



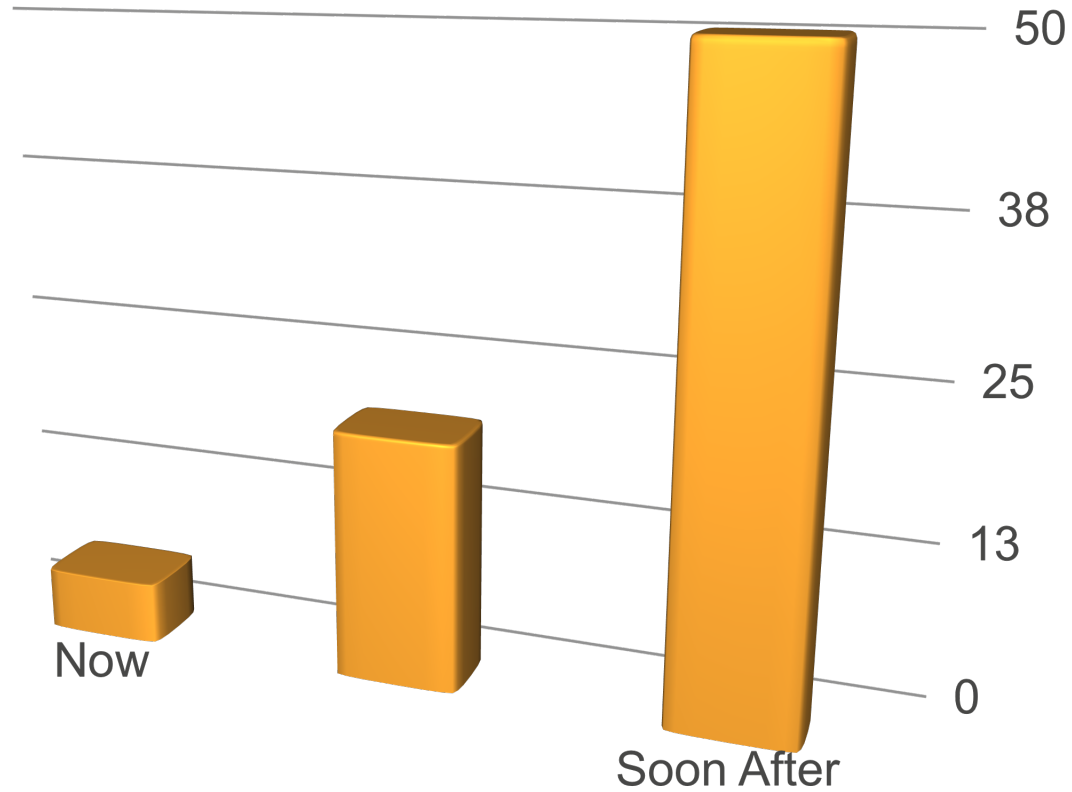
Getting Started with AWS IoT

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Things are becoming connected



Source: Pretty much everyone

The next 3-5 years

Today's hype		Tomorrow's normal
Today's Things		Tomorrow's insights
Today's technology		Tomorrow's solutions
Today's definition of "at scale"		Dwarfed by tomorrow's definition
Today's cost reduction		Tomorrow's growth engine
Today's confusion		Tomorrow's blue print
Today's connectivity issues		Solved on the edge

AWS: hyperscale infrastructure for connected devices



AWS Lambda
*Run Code in
Response to Events*



Amazon DynamoDB
*Predictable and Scalable
NoSQL Data Store*



Amazon Kinesis
Streaming Analytics



Amazon API Gateway
*Build, Deploy, and Manage
APIs*



Amazon Redshift
*Petabyte-Scale
Data Warehouse*



Amazon SNS
*Mobile Push
and Notifications*



Amazon Cognito
*User Identity and Data
Synchronization*

...and more

IoT isn't new to AWS with previous customer success



SONOS
THE WIRELESS HIFI SYSTEM

PHILIPS
Healthcare



AWS Lambda
*Run Code in
Response to Events*



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DynamoDB**
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...and more

AWS IoT: simplify and accelerate IoT development



AWS IoT
*Connect Devices to
the Cloud*



AWS Lambda
*Run Code in
Response to Events*



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*User Identity and Data
Synchronization*

...and more

AWS IoT

“Securely connect one or one billion devices to AWS,
so they can interact with applications and other devices”

AWS IoT



Message Broker



AWS-grade security



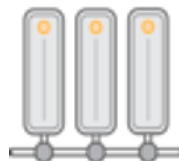
Rules engine



Device Shadows



Device Registry

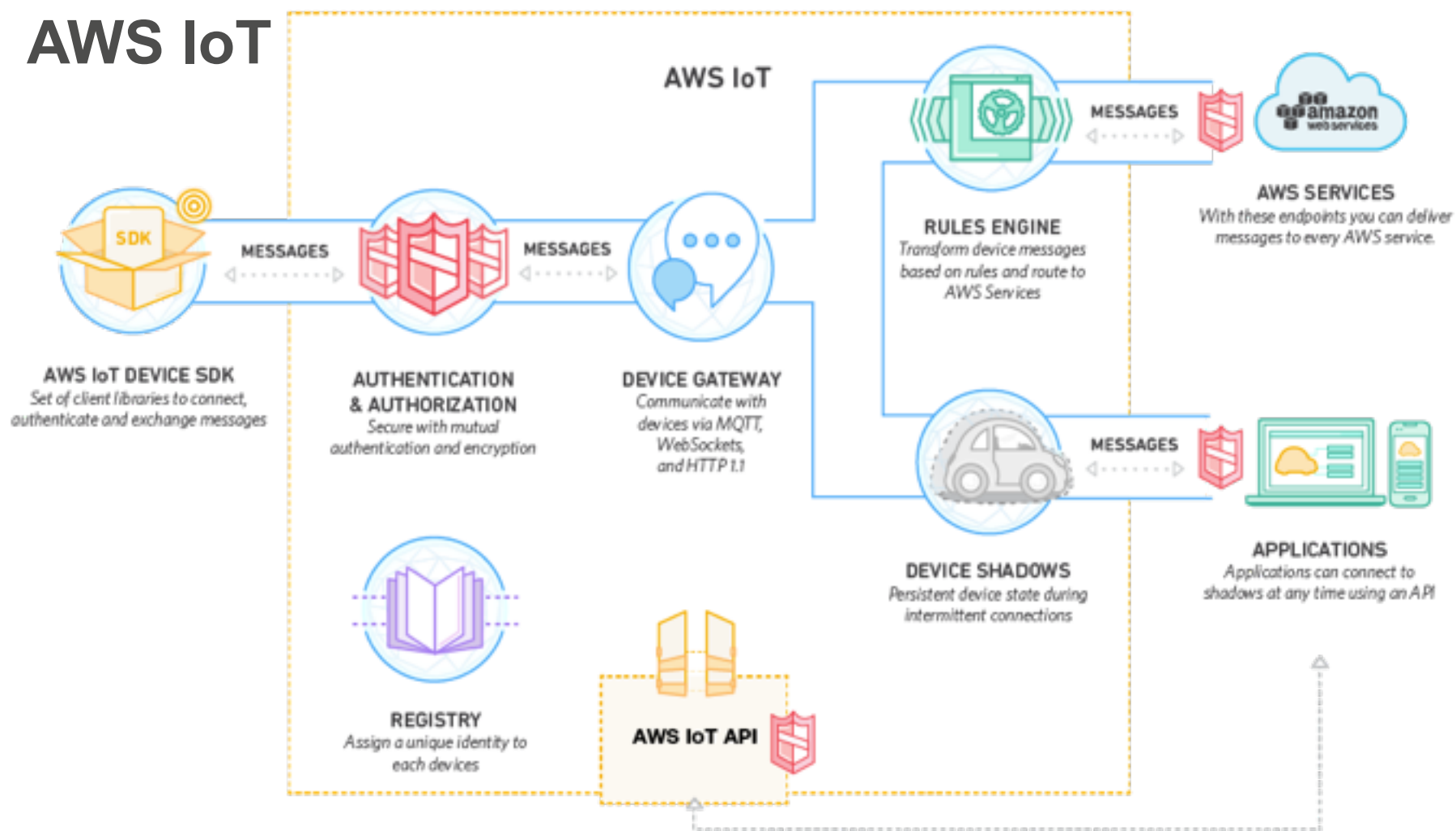


Managed Platform



Seamless integration
with all of AWS

AWS IoT



AWS IoT Message Broker



AWS IoT Message Broker

Example: Connect a device using MQTT



Billions of devices can publish and subscribe to messages



Messages are transmitted and received using the MQTT protocol which minimizes the code footprint on the device and reduces network bandwidth requirements

AWS IoT



AWS IoT enables devices to communicate with AWS services and each other

MQTT

- OASIS standard protocol (v3.1.1)
- Lightweight, pub-sub, transport protocol that is useful for connected devices
- MQTT is used on oil rigs, connected trucks, and many more sensitive and resource-sensitive scenarios
- Customers have needed to build, maintain, and scale a broker to use MQTT with cloud applications

MQTT vs HTTPS:

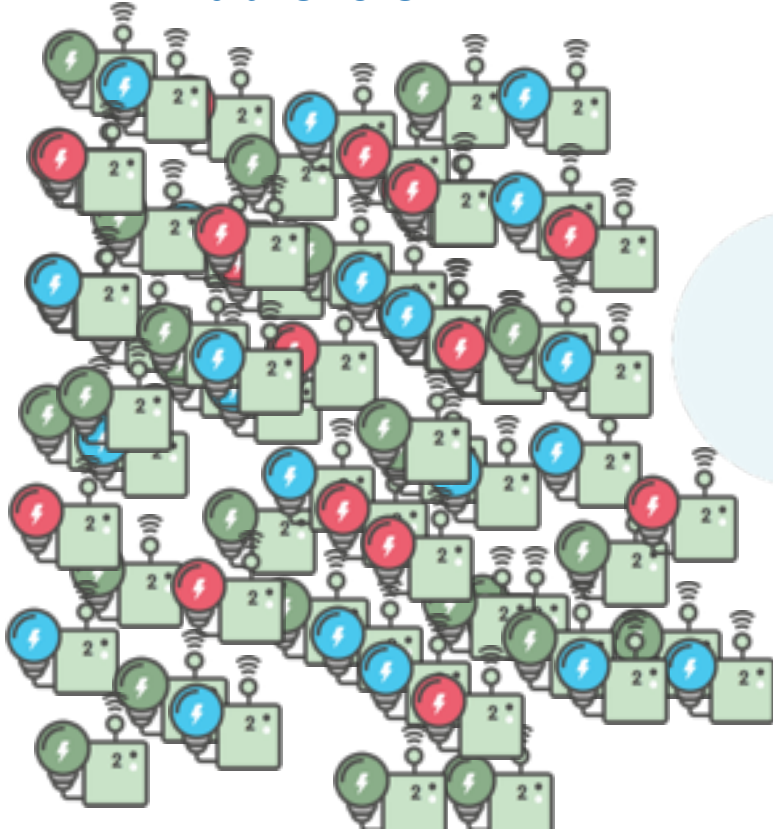
- 93x faster throughput
- 11.89x less battery to send
- 170.9x less battery to receive
- 50% less power to keep connected
- 8x less network overhead

Source: <http://stephendnicholas.com/archives/1217>

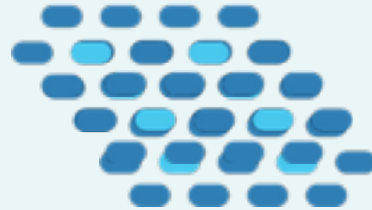
AWS IoT Message Broker : managed service



Publishers

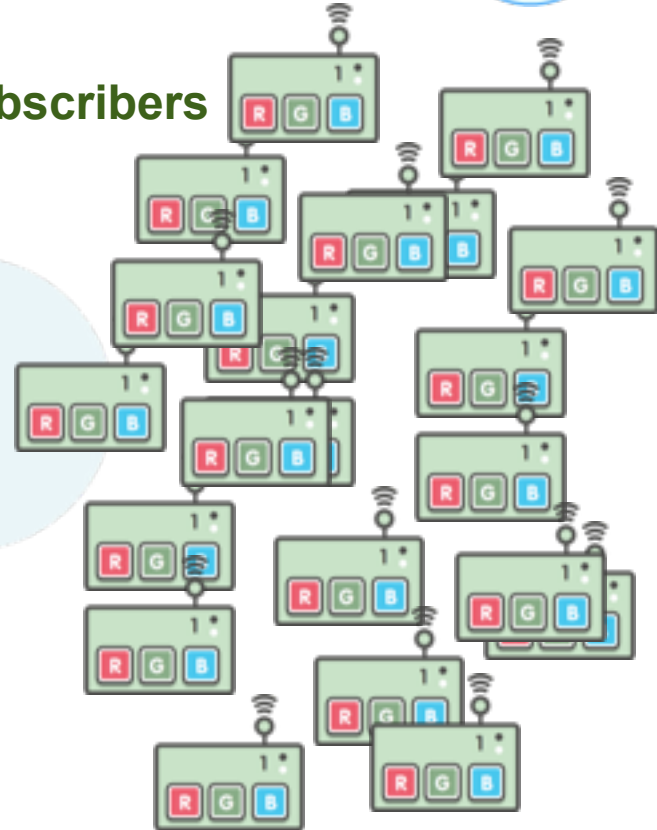


Highly Scalable
Device Gateway

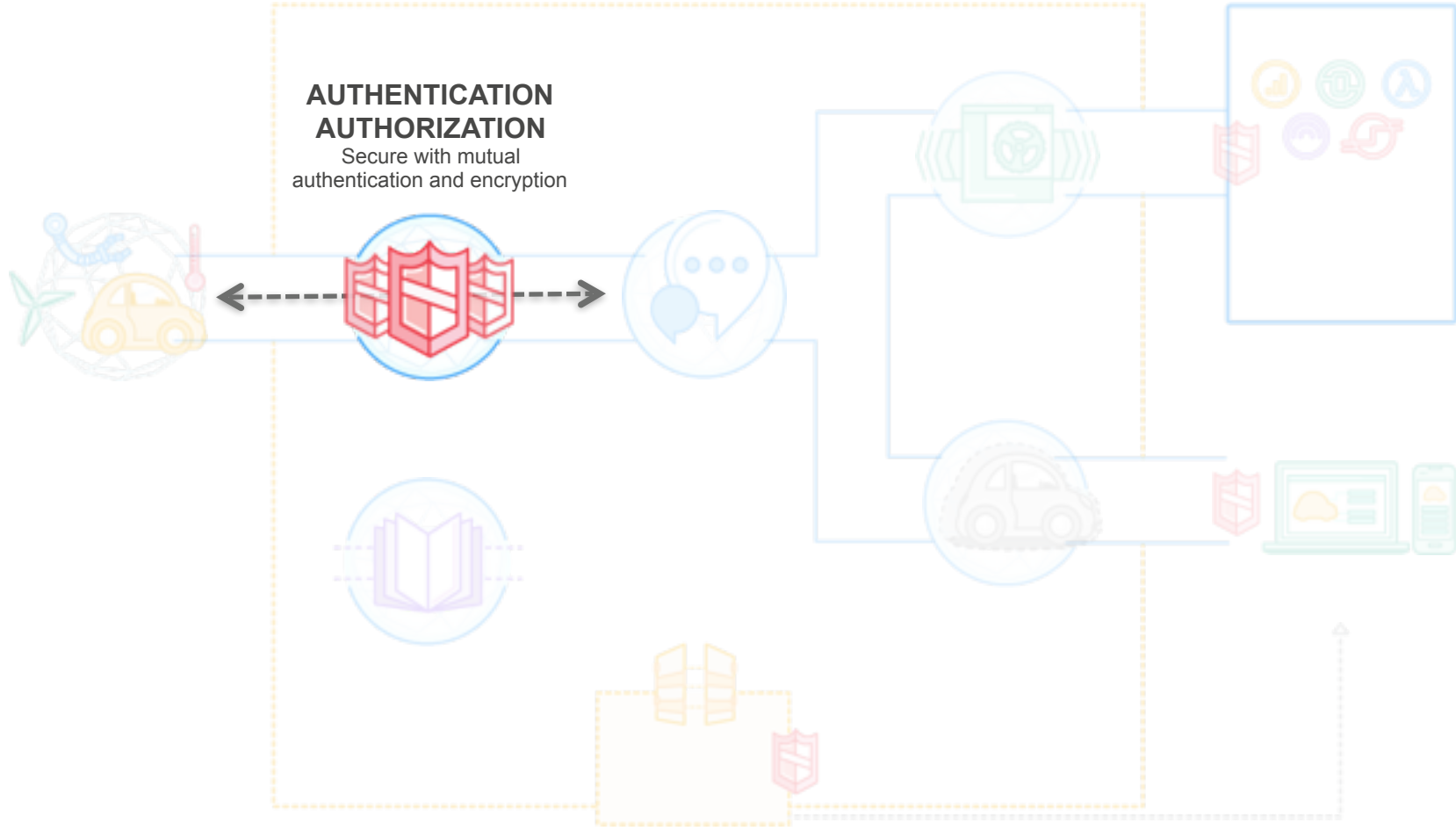


Millions of devices
sending billions of
messages

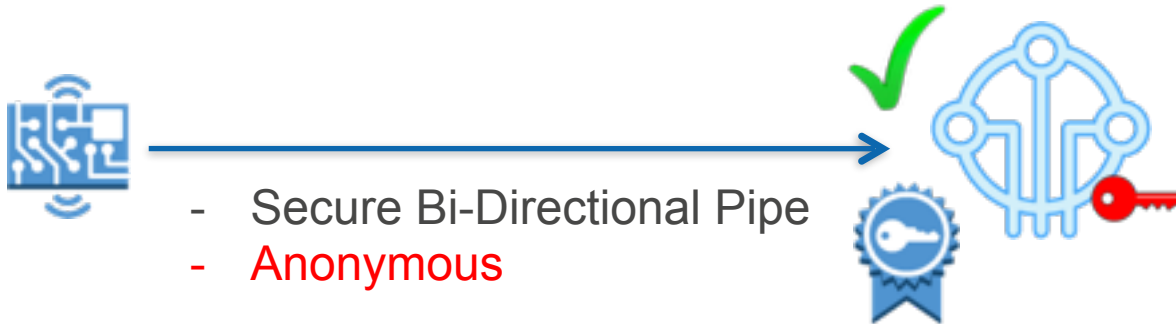
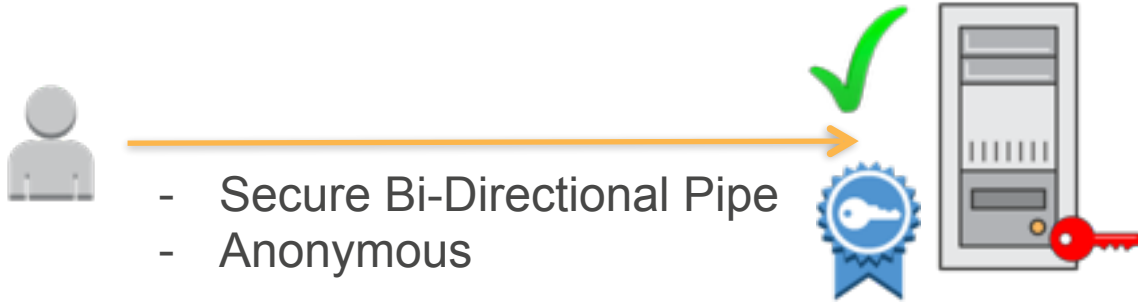
Subscribers



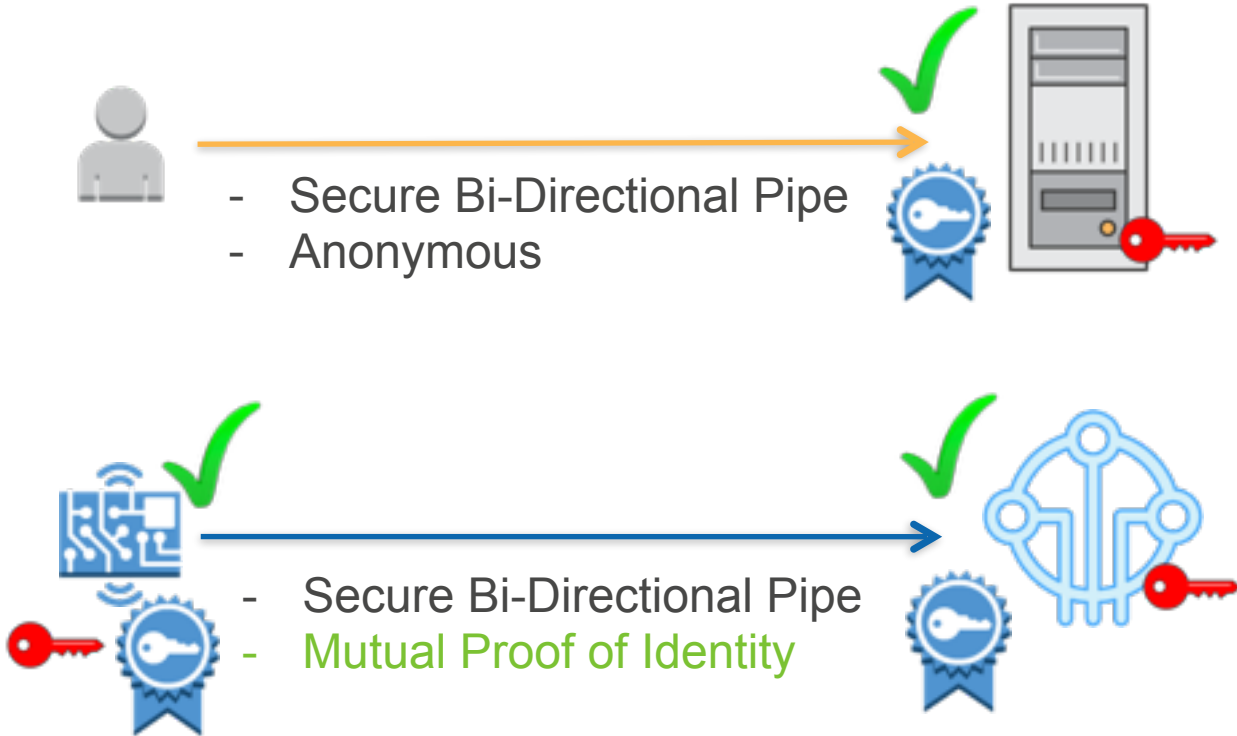
AWS IoT security: authentication and authorization



Securing and identifying Things



Securing and Identifying Things: Mutual Auth TLS



AWS IoT security

Example: Authenticate connections between sensors, a device and an application

- 1** An array of temperature sensors transmit data



- 2** The connection to AWS IoT is authenticated



AWS IoT



- 4** The connection to the fan is authenticated

- 5** The fan receives a command and turns on

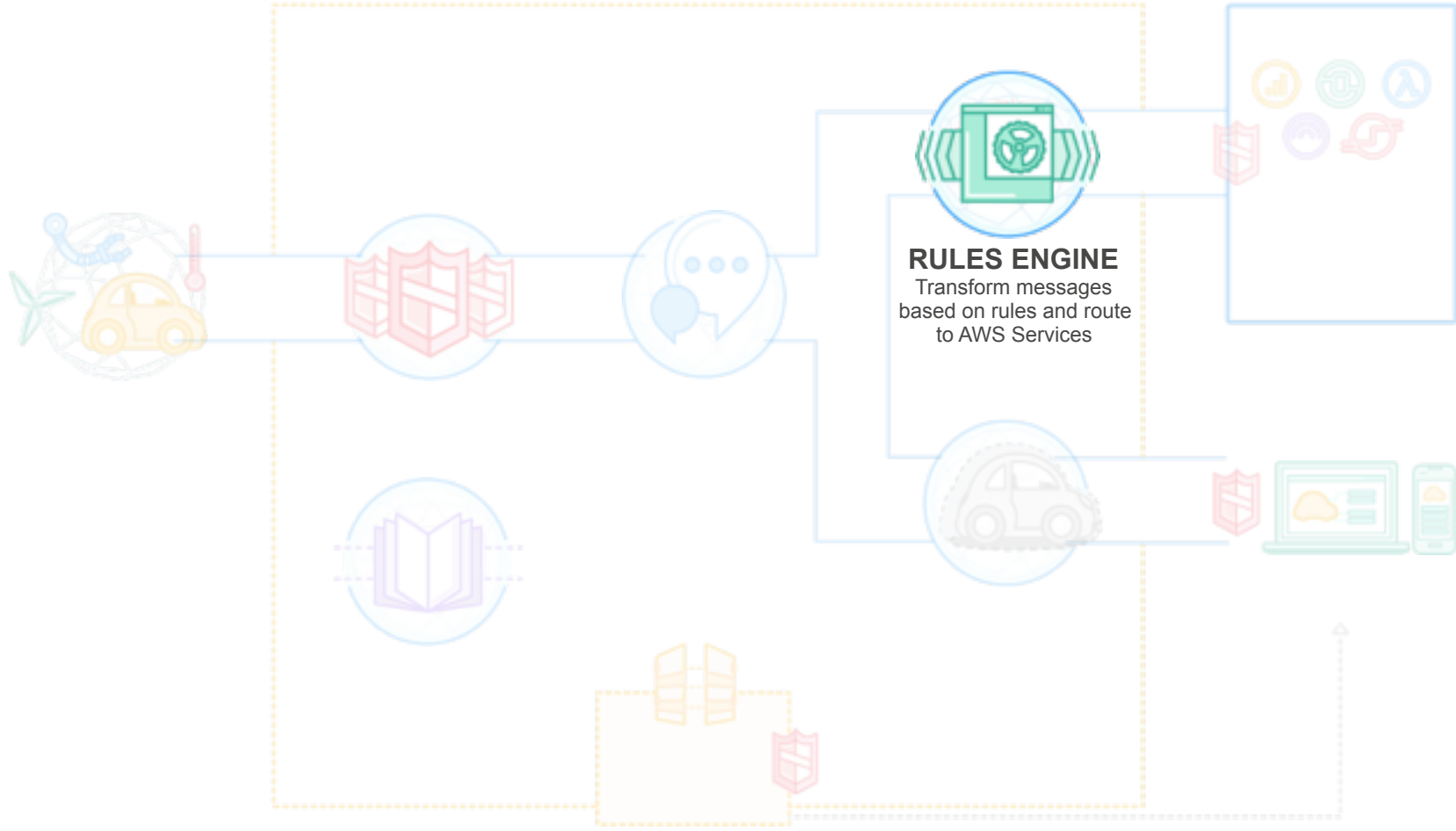


- 3** If the sensors agree the temperature is above a threshold they turn on the fan



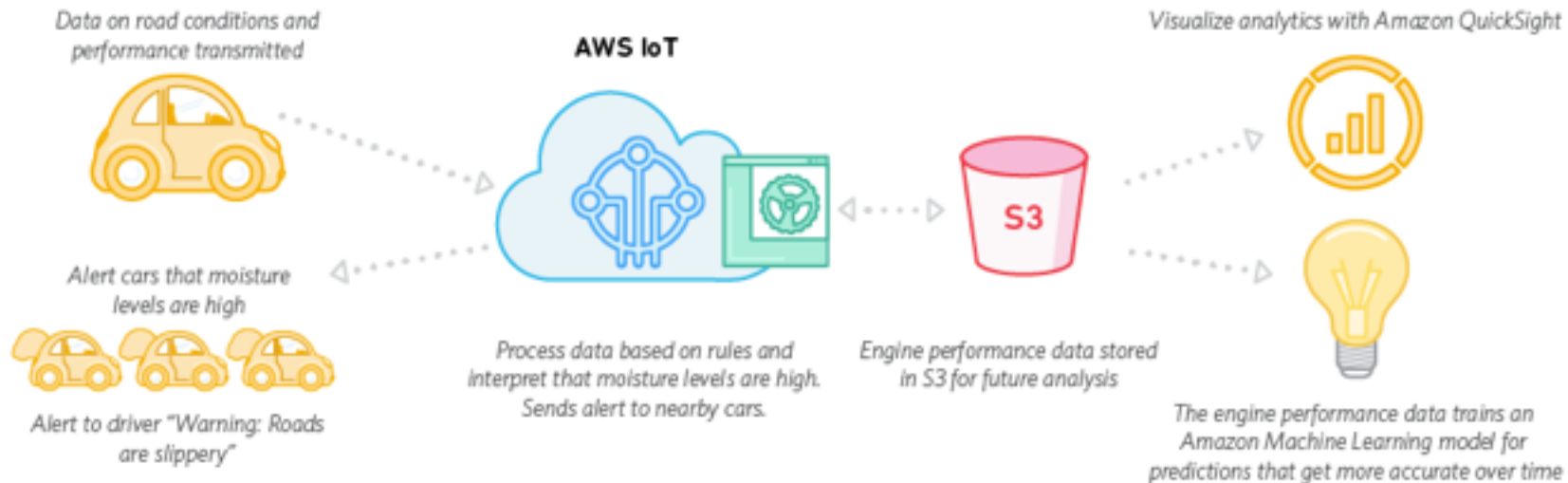
Only authenticated users can control the fan

AWS IoT Rules Engine

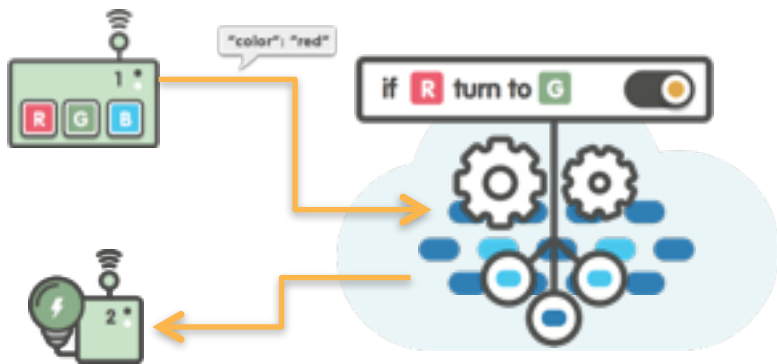


AWS IoT Rules Engine

Example: *Improve driver safety with connected cars*



AWS IoT Rules Engine basics



```
SELECT * FROM 'things/thing-2/color'  
WHERE color = 'red'
```

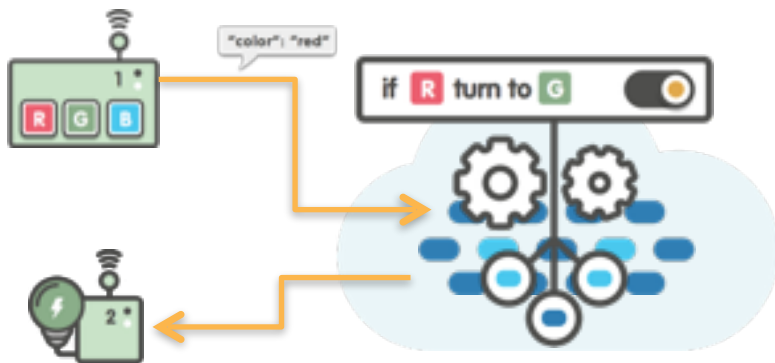
Simple & familiar syntax

- SQL Statement to define topic filter
- Optional WHERE clause
- Advanced JSON support

Functions improve signal : noise

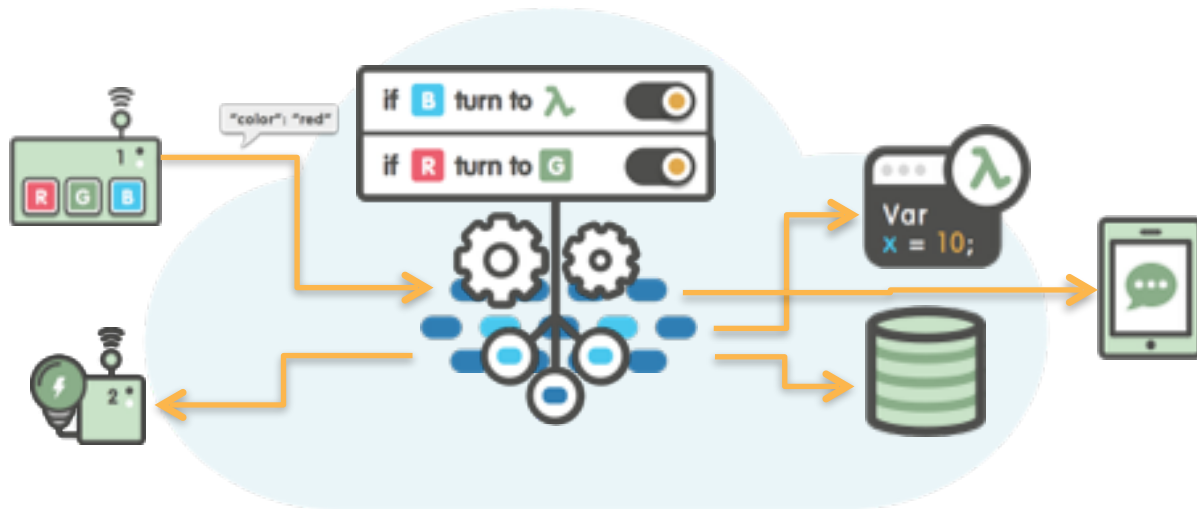
- String manipulation (regex support)
- Mathematical operations
- Context-based helper functions
- Crypto support
- UUID, Timestamp, rand, etc.

AWS IoT Rules Engine's flexibility



```
SELECT *, clientId() as MQTTClientId
FROM 'one/rule'
WHERE
startsWith(topic(2), 'IMEI33') AND
(state = 'INIT' OR hydro_temp >
surface_temp)",
"actions":
[
{
"republish": {
"topic": "controllers/
${substring(topic(3), 3, 5)}",
}]
}
```

AWS IoT Rules Engine



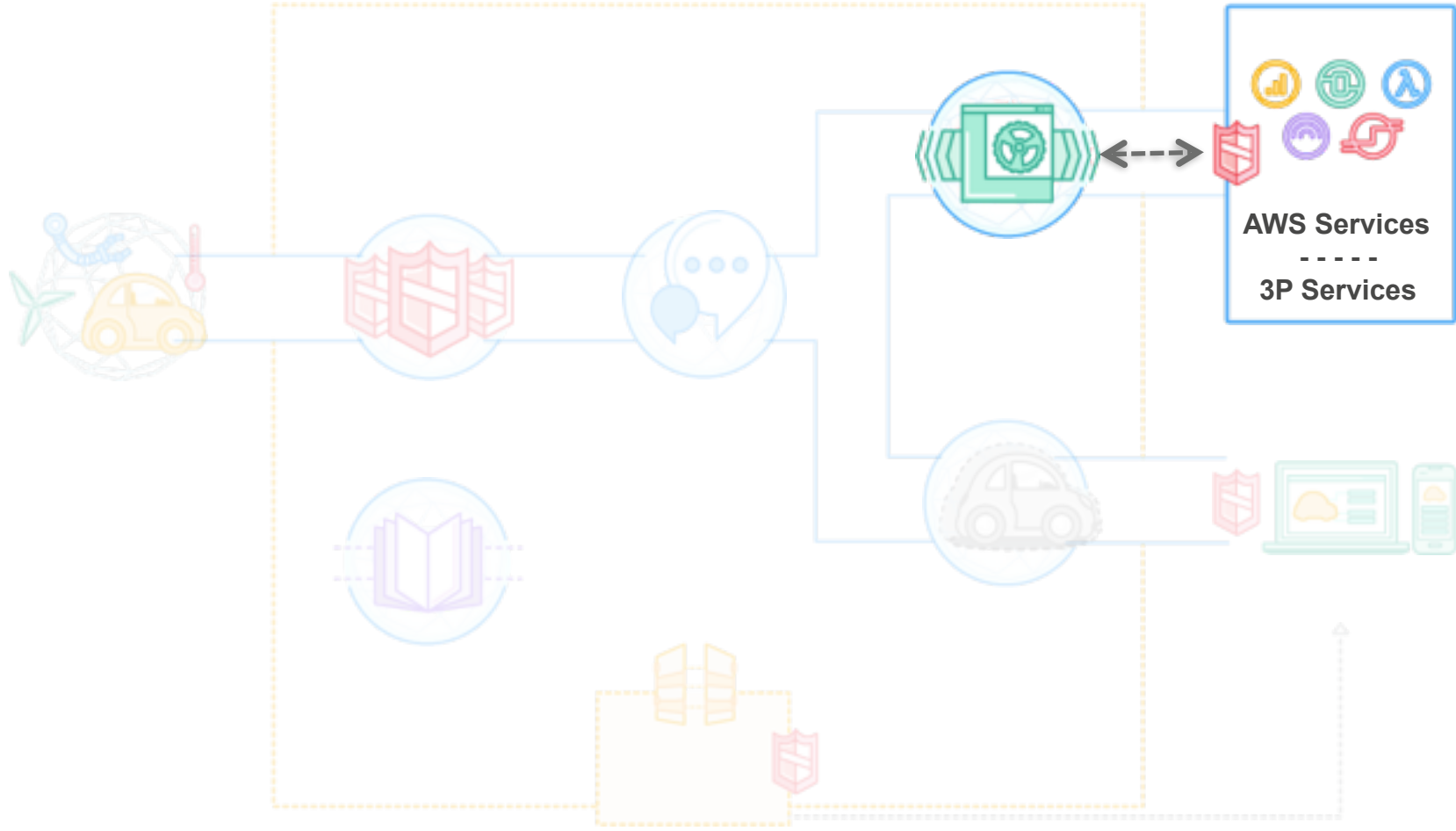
Complex Evaluations

Respond to the fleet, not just a single unit. Dozens of **functions()** available.

Multiple / Simultaneous Actions

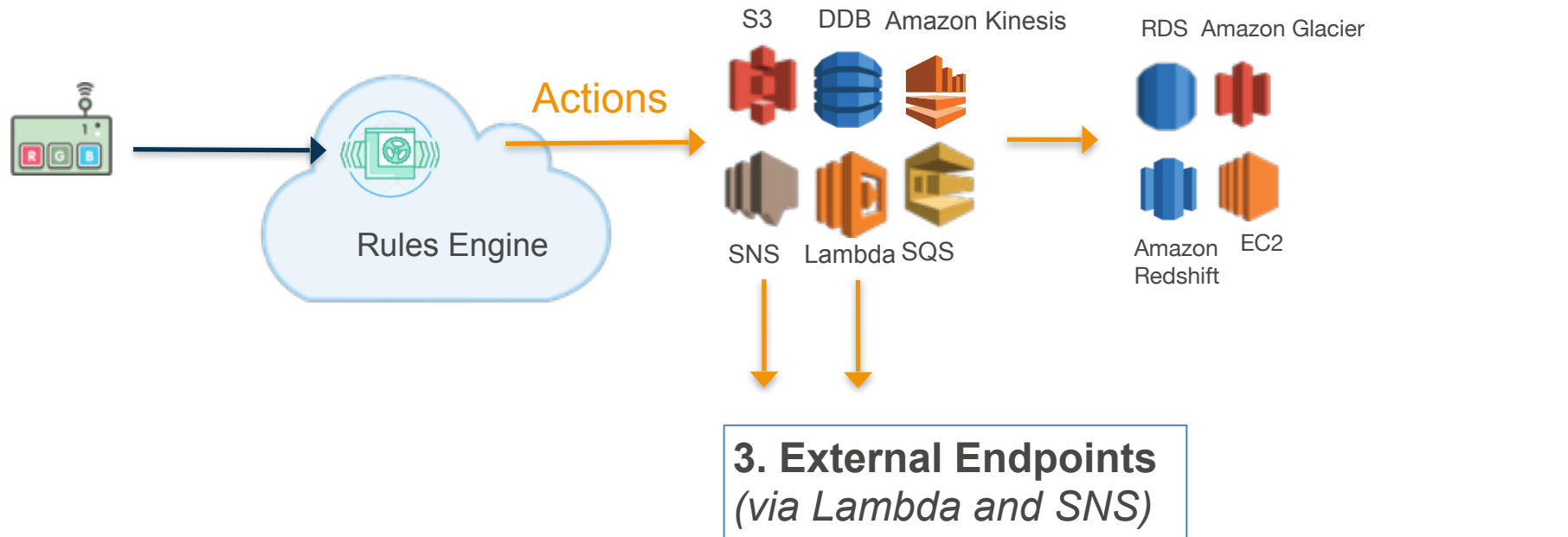
Sometimes a situation requires you to take many actions.

AWS IoT Rules Engine actions



AWS IoT Rules Engine

Rules Engine connects AWS IoT to External Endpoints and AWS Services.



AWS IoT Rules Engine Actions



Rules Engine evaluates inbound messages published into AWS IoT, and transforms and delivers to the appropriate endpoint based on business rules.



External endpoints can be reached via Lambda and Simple Notification Service (SNS).

Actions



Invoke a Lambda function



Put object in an S3 bucket



Insert, Update, Read from a DynamoDB table



Publish to an SNS Topic or Endpoint



Publish to an Amazon Kinesis stream

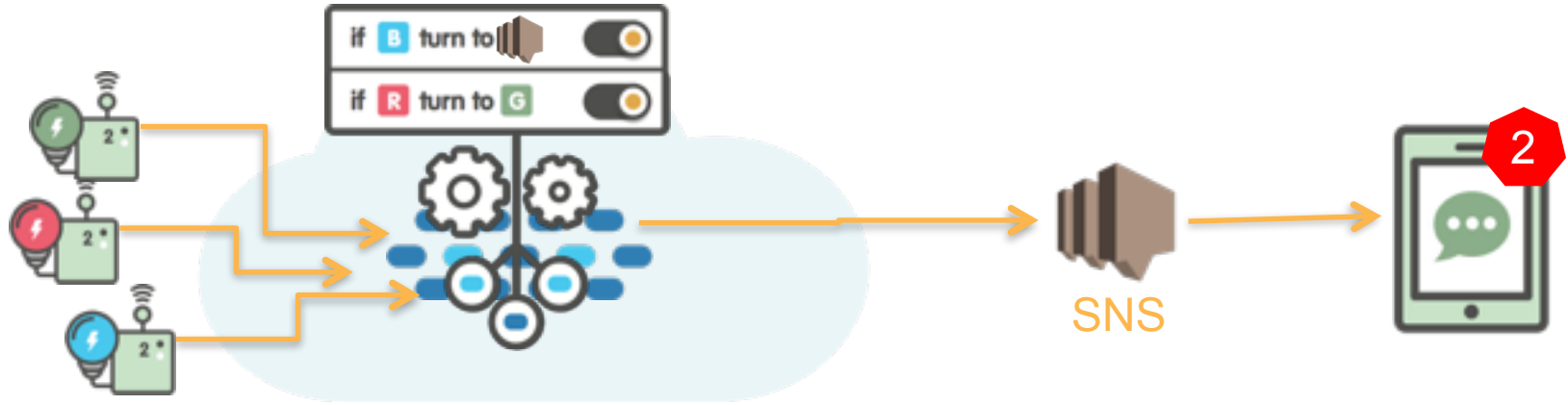


Amazon Kinesis Firehose



Republish to AWS IoT

AWS IoT Rules Engine & Amazon SNS



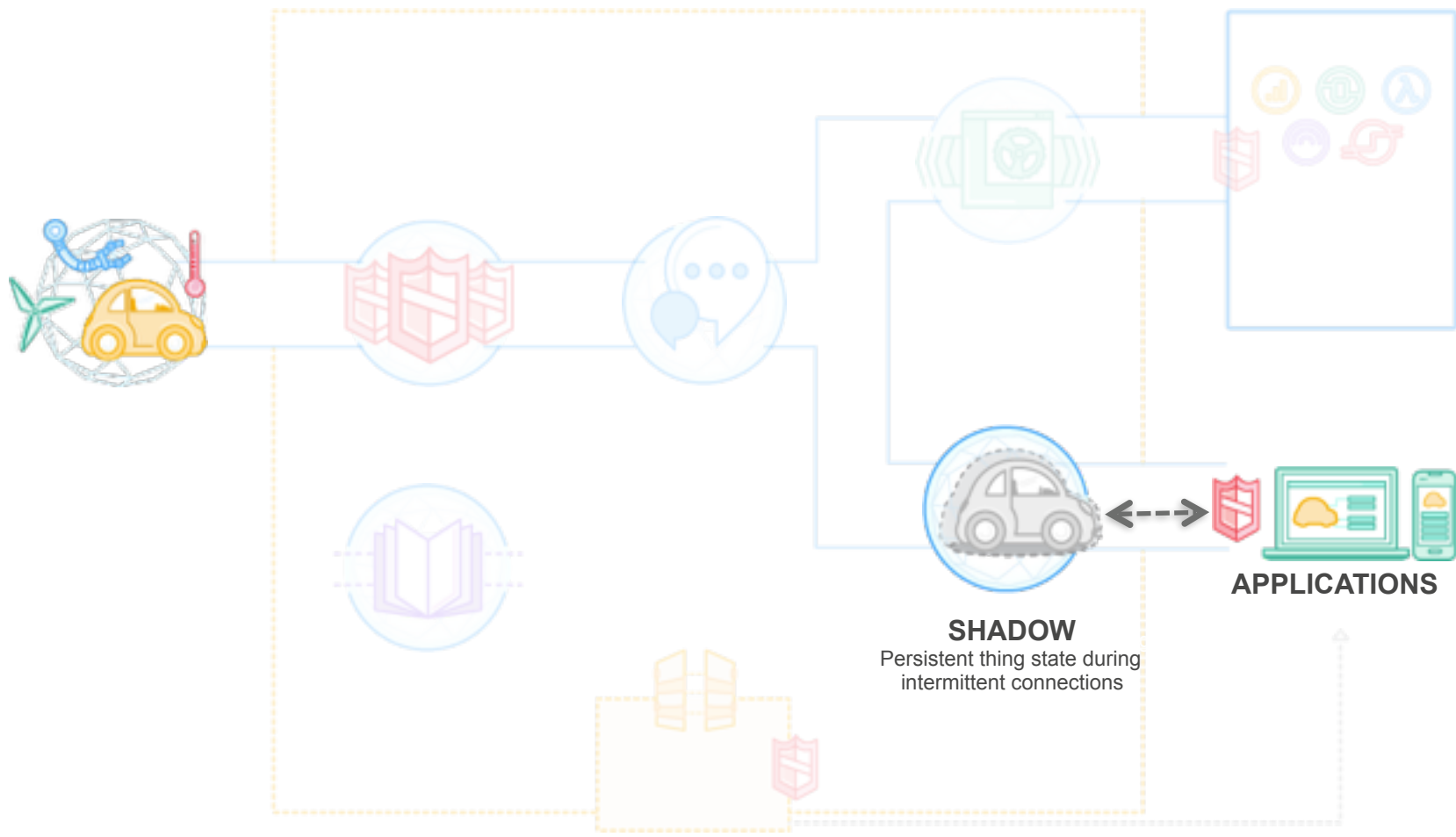
Push Notifications

Apple APNS Endpoint, Google GCM Endpoint, Amazon ADM Endpoint, Windows WNS

Amazon SNS -> HTTP Endpoint (Or SMS or Email)

Call HTTP based third-party endpoints through SNS with subscription and retry support

AWS IoT Thing Shadow



AWS IoT Device Shadows

Example: *Analyze chemicals in a sample with a mass spectrometer*

AWS IoT



**INTERMITTENT
CONNECTION**



REST APIs

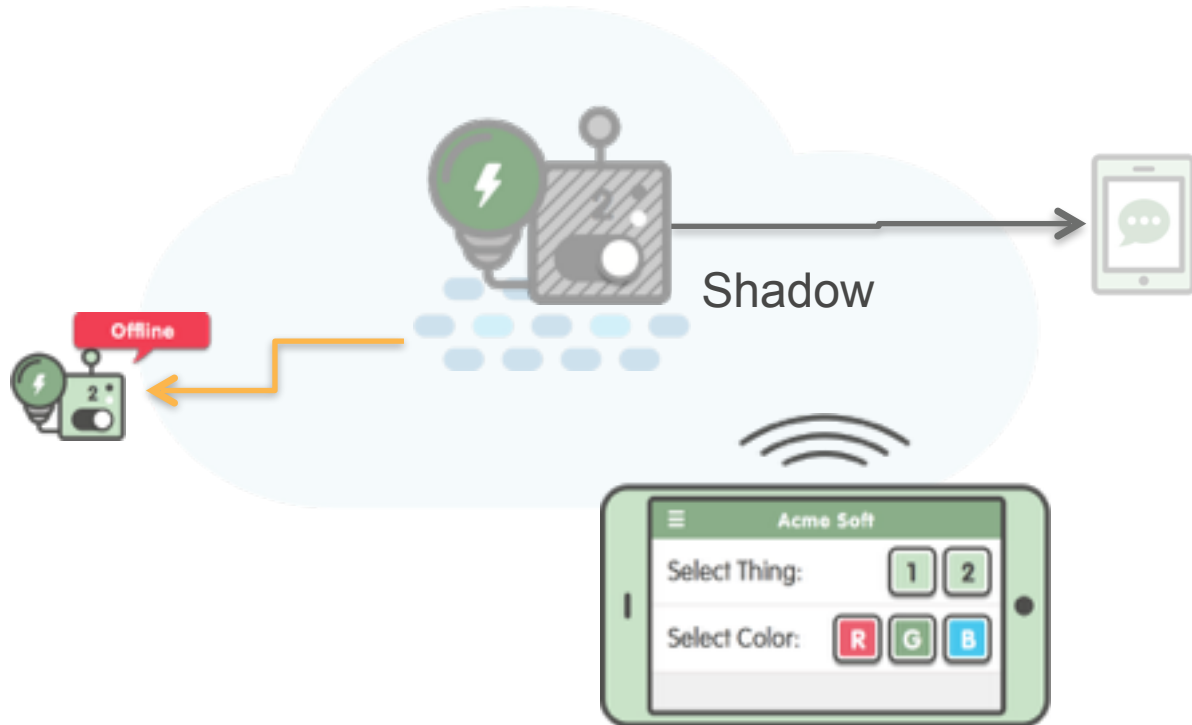


Connected mass spectrometer reports its state and readings throughout a multi-hour cycle

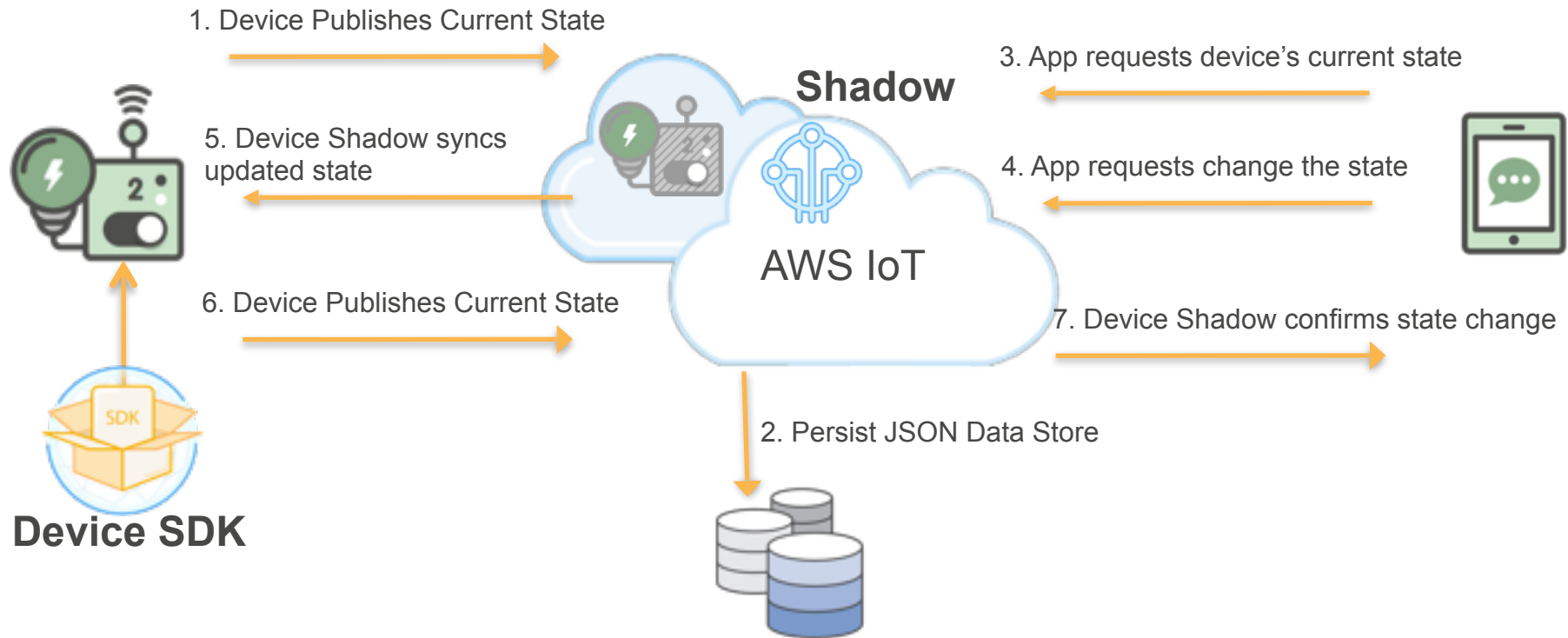
The spectrometer goes offline when its cycle completes, but its last-reported state persists in AWS IoT

Technicians can use mobile apps to set new desired states (e.g. pause the cycle), or query the last reported state of the spectrometer

AWS IoT Thing Shadow



AWS IoT Shadow Flow



AWS IoT Device Shadow - Simple Yet Powerful



Thing

Report its current state to one or multiple shadows
Retrieve its desired state from shadow



Shadow

Shadow reports delta, desired and reported states along with metadata and version



Mobile App

Set the desired state of a device
Get the last reported state of the device
Delete the shadow

```
{  
  "state" : {  
    "desired" : {  
      "lights": { "color": "RED" },  
      "engine" : "ON"  
    },  
    "reported" : {  
      "lights" : { "color": "GREEN" },  
      "engine" : "ON"  
    },  
    "delta" : {  
      "lights" : { "color": "RED" }  
    }  
  },  
  "version" : 10  
}
```

AWS IoT Device Shadow Topics (MQTT)



Thing SDK (C-SDK, JS-SDK)

makes it easy for you to build shadow functionality into your device so it can automatically synchronize the state with the device.

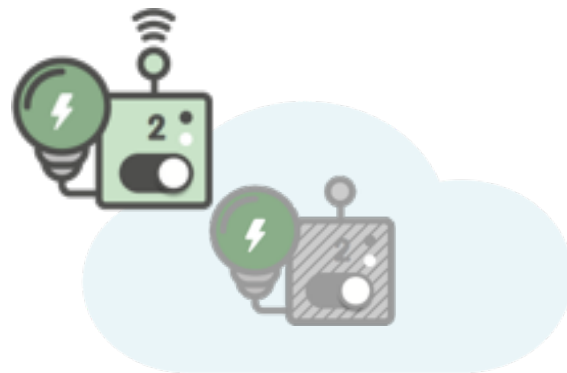
Sensor	Reported	Desired	Delta
LED1	RED	YELLOW	LED1 = Yellow TEMP = 60F
ACCEL	X=1,Y=5,Z=4	X=1,Y=5,Z=4	
TEMP	83F	60F	

UPDATE: `$aws/things/{thingName}/shadow/update`

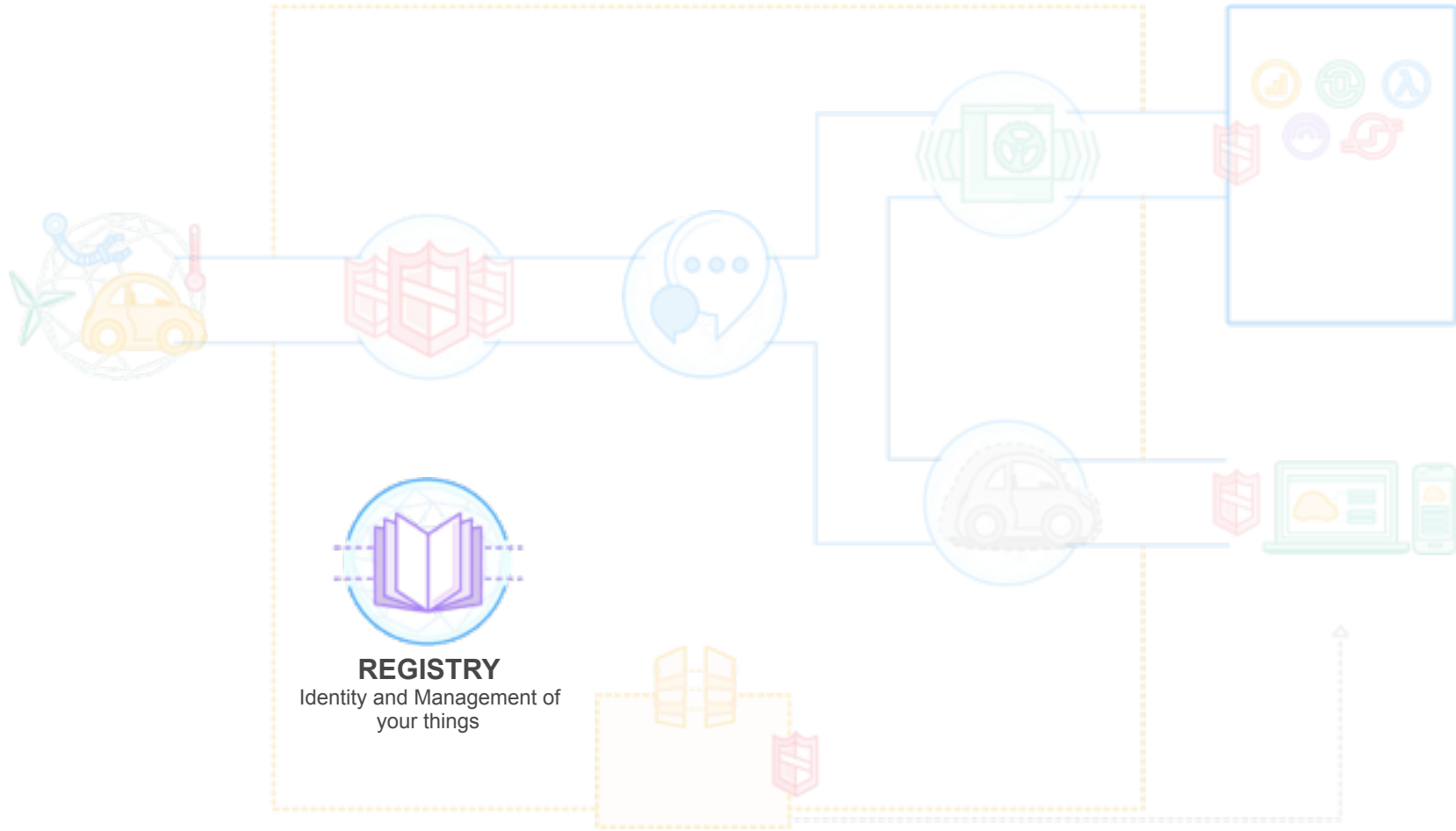
DELTA: `$aws/things/{thingName}/shadow/update/delta`

GET: `$aws/things/{thingName}/shadow/get`

DELETE: `$aws/things/{thingName}/shadow/delete`



AWS IoT Registry

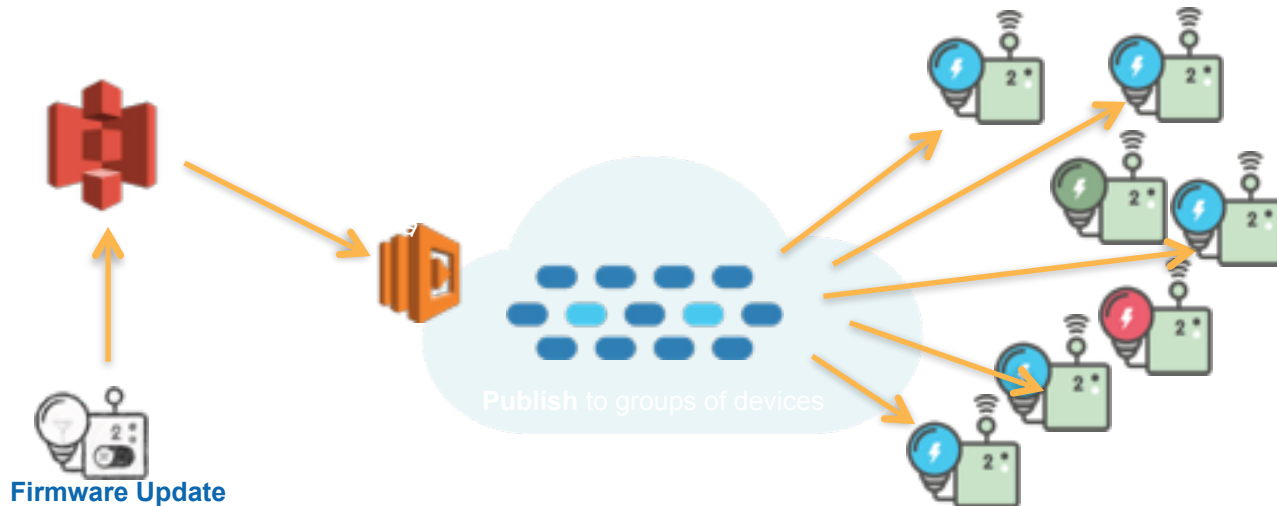


AWS IoT Registry



- Static attributes associated to Thing
 - Firmware version
 - Serial Numbers
 - Device Type
 - Device Group
 - Device Description
 - Sensor description
- Support and Maintenance
 - Reference Manual URL
 - Part # reference
- Reference to external support system

AWS IoT – Device Management



- Ability to update global or within a Region
- Rules Engine keeps state of updates and tracks progress in a DynamoDB Table
- Store Version in Registry Entry

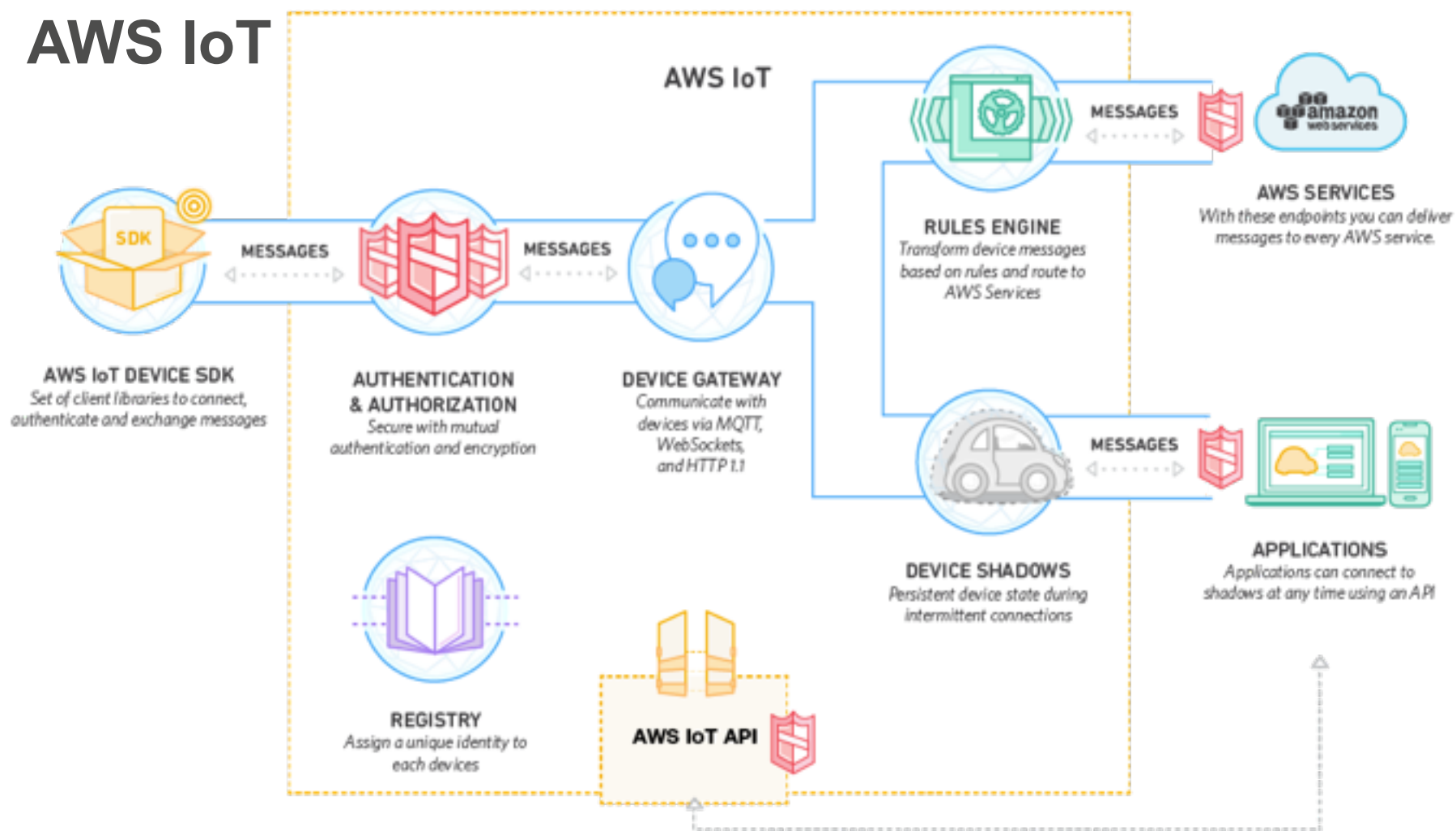
S3 Holds Versioned Firmware Distributions

Organize and secure your firmware binaries in S3

Message Broker notifies groups of the fleet using Topic Patterns

Alert the fleet (or part of it) of the update, and send the URL to the S3 download

AWS IoT



Pricing



AWS IoT

- Pay as you go. No minimum fees.
- \$5 per million messages published to, or delivered by, AWS IoT.
- AWS IoT does not charge for deliveries to the following AWS services: Amazon S3, Amazon DynamoDB, AWS Lambda, Amazon Kinesis, Amazon SNS, and Amazon SQS.
- Free Tier: 250,000 messages per month for 12 months.

Get Started with the AWS IoT Device SDK



C-SDK
(Ideal for embedded
OS)



JS-SDK
(Ideal for Embedded
Linux Platforms)



Arduino Library
(Arduino Yun)



Mobile SDK
(Android and iOS)



Java SDK



Python SDK

Official IoT Starter Kits, Powered by AWS

Launched 10 Starter Kits, Powered by AWS



Seeeduino Cloud
(by Seed Studio)



Beaglebone Green
(by Seed Studio)



Dragonboard 410c
(by Arrow)



Marvell EasyConnect
(By Marvell)



Ti Launchpad
(By Ti)



Intel Edison
(by Seed Studio)



MediaTek LinkIt One
(by Seed Studio)



Broadcom BCM4343W
(by Avnet)



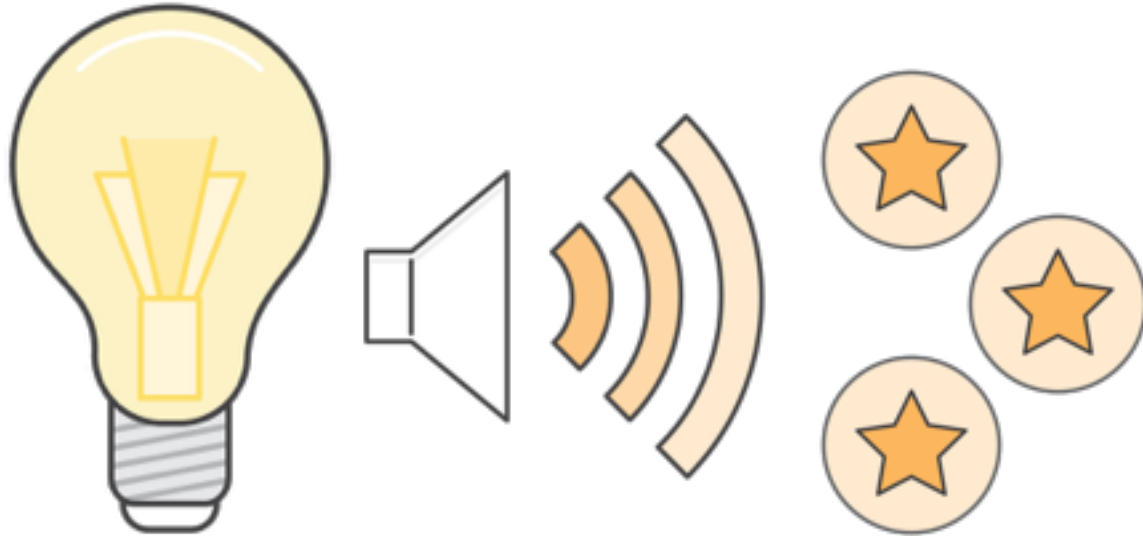
Microchip WCM
(by Microchip)



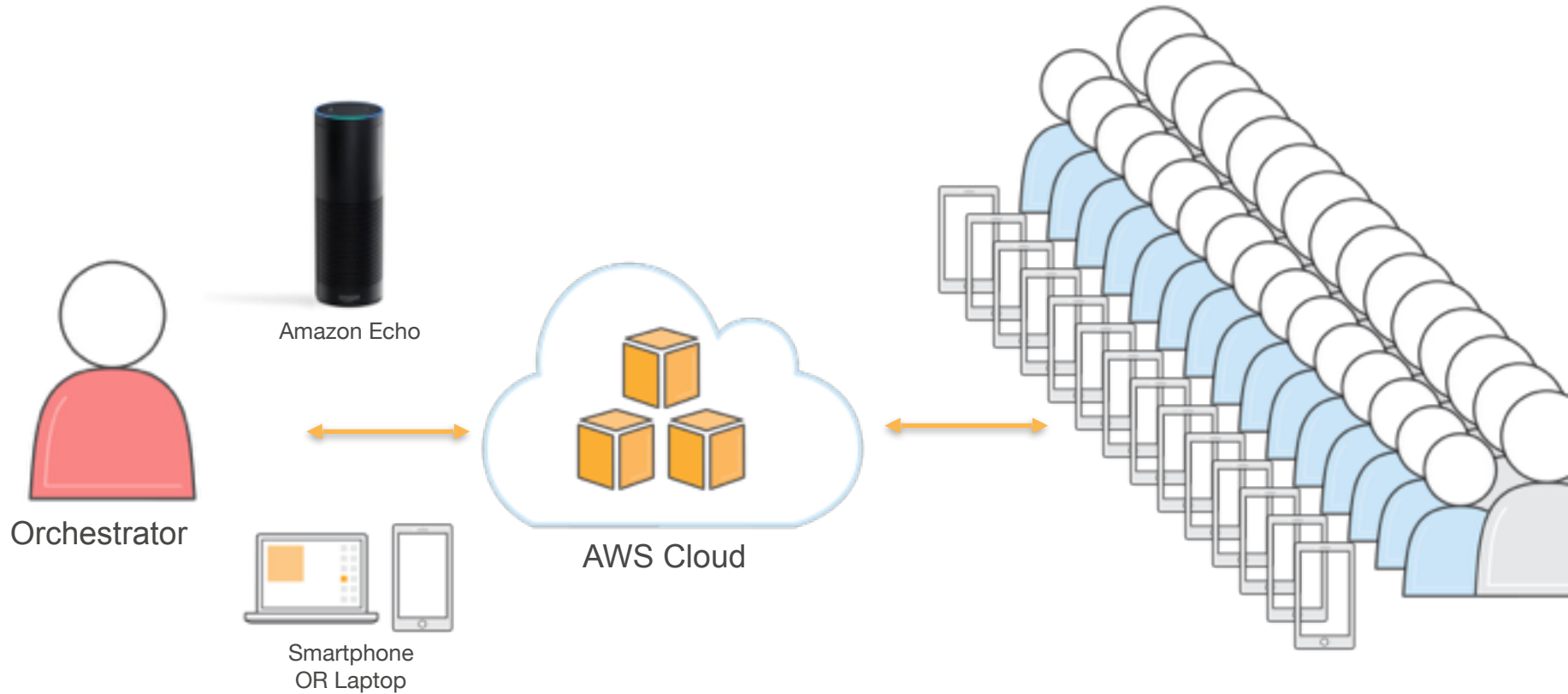
Renesas RX63N
(by Micrium)

Demonstration

Amazon LightShow



Demonstration



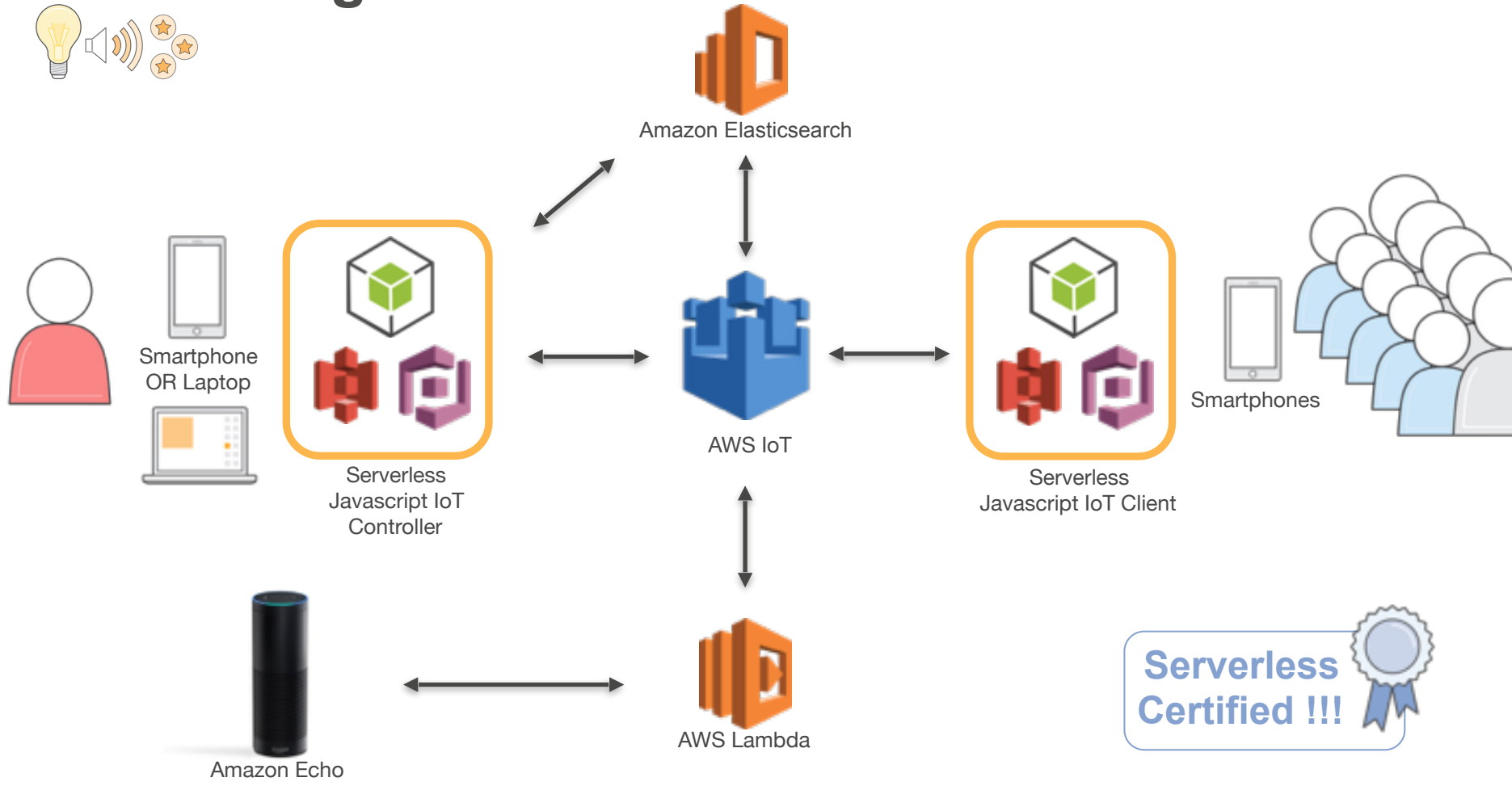
Audience with smartphones

Demonstration

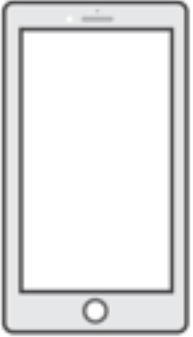


Virtual Light Bulb

Amazon LightShow



Use your smartphones now !!



Smartphone
Push luminosity



Celullar Data



WiFi



Geolocalisation



Demo Time !

<https://bit.ly/awslightshow>



Thank You!

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