

# An Empirical Characterization of IFTTT Ecosystem, Usage, and Performance

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# Outline

What is IFTTT

Why is IFTTT

How IFTTT Works

How IFTTT Evolves

How IFTTT Performs

What We can Learn

# What is IFTTT

**IFTTT**

**if**  **this** **then that**

**User**

Define, Run and Publish **IF This Then That**  
Workflows Called **Applets**

**Service  
Provider**

Configure and Publish **Services** Consisting of  
**Triggers** and **Actions**

# What is IFTTT: Applets



## Google Home Find My Phone

When you ask Google home to find your phone it turns the ringer to 100% and places a VOIP call through IFTT.

by sss90

Turn on

This Applet uses the following services:

- Google Assistant**  
Say a simple phrase
- Android Device**  
Set ringtone volume
- VoIP Calls**  
Call my device

8.7k

works with



## Save new photos you're tagged in on Facebook to Google Photos

An easy way to download and save pictures that you're tagged in on Facebook. Every time that you're tagged, a copy of the photo will be saved in a Google Photos folder.

by IFTTT

Turn on

This Applet uses the following services:

- Facebook**  
You are tagged in a photo
- Google Photos**  
Upload photo to album

21k

works with



## When it's bedtime, turn off WeMo Switch

Select a time that you normally go to bed and your lights will let you know it's time to go to sleep.

by nickhamm

Turn on

This Applet uses the following services:

- Date & Time**  
Every day at
- WeMo Smart Plug**  
Turn off

8.6k

works with



## Tell Alexa to start the party with a Hue light color show

When you say "Alexa, trigger party time" your lights will be set to color loop.

by Philips Hue

Turn on

This Applet uses the following services:

- Amazon Alexa**  
Say a specific phrase
- Philips Hue**  
Turn on color loop

20k

works with

# Why IFTTT

Diverse

400+ service providers, half are IoT related

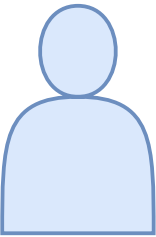
Popular

300K applets, 24-million adoptions

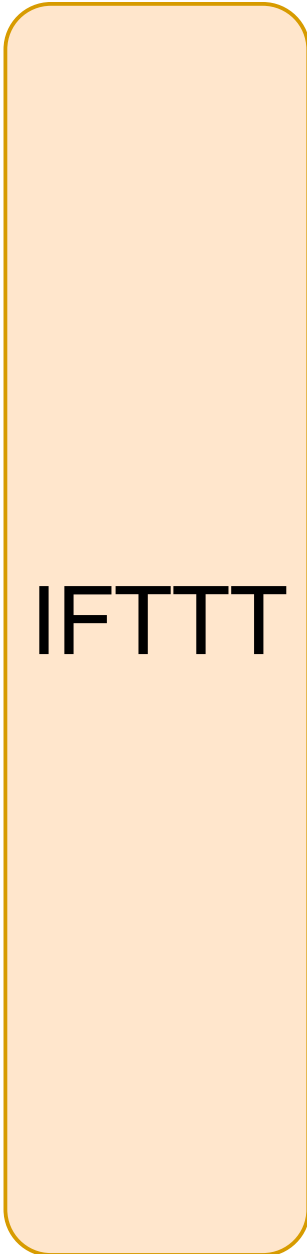
Emerging

How it works, How well it works

# How IFTTT Works



Set up  
an Applet



Request Trigger Events

Return Trigger Events

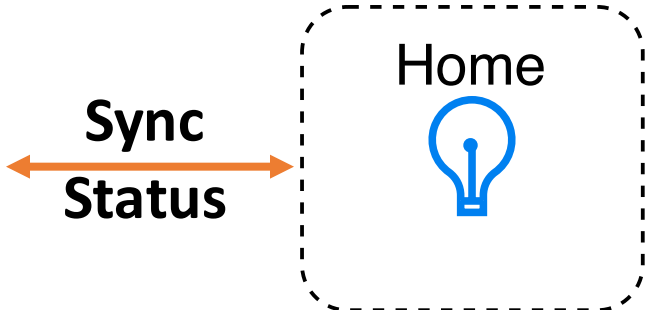
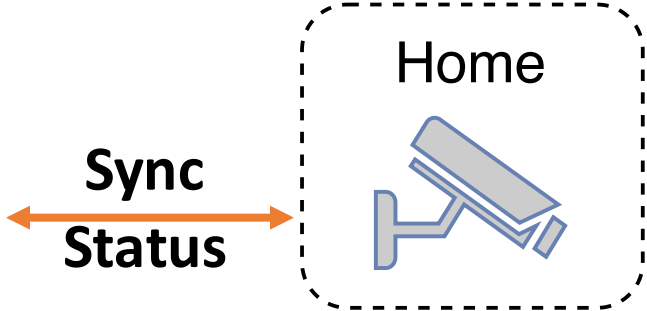
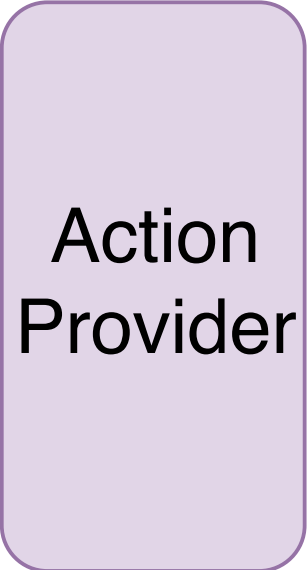
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Request Trigger Events

Return **New**  
Trigger Events

Send Action Request

Return Action Result



Sync  
Status

Sync  
Status

# How IFTTT Works

IFTTT

RESTful Web APIs + Shared Token

Service

Service

Transparent to IFTTT and Users

Device

User

Issue and Revoke OAuth to IFTTT

Service

# How IFTTT Evolves: Methodology

## Crawl

We crawled IFTTT every week for its services and applets between Nov 2016 and May 2017

## Dataset

Overall, we crawled **200G** data and we have open sourced it on [our project website](#).

## Measure

Service categories and distribution, IoT usage, applet properties.



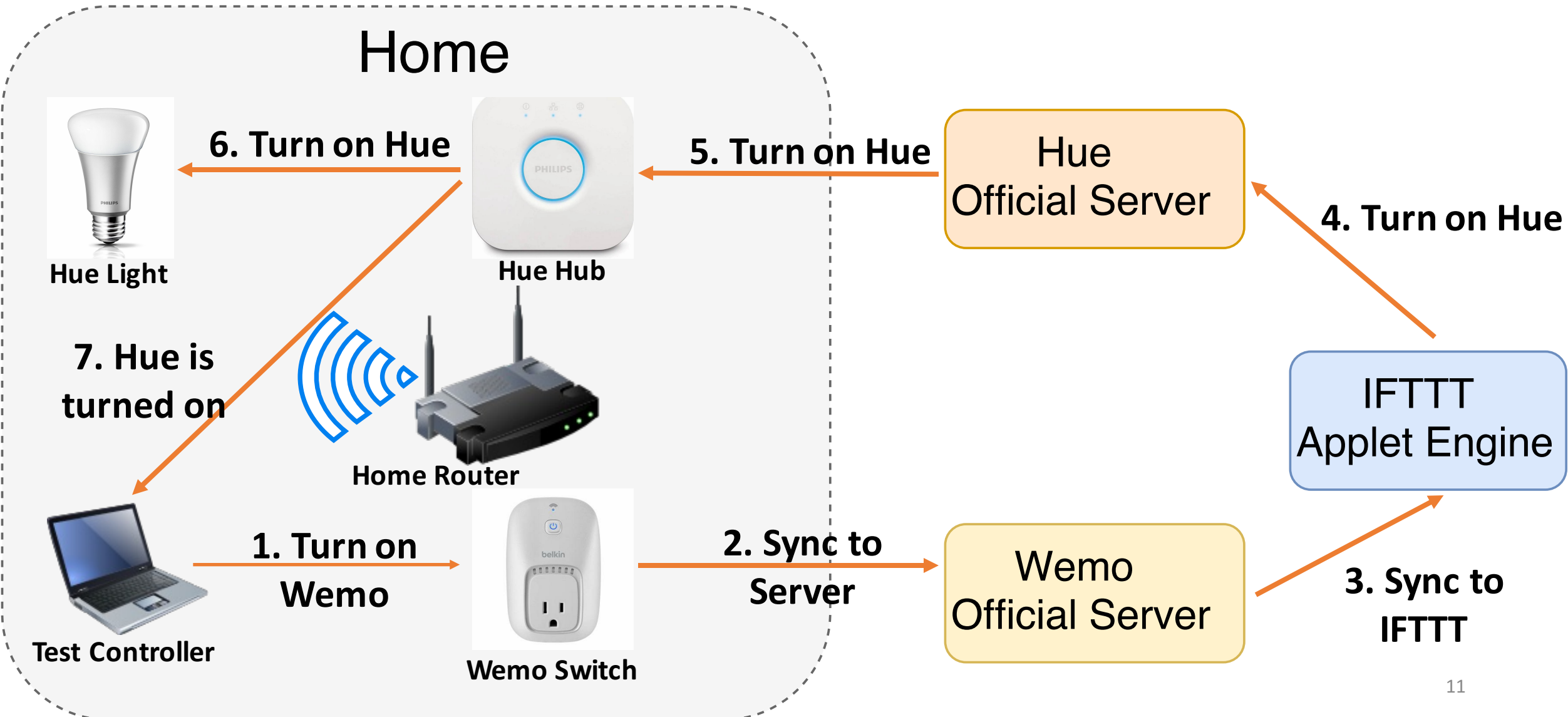
# How IFTTT Evolves: Statistics

Aspect	Sep 2015	Apr 2017
Services	220	408
Triggers	768	1490
Actions	368	957
Applets	224K	320K
Applet Contributors	106K	135K
Adoptions	12 millions	24 millions

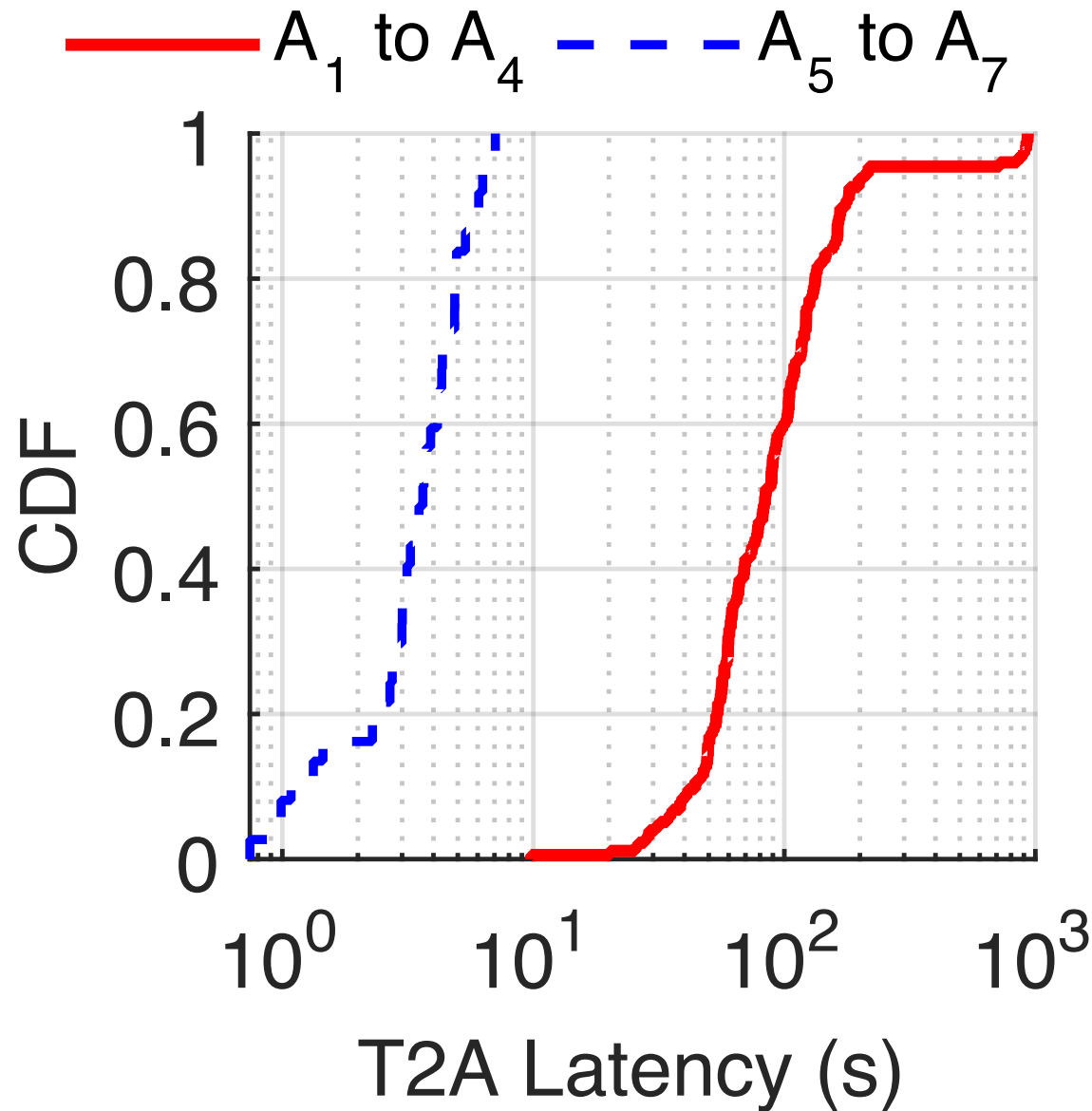
# How IFTTT Performs: Applet Selection

A1	IF	Wemo Switch	is turned on	THEN	Turn on	Hue Light
A2	IF	Wemo Switch	is turned on	THEN	Add line to	Google Spreadsheet
A3	IF	Gmail	gets a email	THEN	Blink	Hue Light
A4	IF	Gmail	gets new attach	THEN	Save to	Google Drive
A5	IF	Amazon Alexa	gets a voice CMD	THEN	Turn off	Hue Light
A6	IF	Amazon Alexa	gets a voice CMD	THEN	Turn on	Wemo Switch
A7	IF	Amazon Alexa	plays a song	THEN	Add line to	Google Spreadsheet

# How IFTTT Performs: End2End Latency



# How IFTTT Performs: End2End Latency



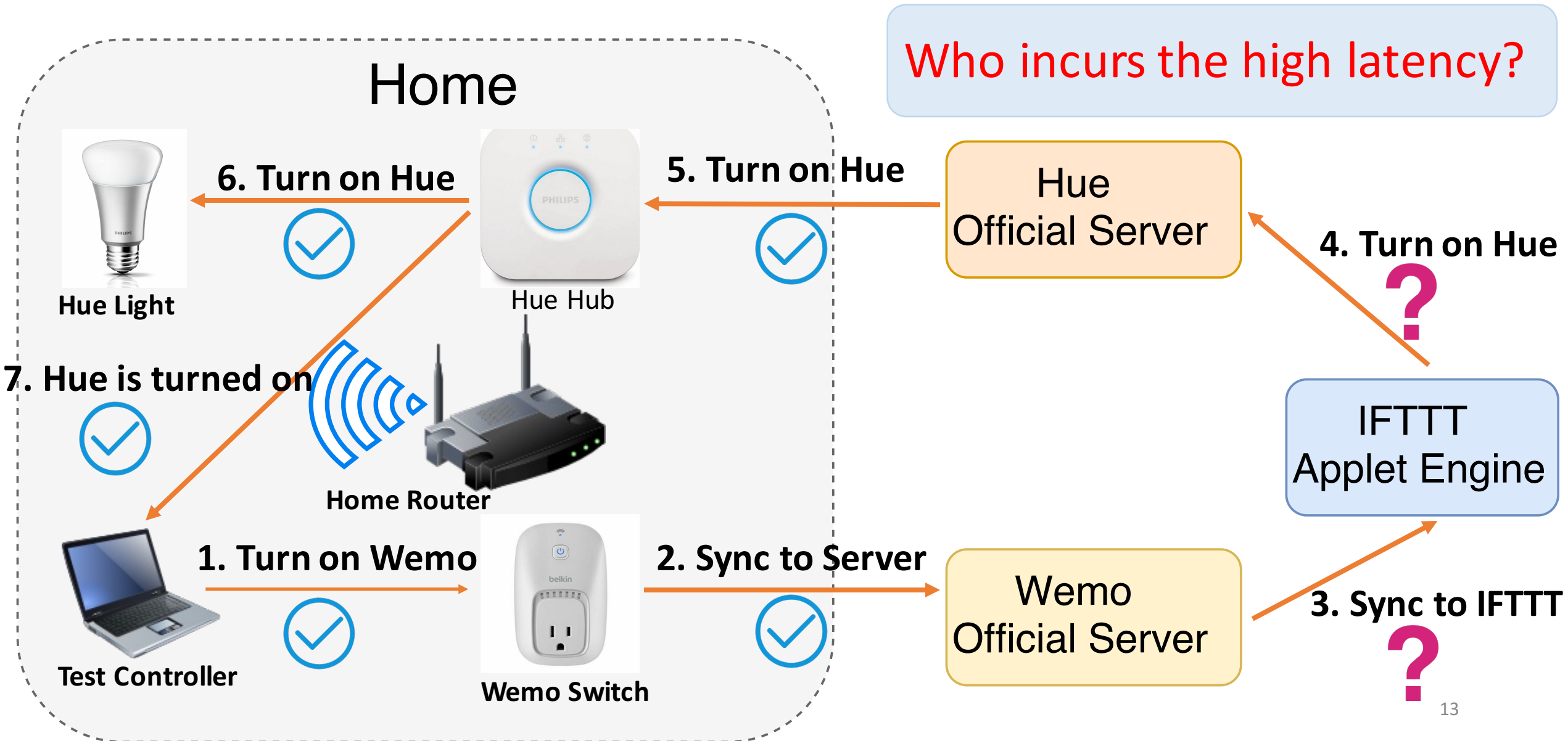
Each applet is tested 50 times at different hours of a 3-day period.

A1-A4 show **large** and **highly variable** latency.

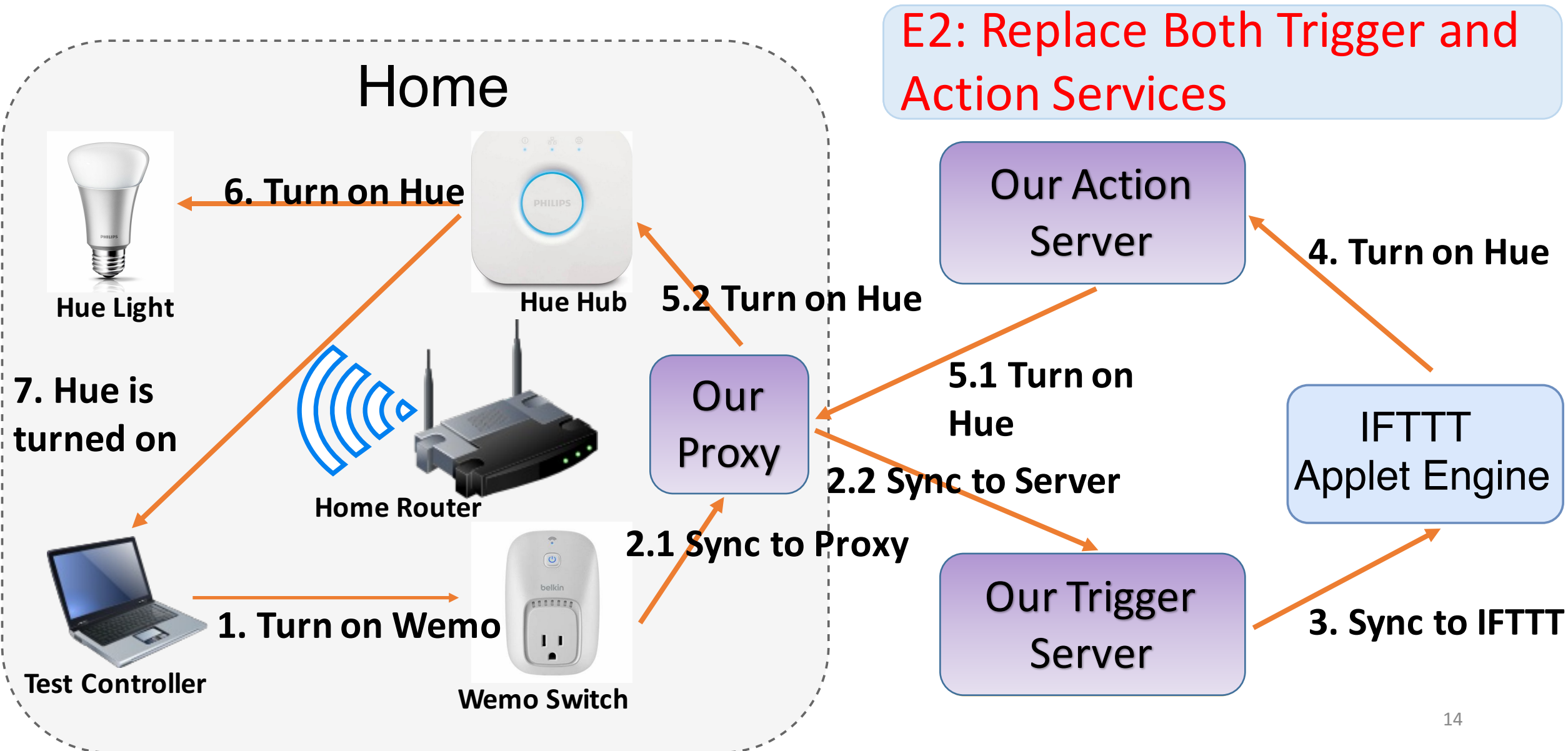
25<sup>th</sup>: 58s, 50<sup>th</sup>: 84s, 75<sup>th</sup>: 122s

A5-A7 involve Amazon Alexa whose applet execution seem to be specially customized.

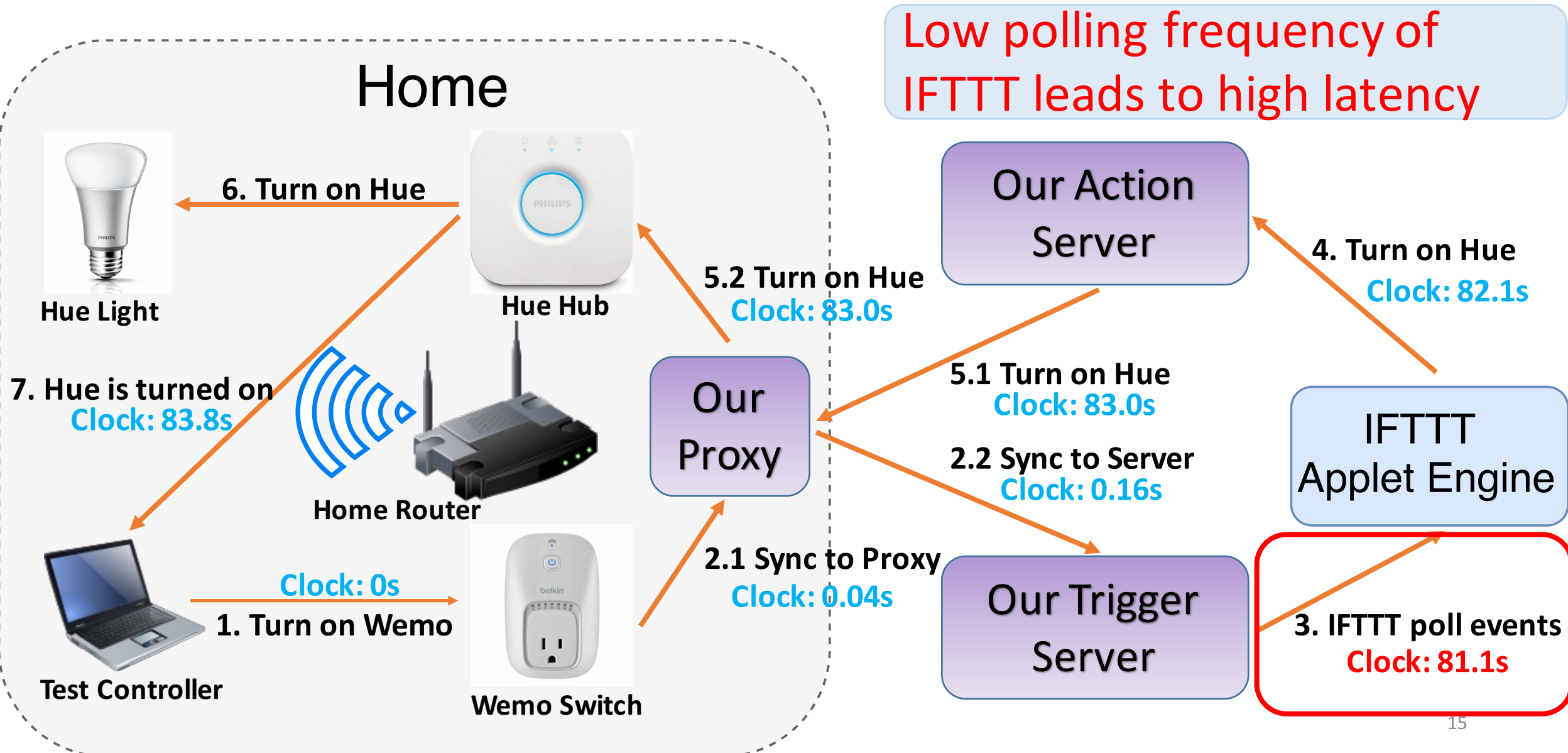
# How IFTTT Performs: Identify Bottlenecks



# How It Performs: Identify Bottlenecks



# How It Performs: Identify Bottlenecks



# Discussion: Performance

## Low Polling

Low polling frequency is not suitable for time-sensitive workflows.

## High Polling

High polling frequency will add untenable pressure to the server side.

## High Polling

Adoptions: 24 millions, Frequency: 20/min  
**Polls/Day: 691.2 billions**



# Discussion: Performance

**Push**

Intuitively works, requires various service providers to support subscription

**Edge Computing**

Deploy workflow engines in edging or local environment: security issues

**We need a more **Efficient** and **Responsive** Solution**

# Discussion: Security

## Least Privilege

Least Privilege rule is broken.  
IFTTT requires max privileges for each service.

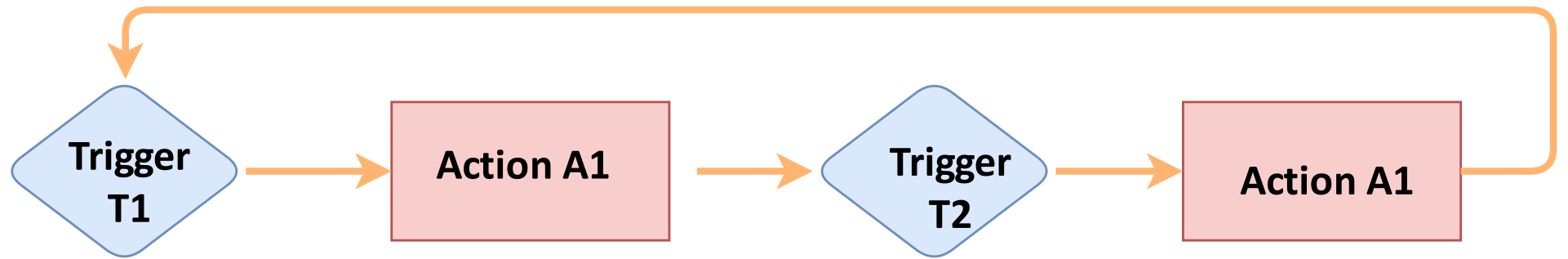
## Binding

Privilege authorization is not binding to specific applets and is valid even if no applets require it.

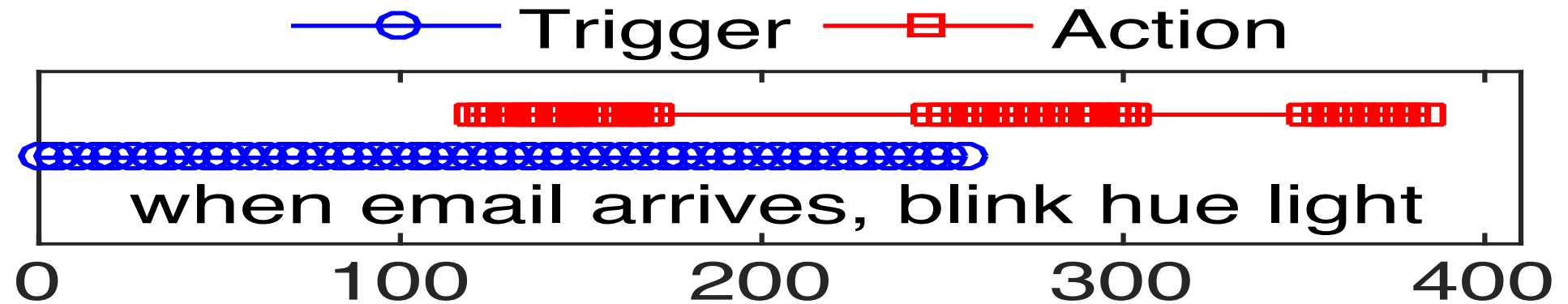
**We need a more **Secure** Solution**

# Discussion: Intelligence

Infinite Loop



Action Burst



We need a **Smarter** Solution

# Data Release

## Applets Services

7 Snapshots, each per month across Nov 2016 to May 2017.

## Source Code

Performance testbed, self-implemented IFTTT service, measurement scripts, data crawling scripts.

[https://www.cs.indiana.edu/~fengqian/ifttt\\_measurement/](https://www.cs.indiana.edu/~fengqian/ifttt_measurement/)

Q&A

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