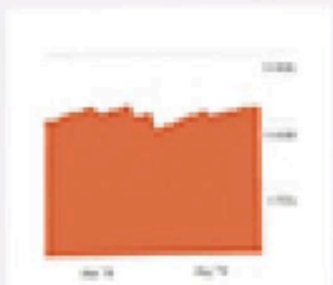
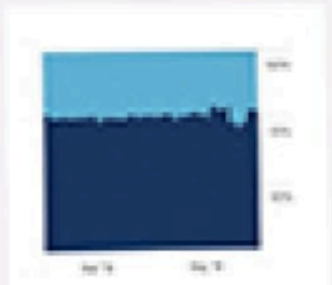
# Securing the Internet of Things

Elmer Lastdrager

*23 May 2019*

# .nl stats and data





# Stichting Internet Domeinregistratie Nederland (SIDN)

**.nl = the Netherlands**
17M inhabitants
5.8M domain names
3.2M DNSSEC-signed
1.5B DNS queries/day

Critical Internet services

- Lookup IP address of a domain name (almost every interaction)
- Domain name registration
- Manage fault-tolerant and distributed infrastructure

“Catalyst” of the Internet in the Netherlands

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

SIDN LABS

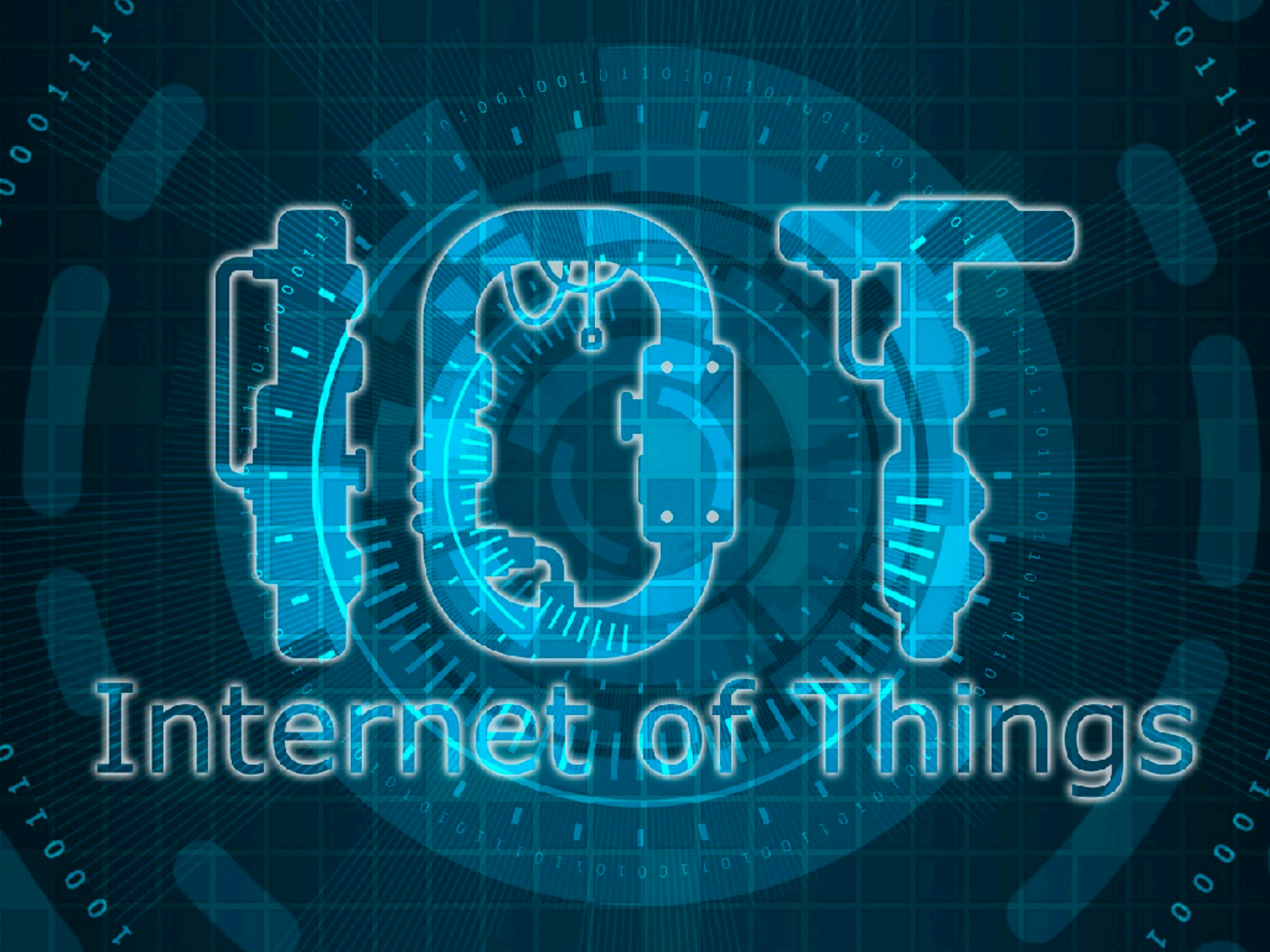
# SIDN Labs

**Goal**: advance operational Internet security and resilience through world-class measurement-based research and technology development

**Research challenges**: core Internet systems and Internet evolution

**Daily work**: help operational teams, write open source software, analyse vast amounts of data, run experiments, write academic papers, work with universities

SIDN LABS

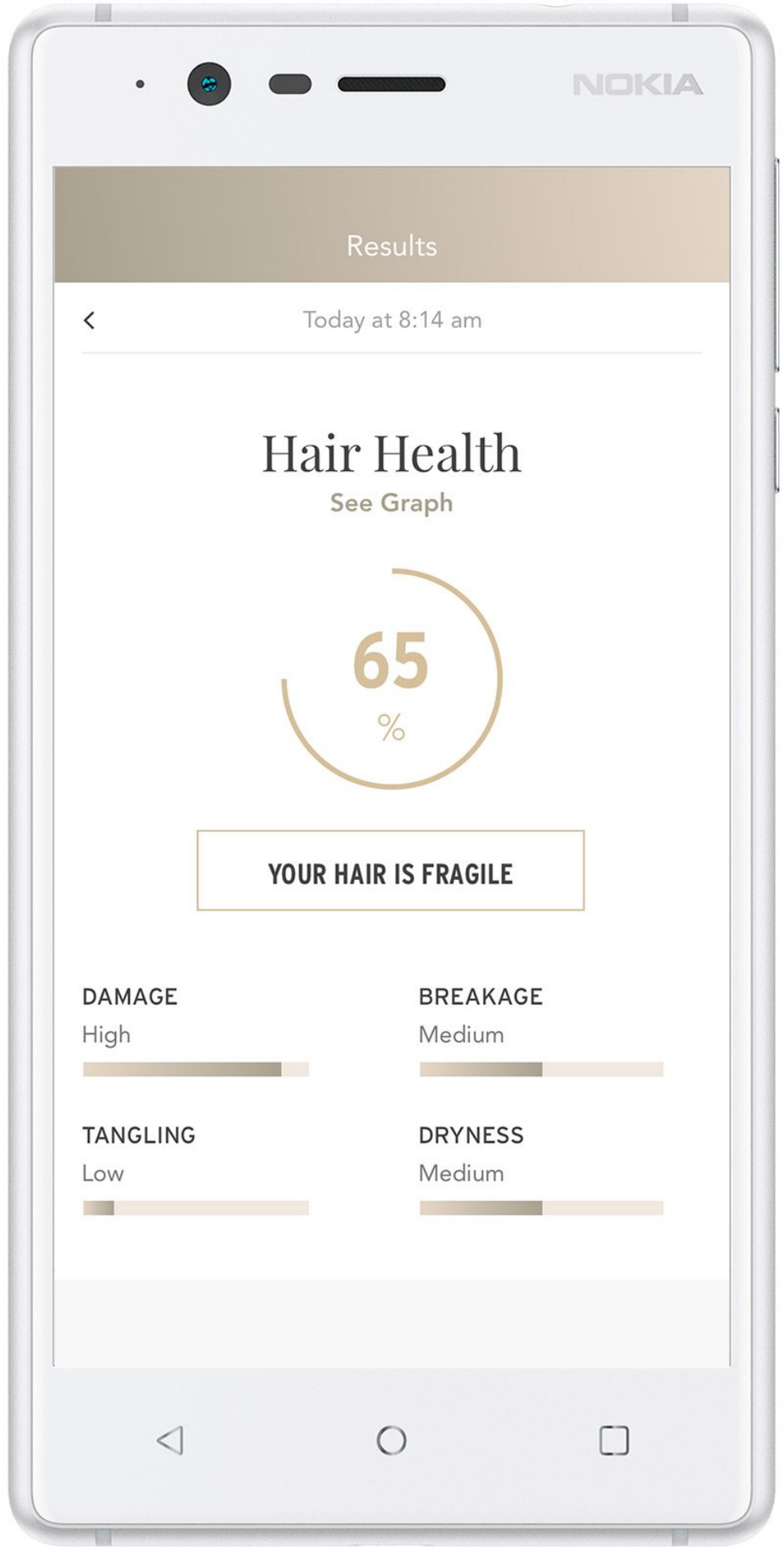

Internet of Things

# Smart Devices

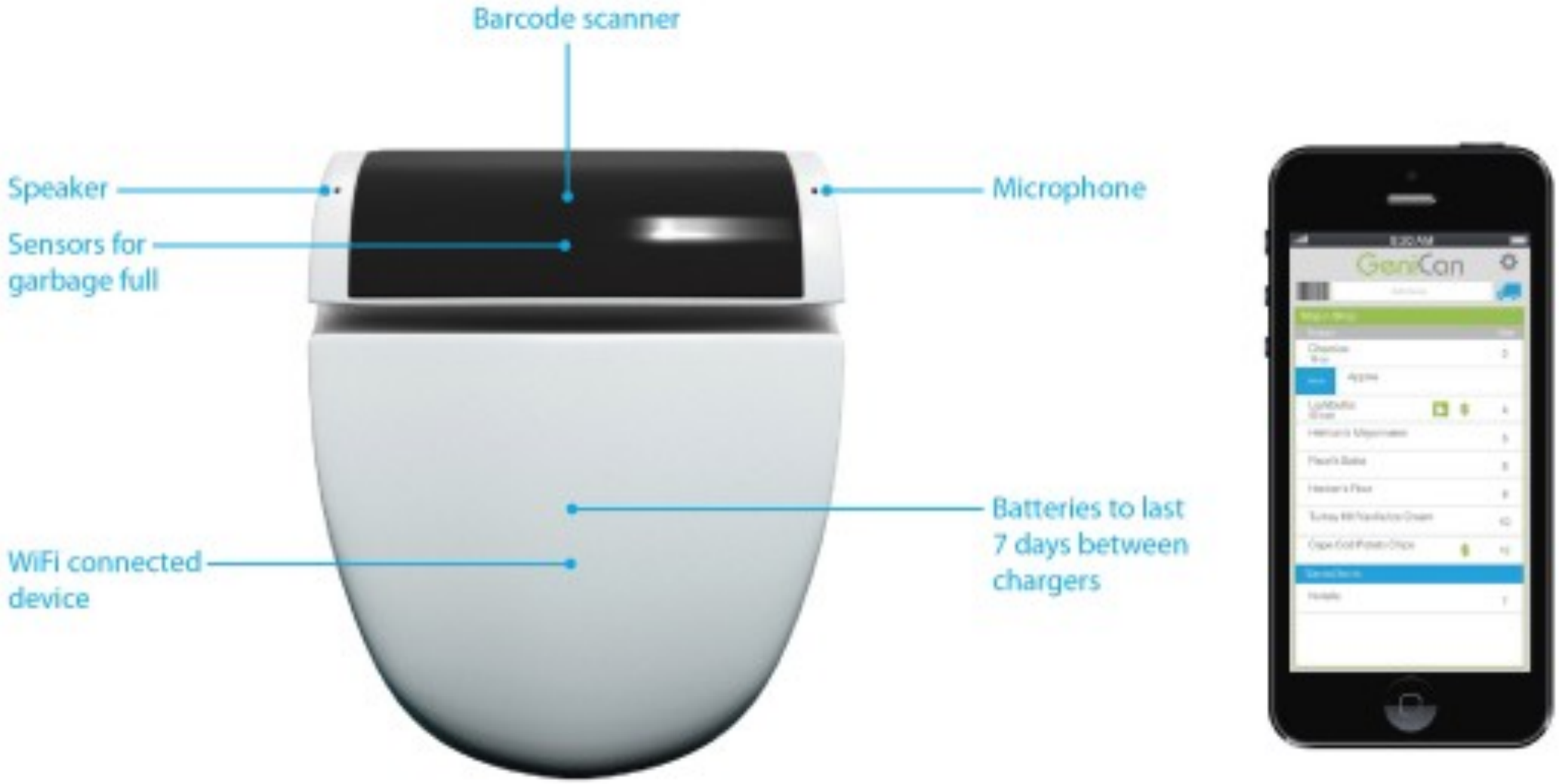
"**A smart device is an electronic device**, [snip], **that can operate to some extent interactively and autonomously.**"

*According to Wikipedia*

KÉRASTASE


NOKIA
Results
Today at 8:14 am
Hair Health
See Graph
65
%
YOUR HAIR IS FRAGILE
DAMAGE
High
BREAKAGE
Medium
TANGLING
Low
DRYNESS
Medium

Success!



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**

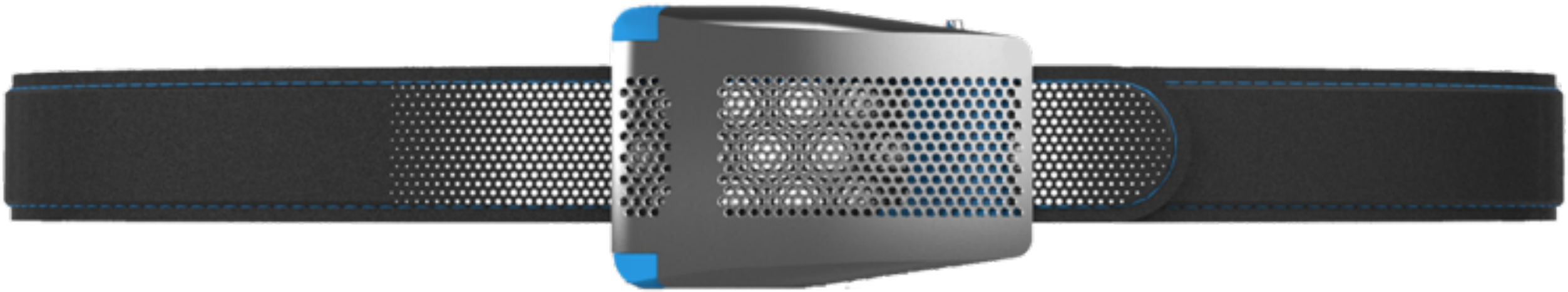
**Através do APP mamães e papais conseguem comprar fraldas sem sair de casa.**

Conheça TweetPee

Como funciona

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

Wonderful
PISTACHIOS



**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.”

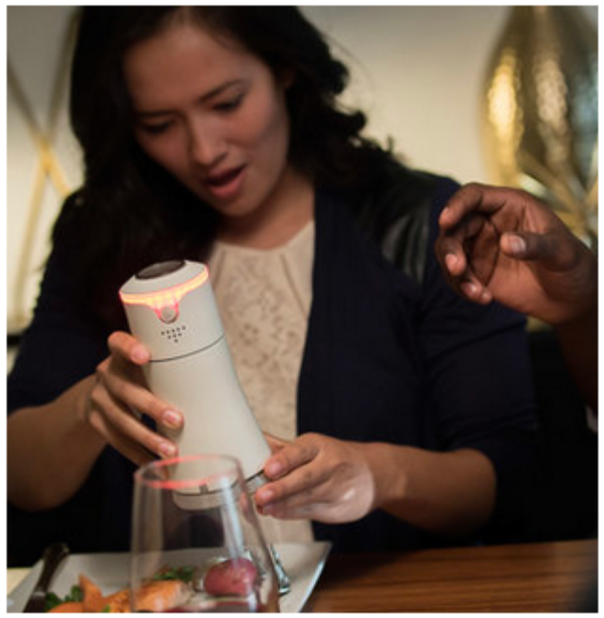
# Welcome to U by Moen

**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.

YOU GET CONNECTED!
AND YOU GET CONNECTED!
EVERYTHING GETS CONNECTED!
imgflip.com

4

# 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)

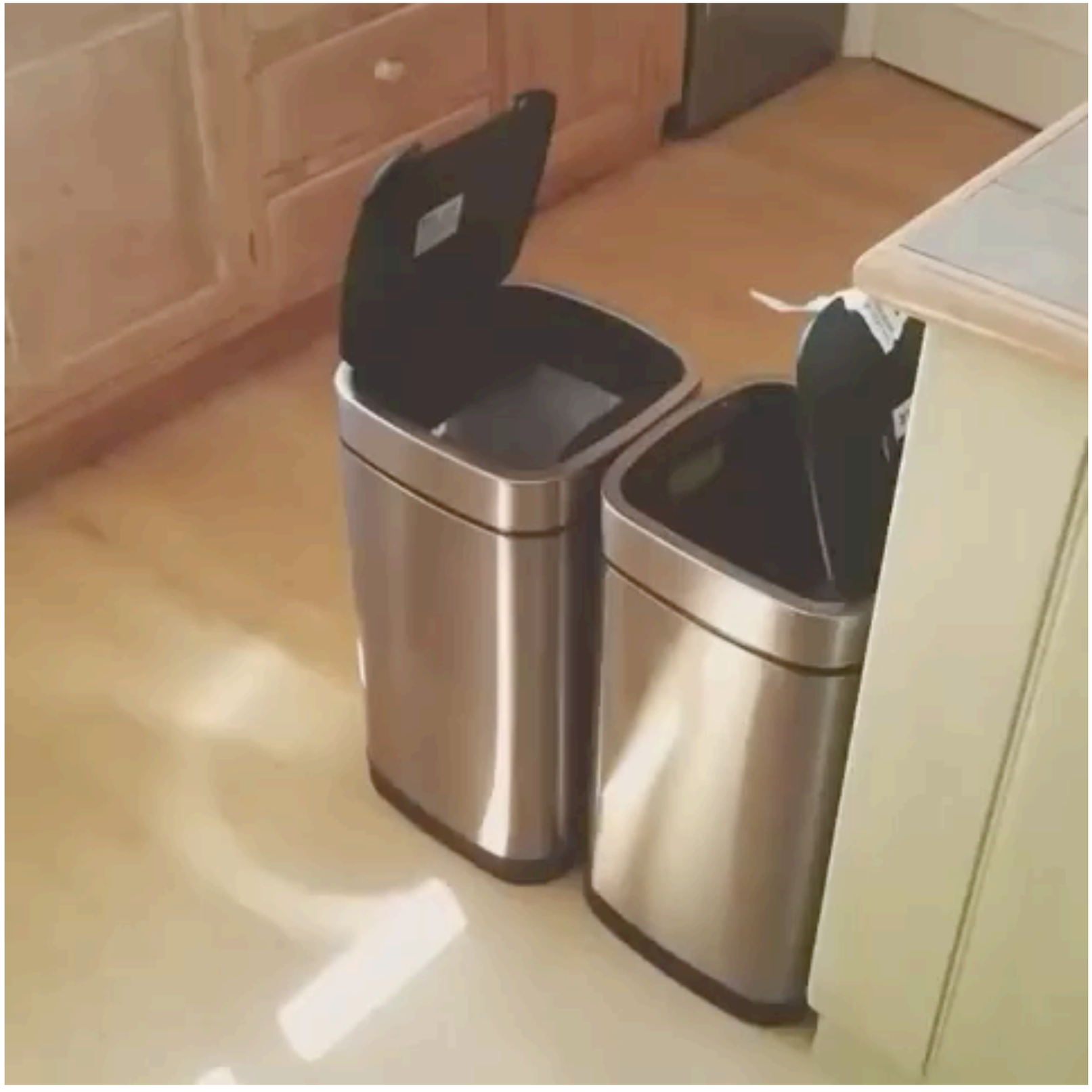
Revision 1 – Published 27 MAY 2015

IEEE Internet Initiative | iot.ieee.org

A simpler definition:

“Stuff that did not use to be networked”

# “*One big mess*”



SLIDESHOW

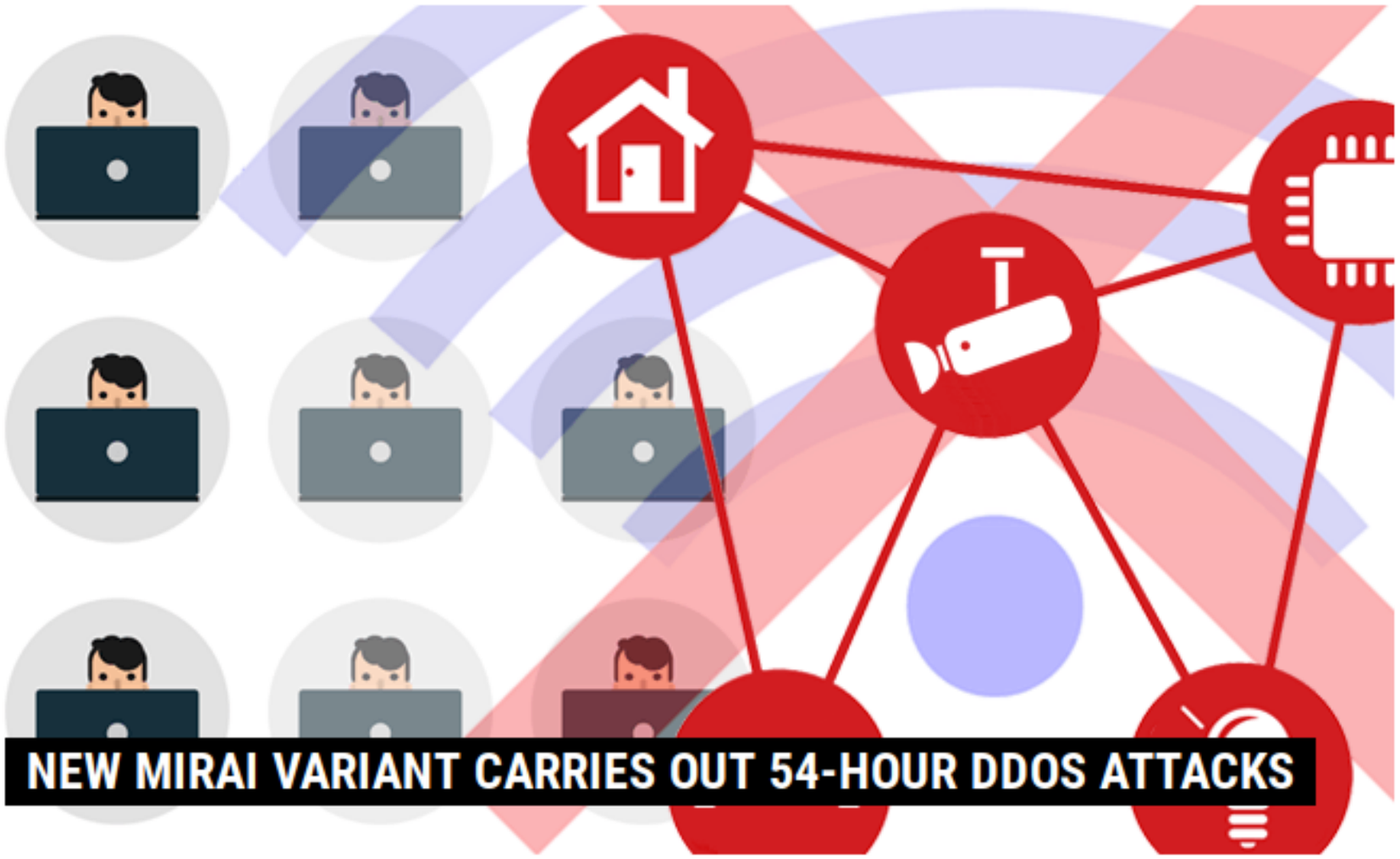
# The internet of insecure things: Thousands of internet-connected devices are a security disaster in the making

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




by **Tom Spring**

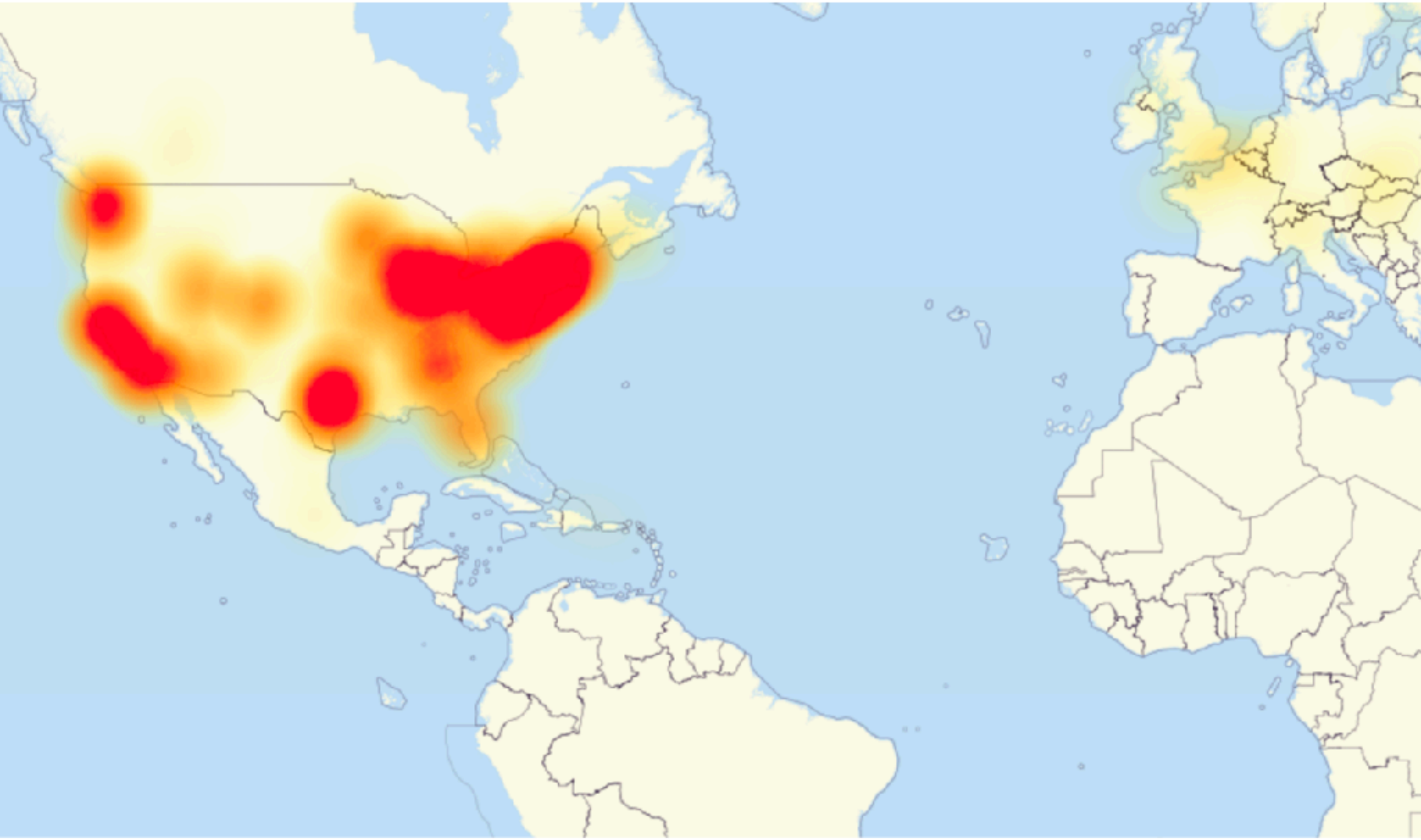
March 30, 2017 , 2:50 pm

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

# 1.2 Tbps

## From ‘only’ 100.000 devices



The Economist

APRIL 8TH-14TH 2017

The Pearl river delta: a special report

Hospitals of the future

Jacob Zuma must go

Parking, wrong on so many levels

# Why computers will never be safe

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

# 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

**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.

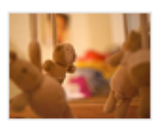
NEWS ANALYSIS

# 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

Free **secure** software stacks

Empower users

International policy, regulation, certification

Quarantine bad actors (e.g. at ISP)

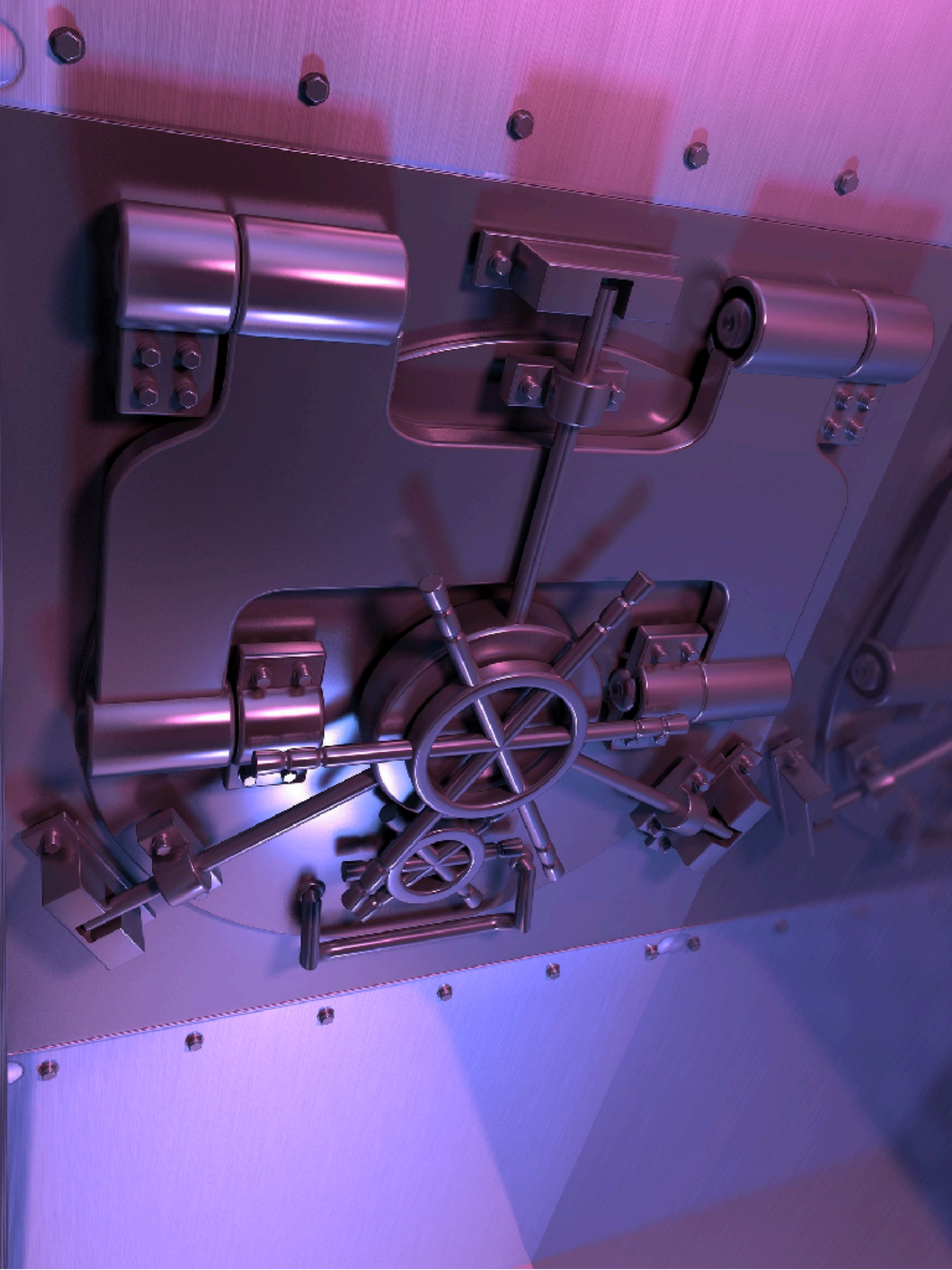
Generate market demand for secure products

Clear up accountability issues

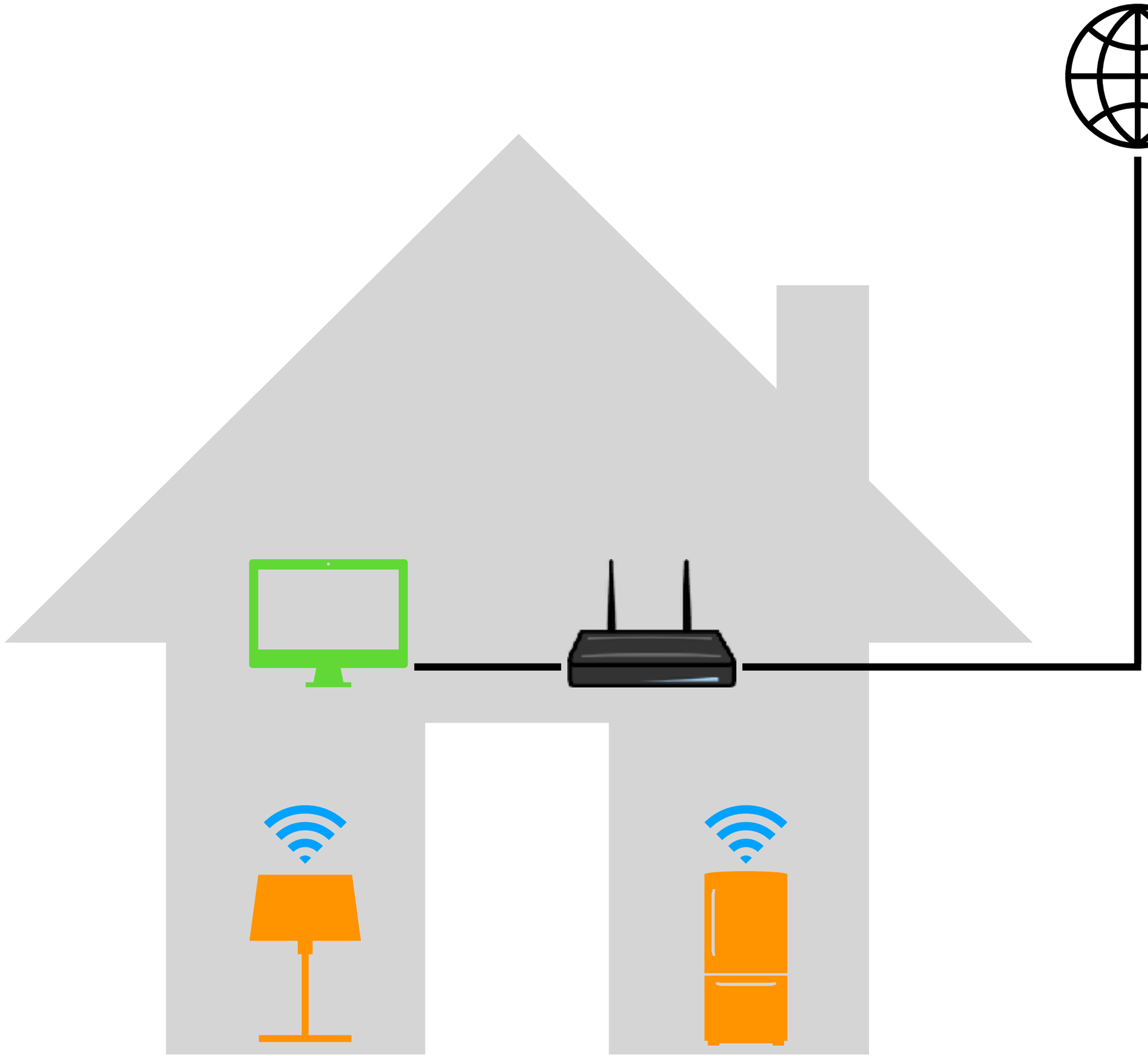
Quarantine bad actors (e.g. at ISP)

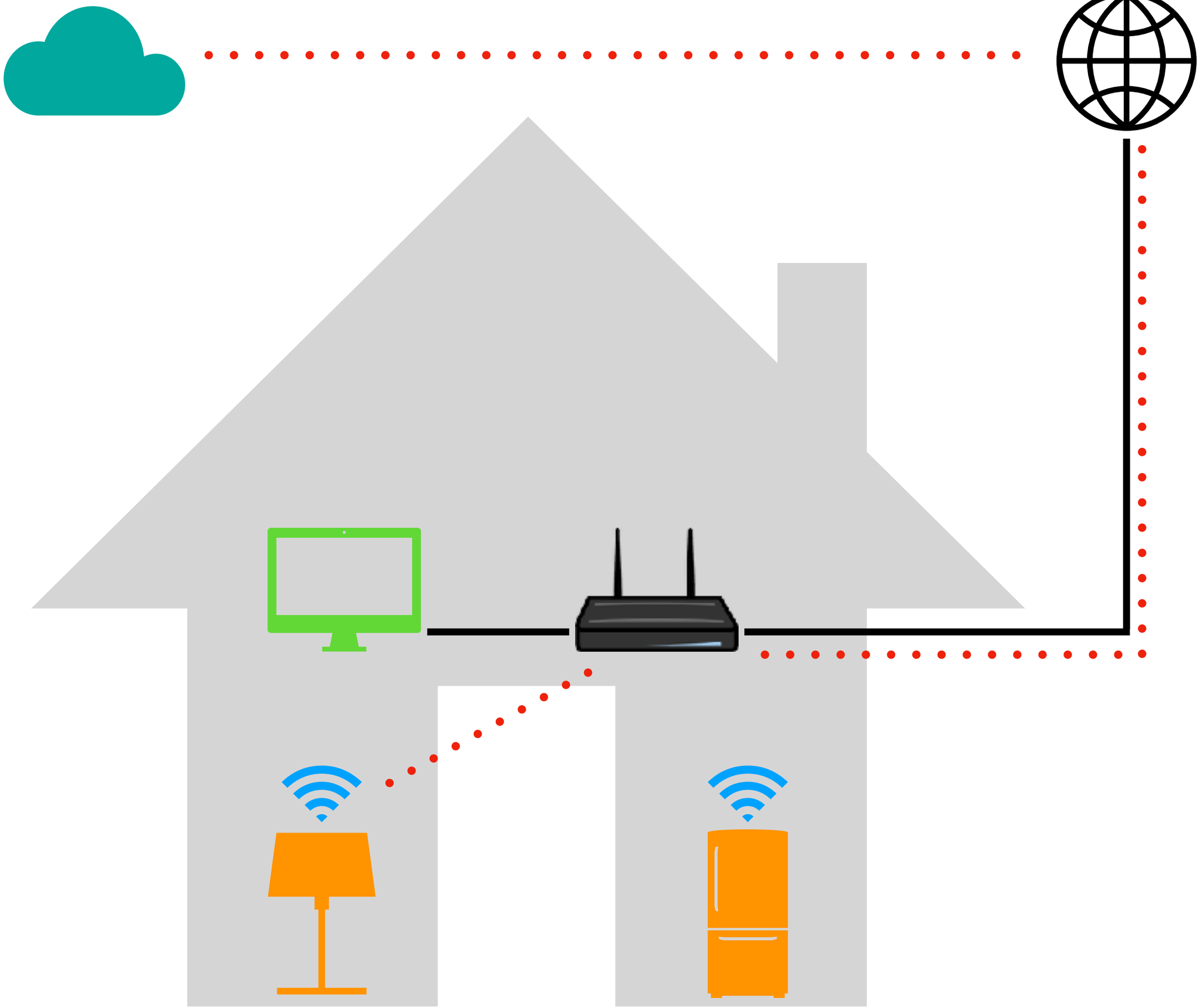
Educate users

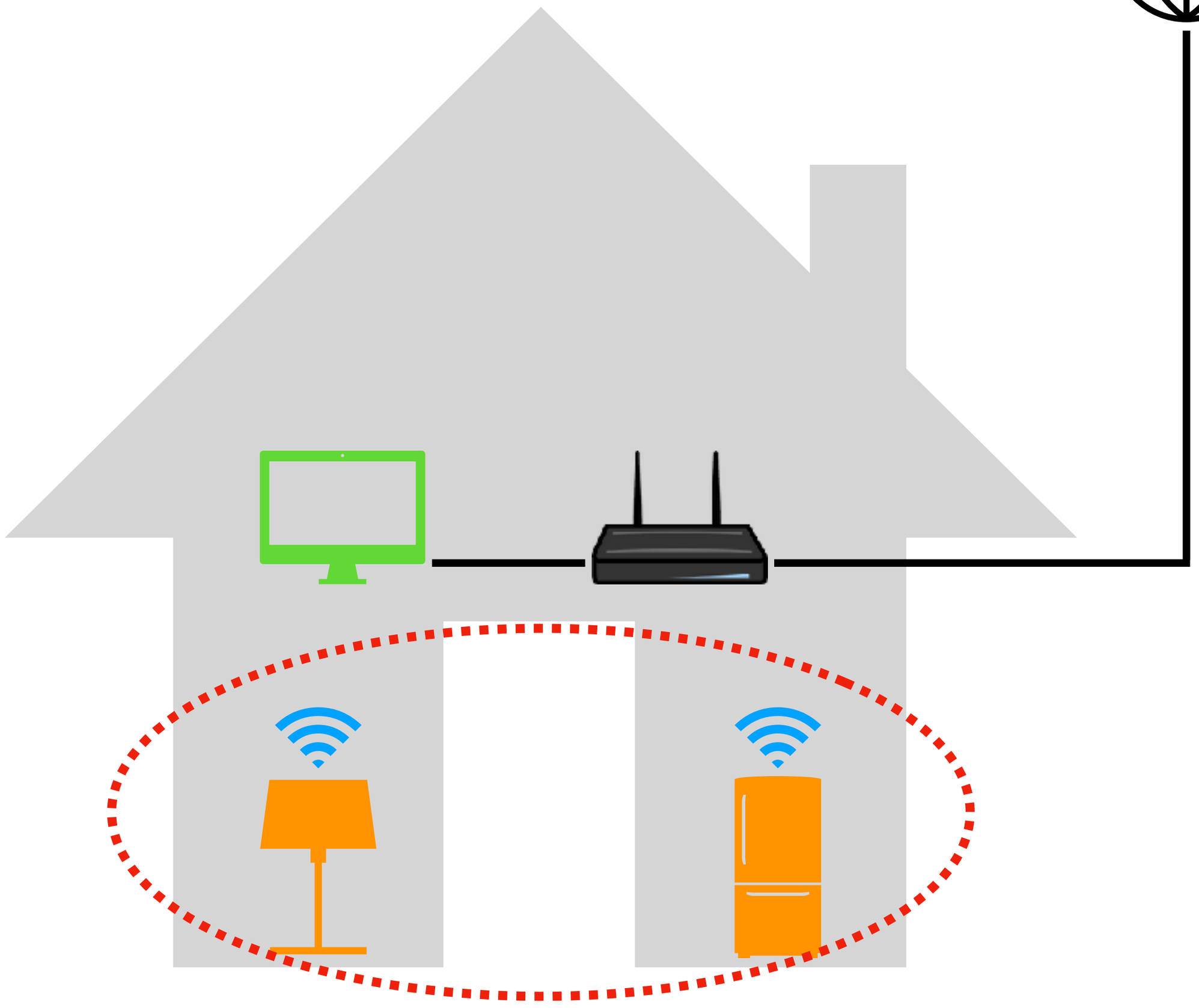
Better practices for manufacturers

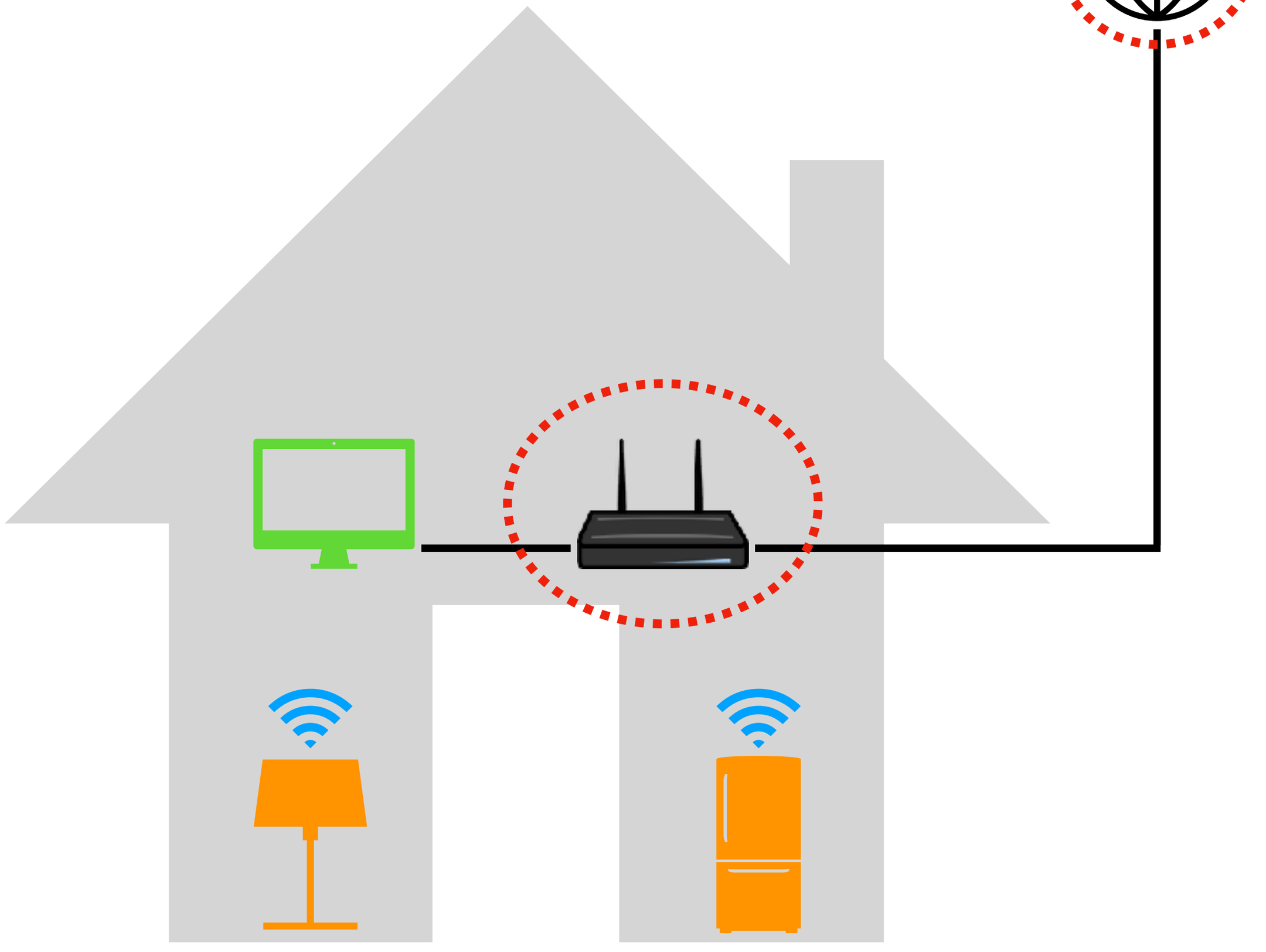


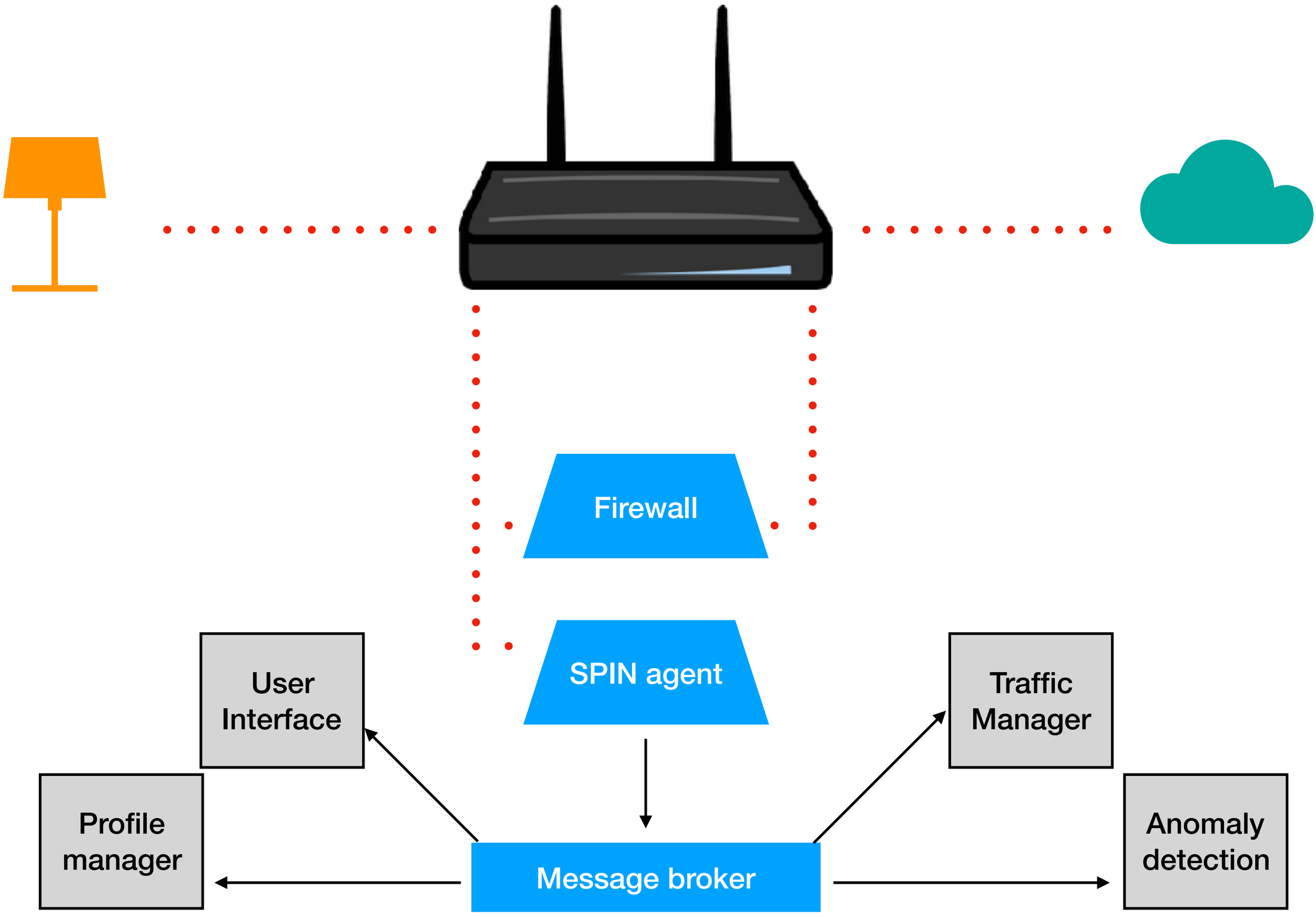
DETECT SMOKE AND CO
CONTROL SWITCHES AND OUTLETS
CONTROL LIGHTING
CONTROL SHADES AND BLINDS
ADJUST CLIMATE
21
UNLOCK AND LOCK DOORS
OPEN AND CLOSE GARAGE DOORS
MONITOR YOUR HOME

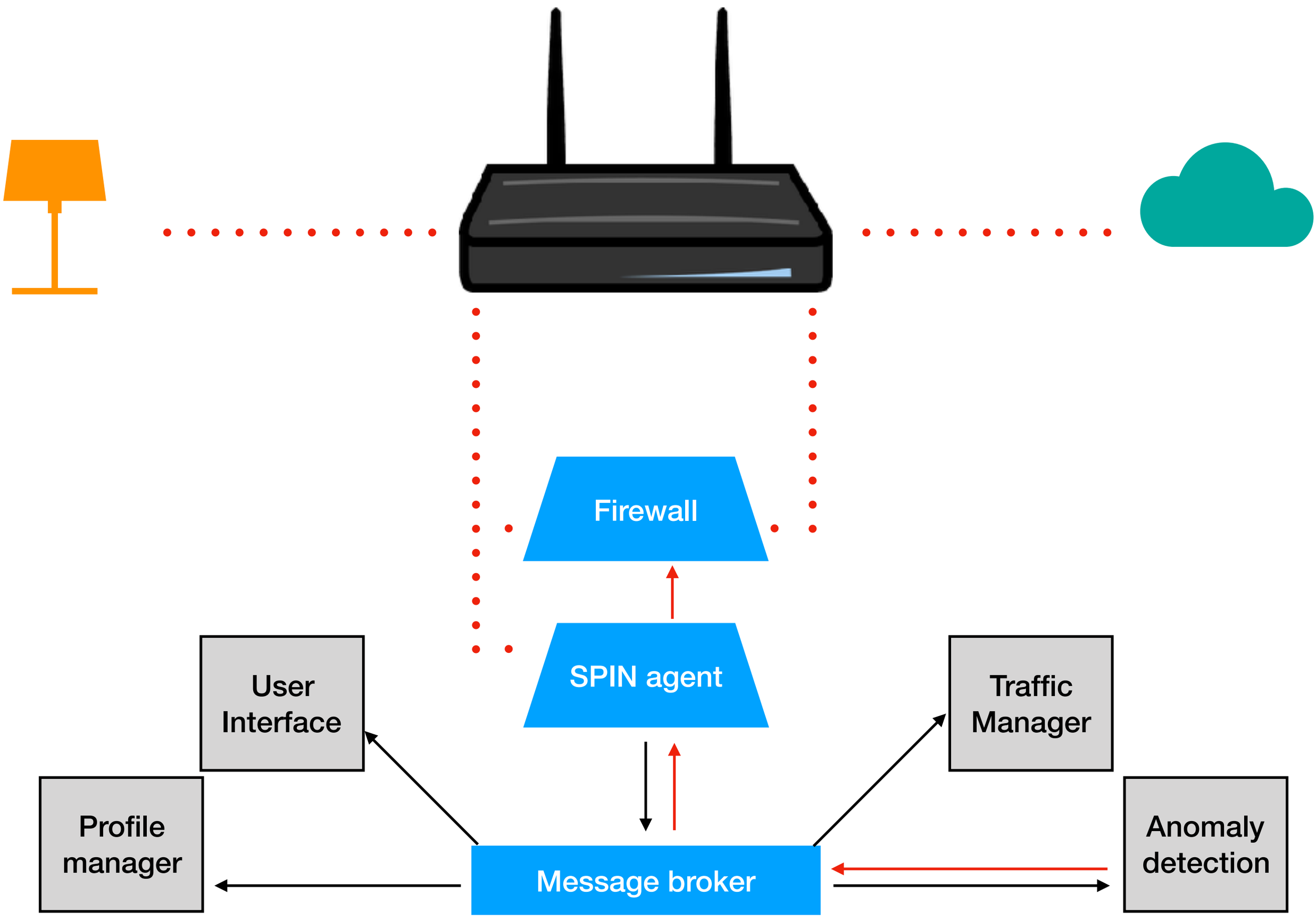









Firewall
SPIN agent
User Interface
Traffic Manager
Profile manager
Message broker
Anomaly detection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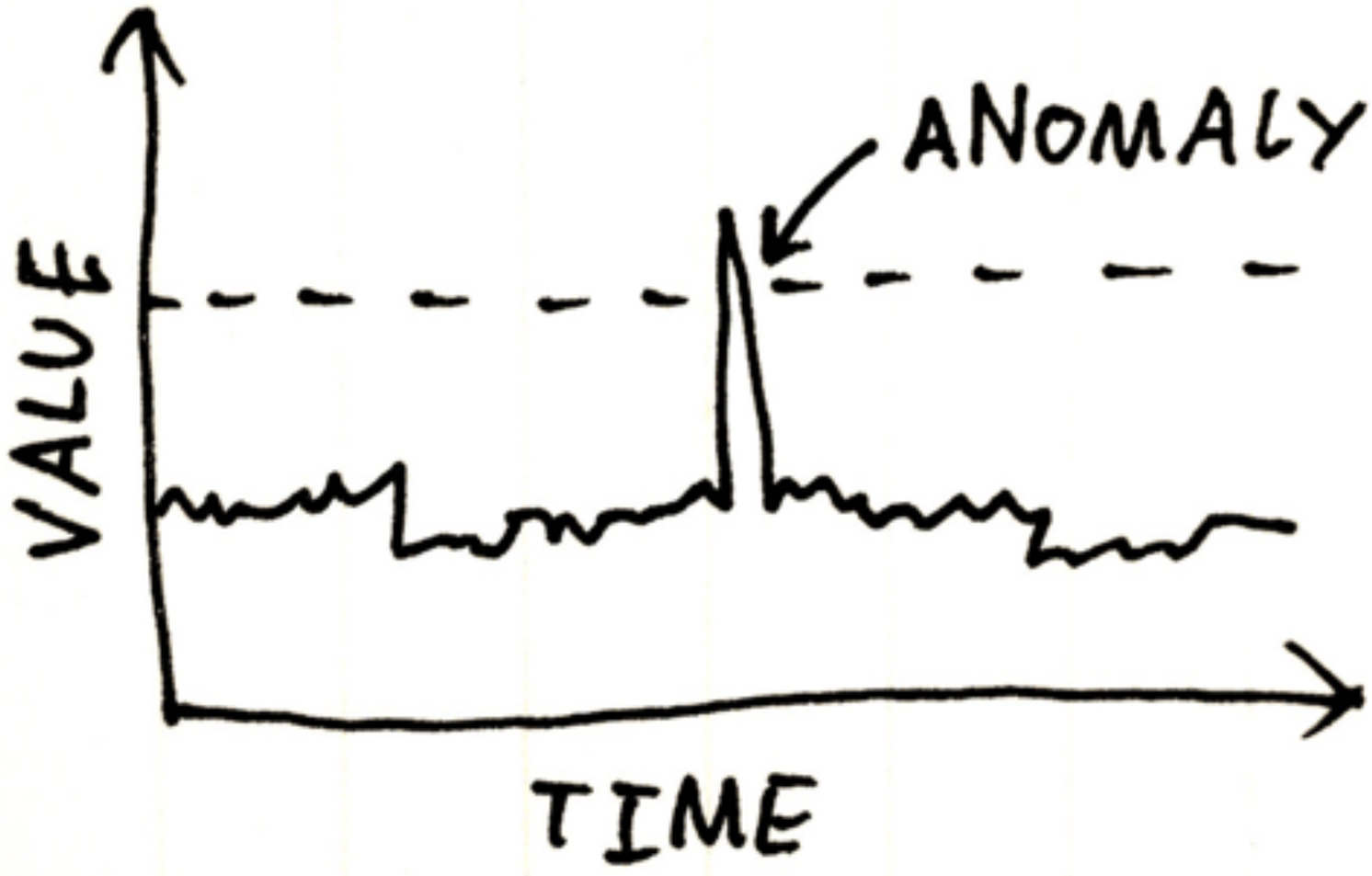
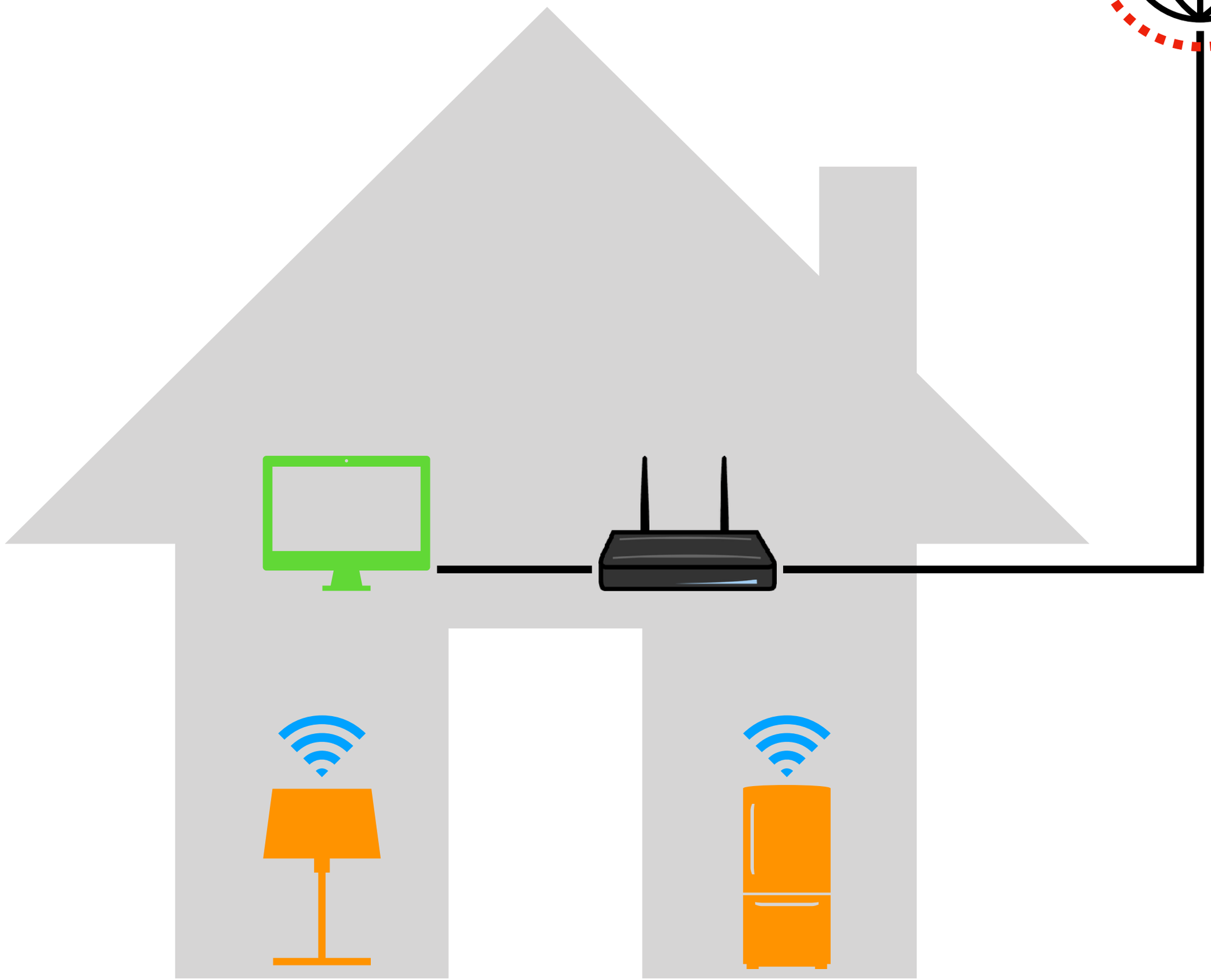
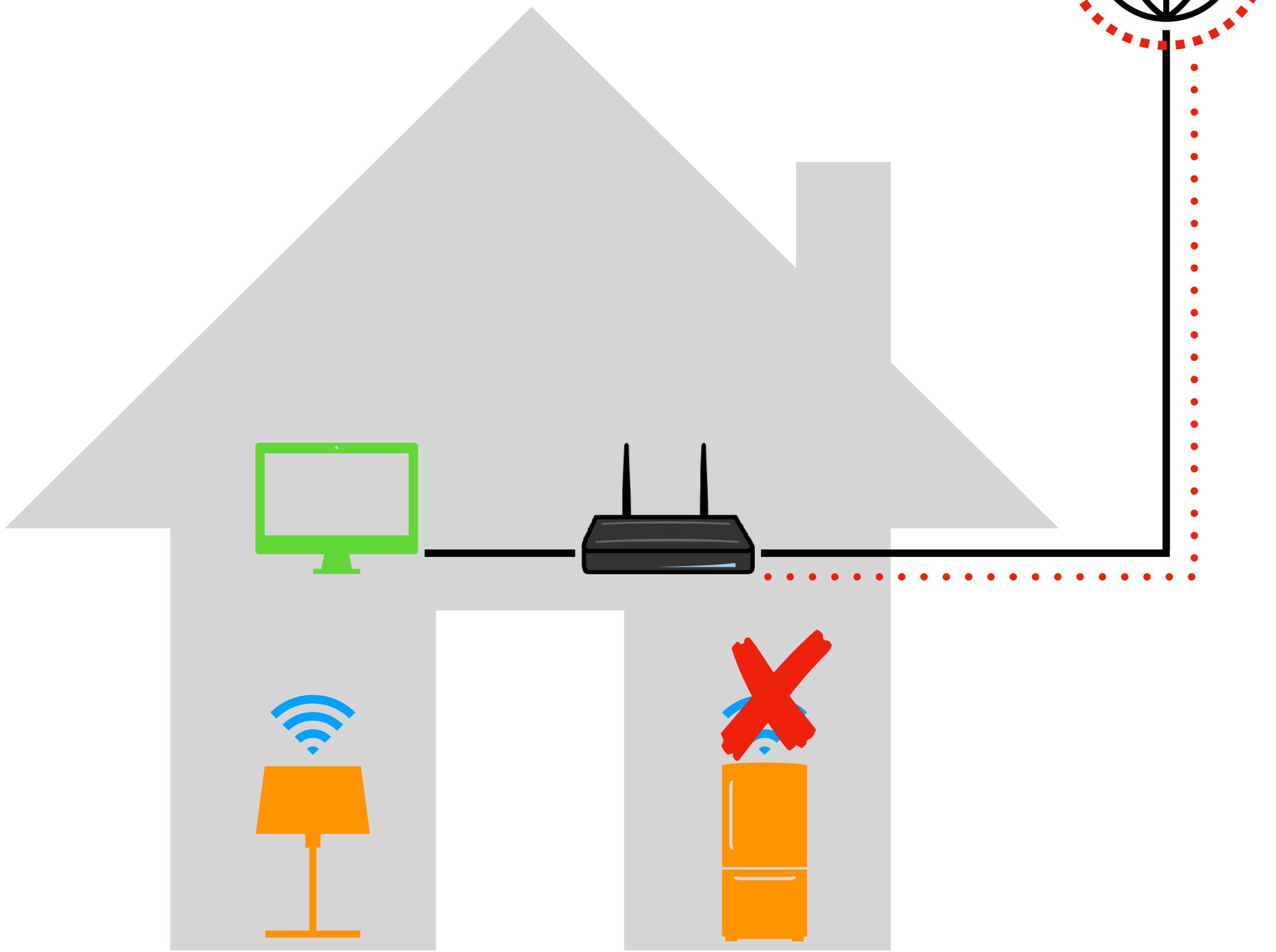

ANOMALY
VALUE
TIME



# CAUTION

# KEEP OUT

# QUARANTINE



# Demo

THE TECHNOLOGY DEMO
THE SOFTWARE ISN'T 100% COMPLETE.
IF IT HAD A USER INTERFACE YOU WOULD SEE SOMETHING HERE... HERE...AND SOMETIMES HERE.
AND THEN YOU'D BE SAYING, "I GOTTA GET ME SOME OF THAT."
ANY QUESTIONS?
scottadams@aol.com
www.dilbert.com
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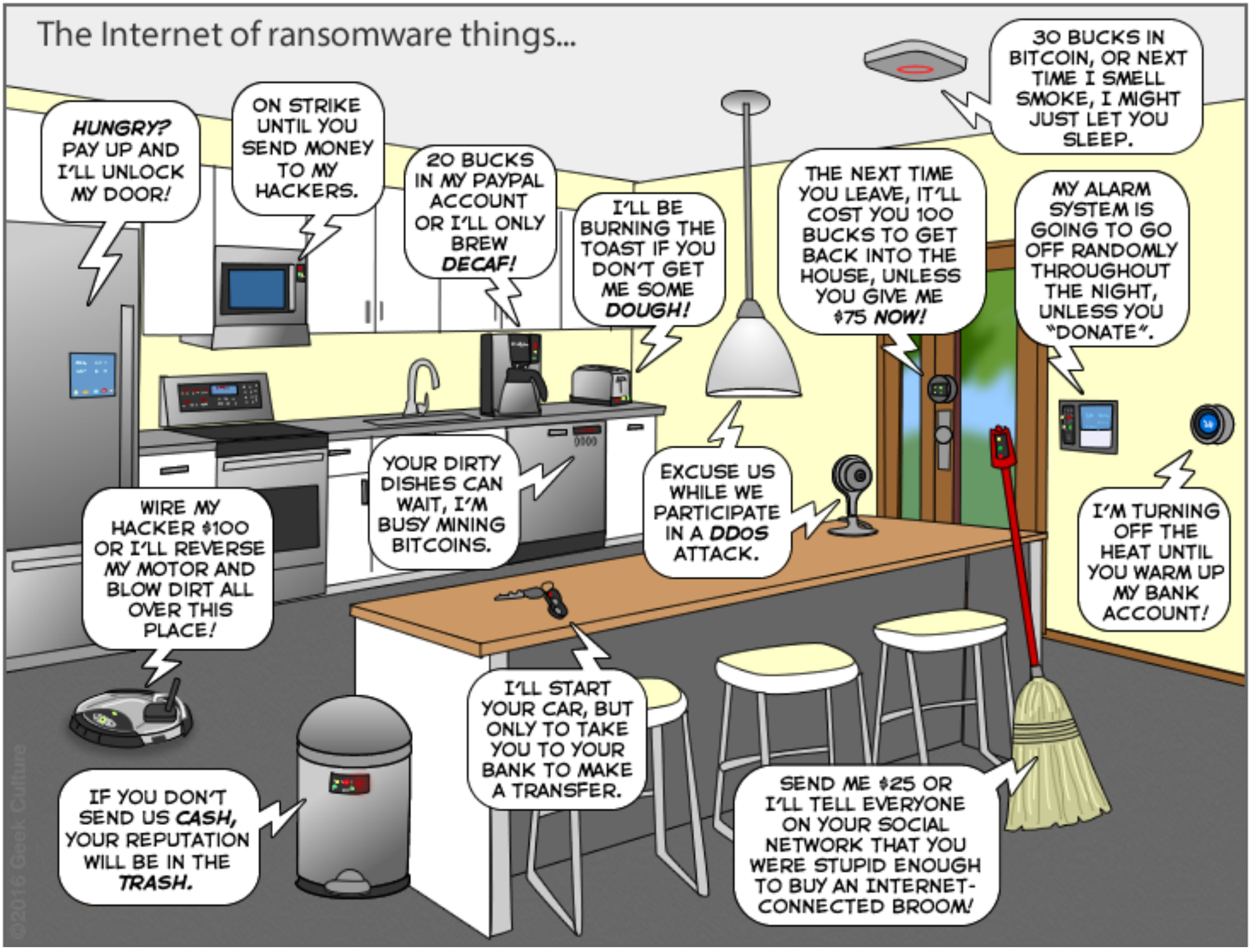
roqos

The Joy of Tech™ by Nitrozac & Snaggy

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