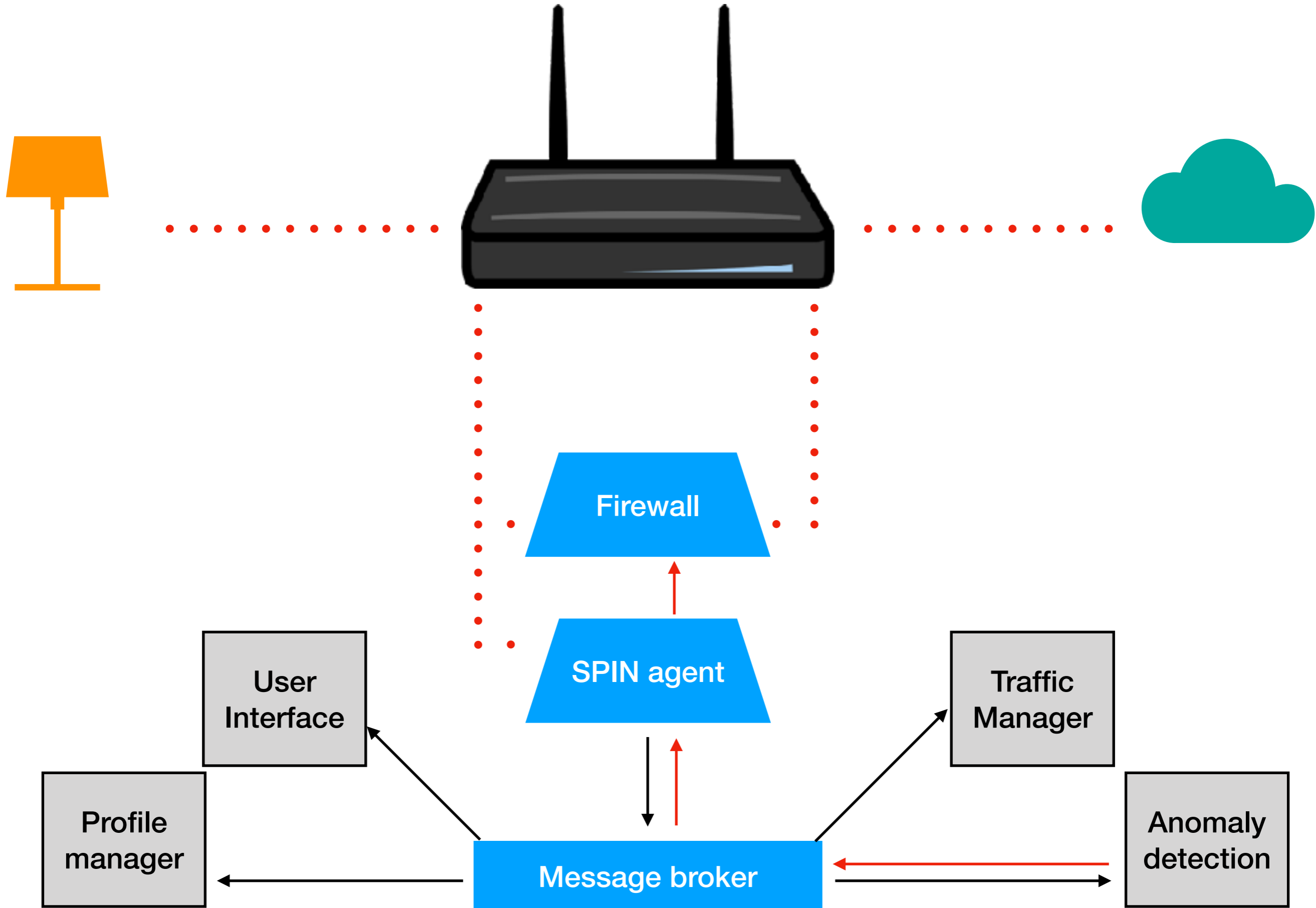


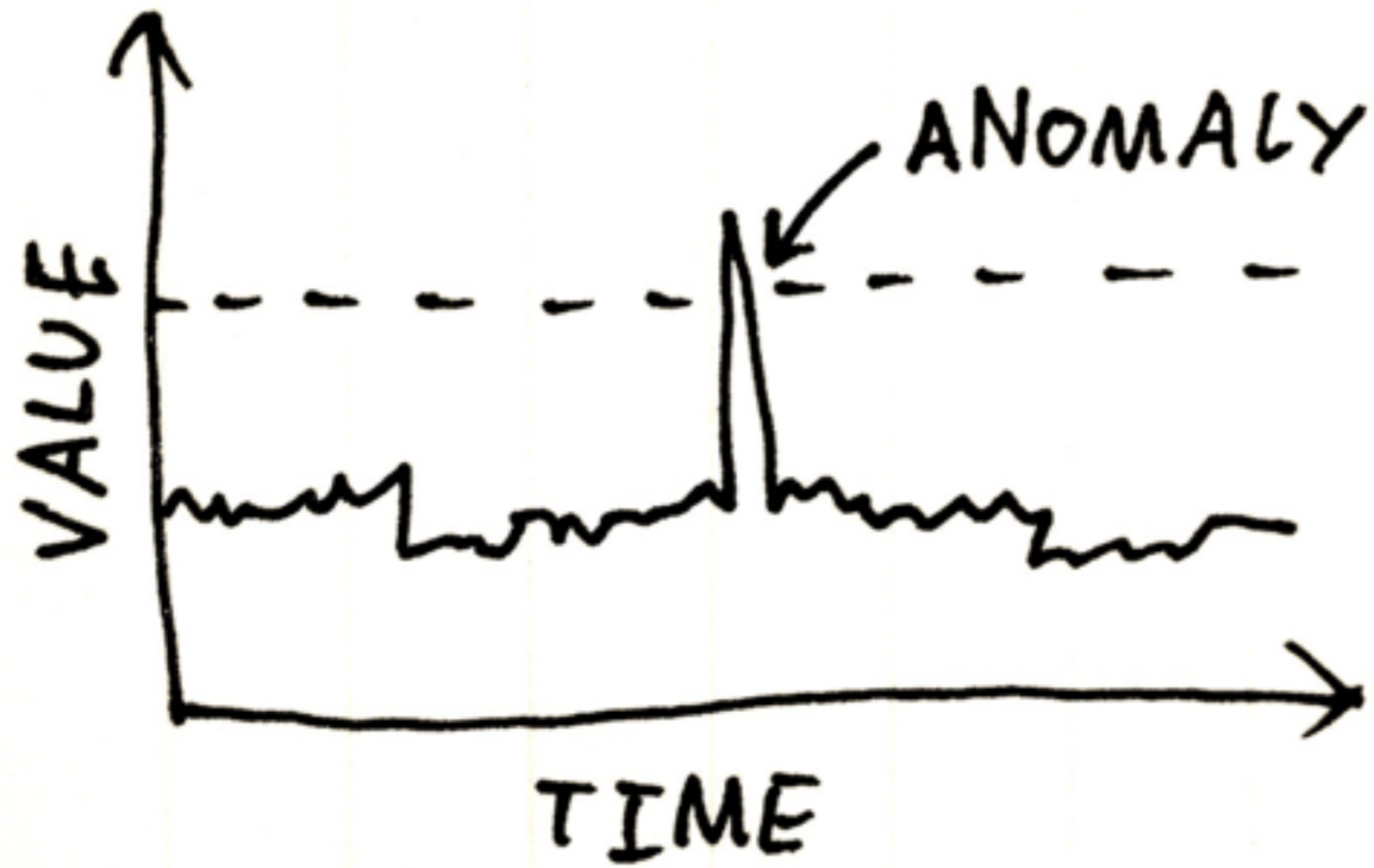












[[Docs](#)] [[txt](#)|[pdf](#)] [[draft-ietf-opsa...](#)] [[Tracker](#)] [[Diff1](#)] [[Diff2](#)] [[Errata](#)]

PROPOSED STANDARD

[Errata](#) [Exist](#)

Internet Engineering Task Force (IETF)

Request for Comments: 8520

Category: Standards Track

ISSN: 2070-1721

E. Lear

Cisco Systems

R. Droms

Google

D. Romascanu

March 2019

Manufacturer Usage Description Specification

Abstract

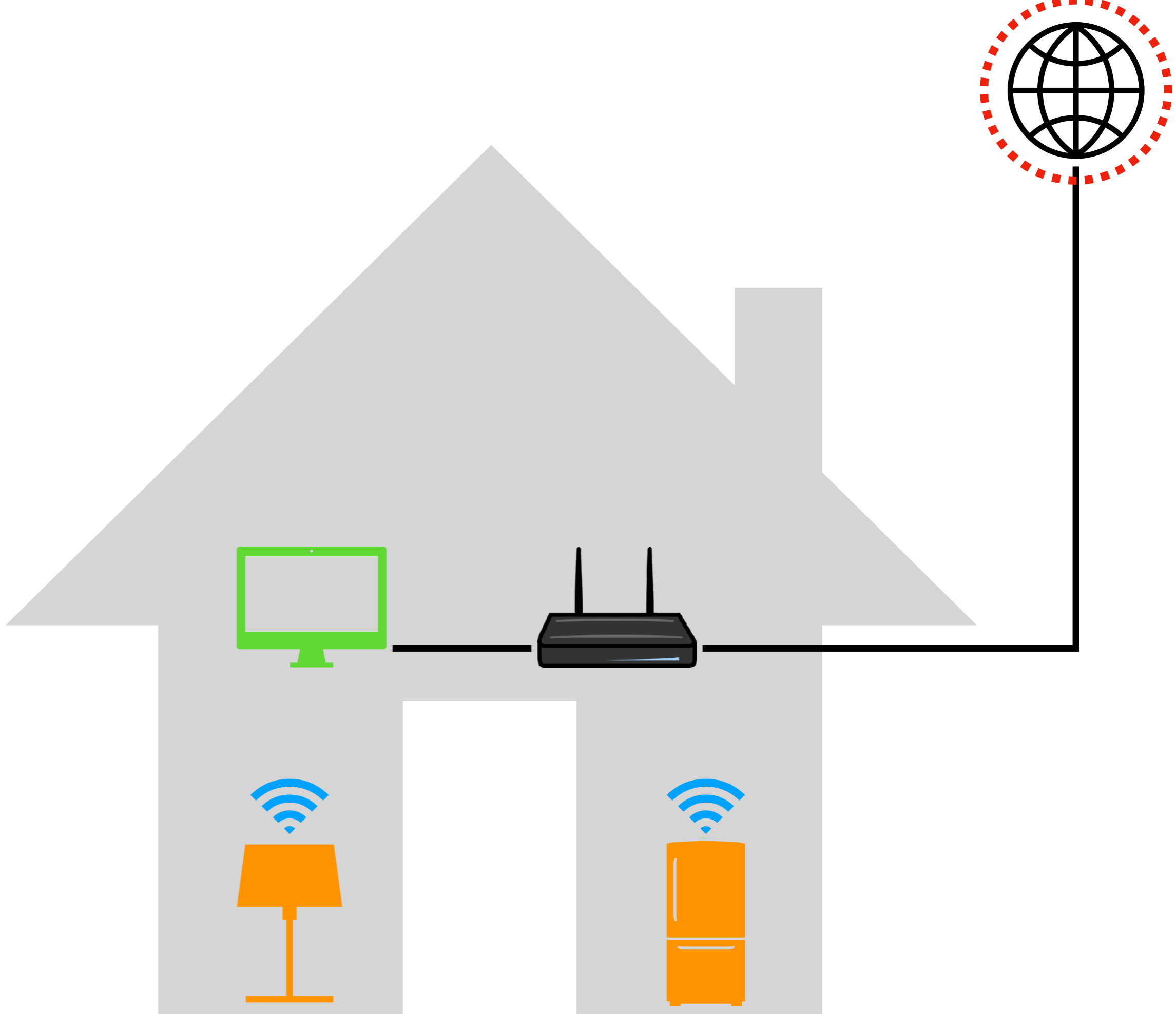
This memo specifies a component-based architecture for Manufacturer Usage Descriptions (MUDs). The goal of MUD is to provide a means for end devices to signal to the network what sort of access and network functionality they require to properly function. The initial focus is on access control. Later work can delve into other aspects.

This memo specifies two YANG modules, IPv4 and IPv6 DHCP options, a Link Layer Discovery Protocol (LLDP) TLV, a URL, an X.509 certificate extension, and a means to sign and verify the descriptions.

Status of This Memo

This is an Internet Standards Track document.

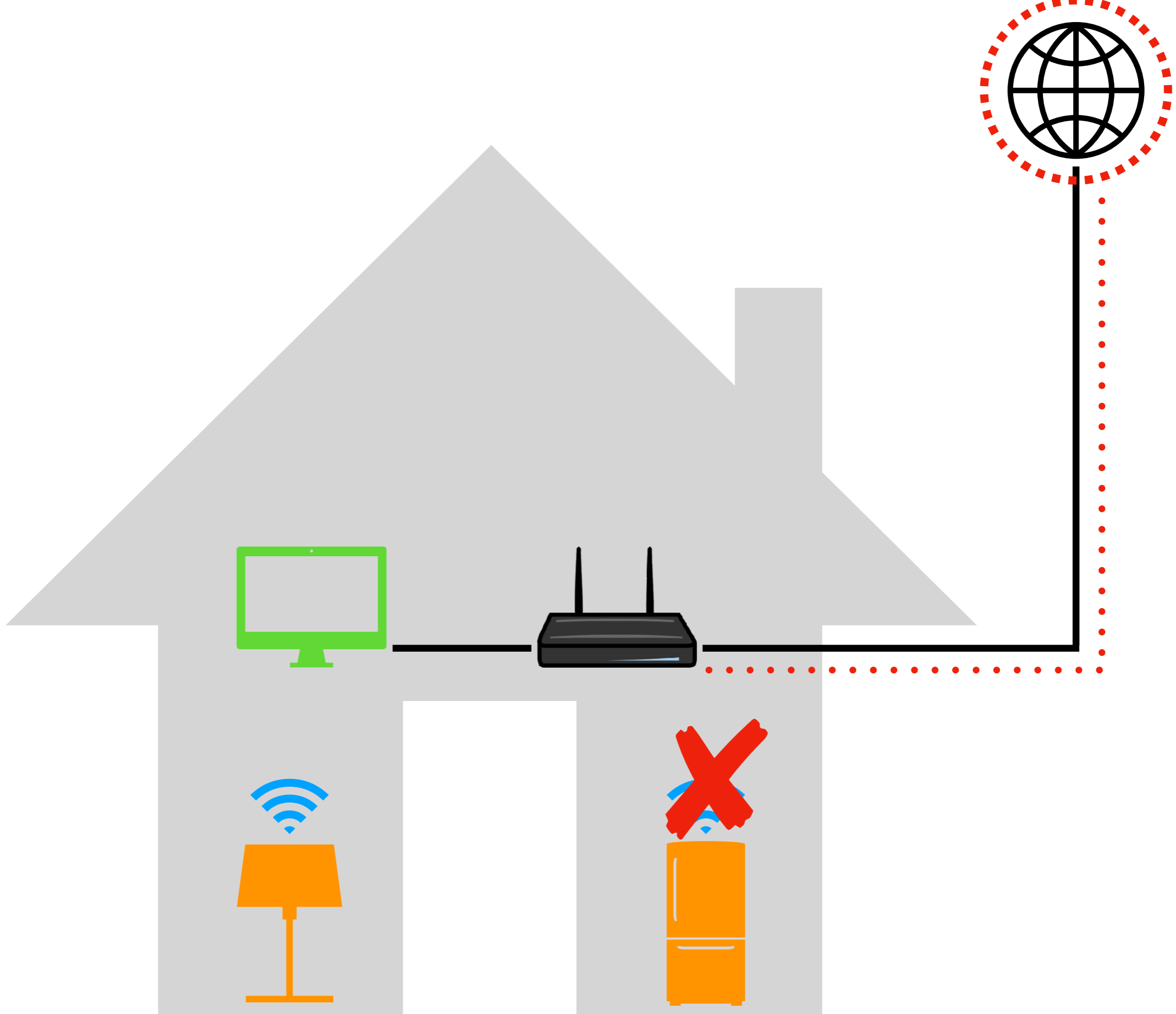
This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in [Section 2 of RFC 7841](#).



CAUTION

KEEP OUT

QUARANTINE





Demo





roqos

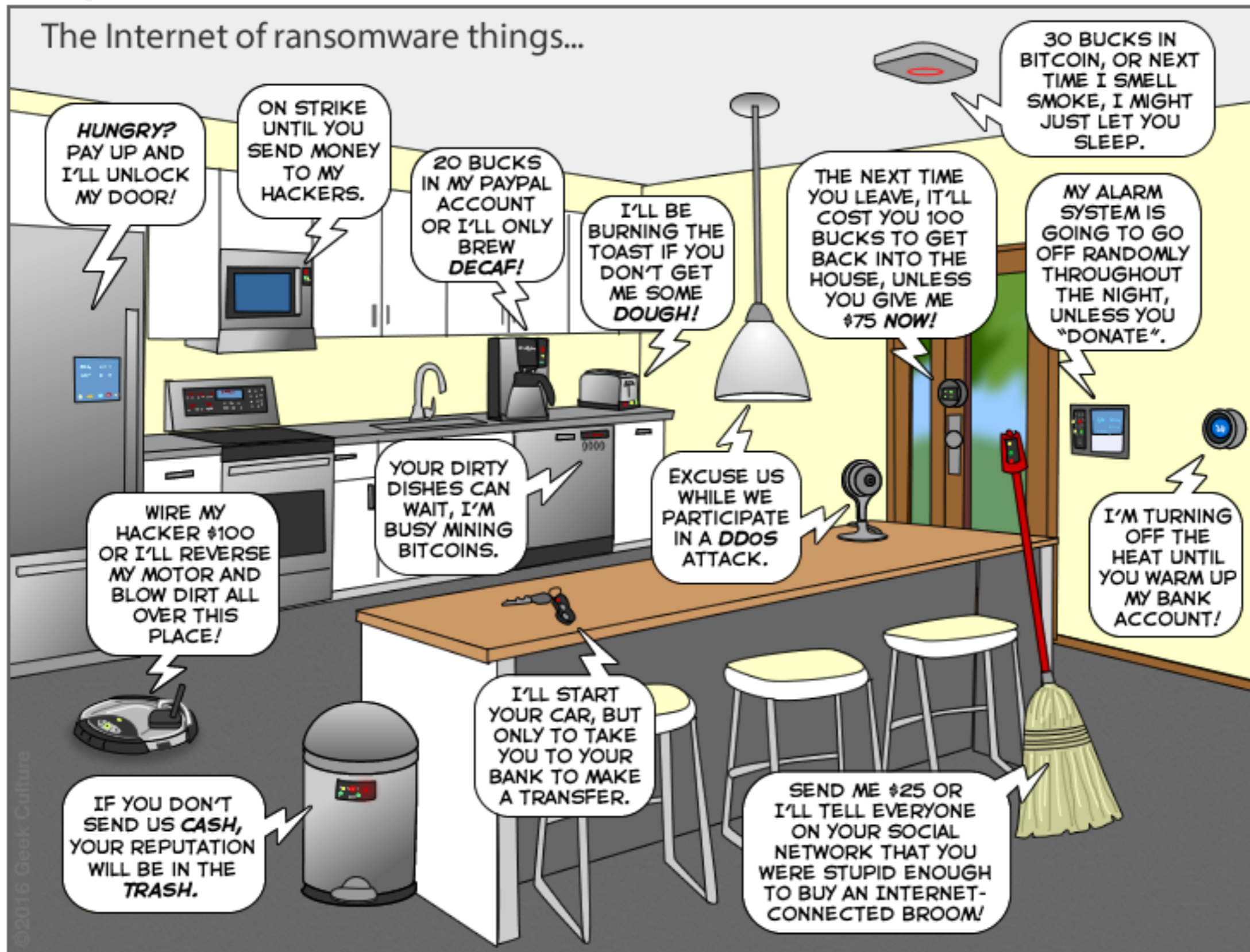


LoRaWANTM

 IOT FACTORY



Max Input: 230 V
© 2010 Philips



elmer.lastdrager@sidn.nl
<https://spin.sidnlabs.nl>

Q&A

<https://spin.sidnlabs.nl>

<https://github.com/sidn/spin>

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