Architecture of the AWS IoT platform

Julien Simon
Principal Technical Evangelist, AWS
julsimon@amazon.fr
@julsimon

Jean-Paul Huon
CTO, Z#bre
jp.huon@zbre.fr

amazon web services

AWS IoT is a fully managed cloud platform that lets connected devices easily and securely interact with cloud applications and other devices.

1

Securely connect and manage any physical device across multiple networks and protocols

2

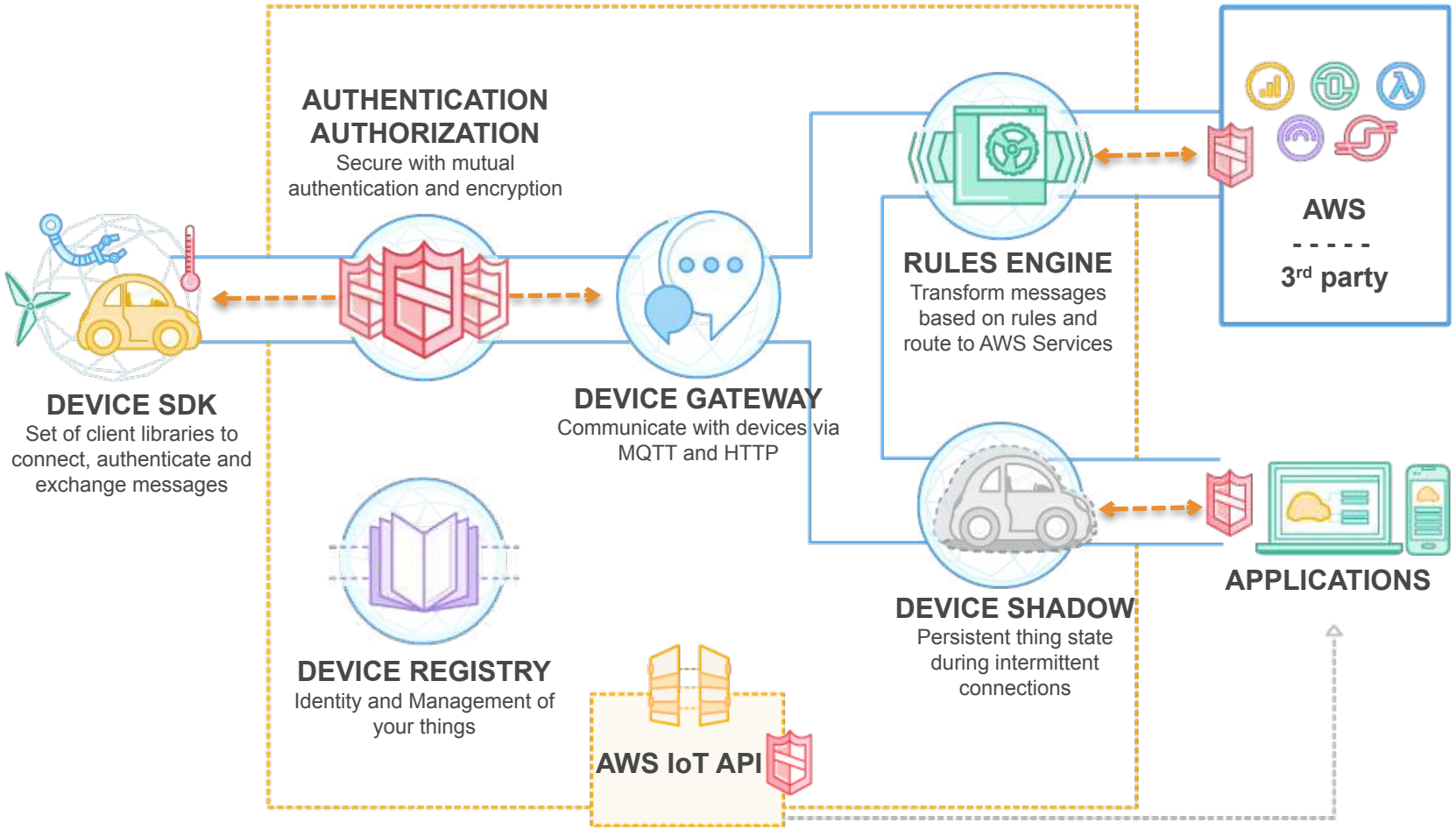
Extract and filter data from your devices and take action with custom rules

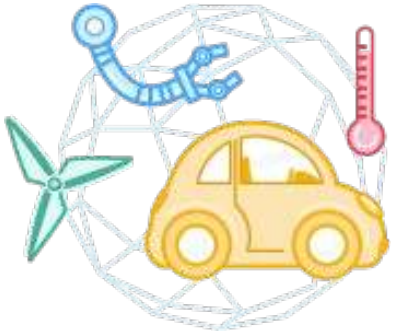
3

Create web and mobile applications that interact with devices reliably at any time

amazon web services

AWS IoT


AUTHENTICATION
AUTHORIZATION
Secure with mutual authentication and encryption
DEVICE SDK
Set of client libraries to connect, authenticate and exchange messages
DEVICE GATEWAY
Communicate with devices via MQTT and HTTP
RULES ENGINE
Transform messages based on rules and route to AWS Services
AWS
- - - - -
3rd party
DEVICE SHADOW
Persistent thing state during intermittent connections
APPLICATIONS
DEVICE REGISTRY
Identity and Management of your things
AWS IoT API



Devices & SDKs

Official AWS IoT Starter Kits

AVNET BROADCOM

MARVELL

RENESAS

TEXAS INSTRUMENTS

MICROCHIP

intel

MEDIATEK

ARROW

QUALCOMM

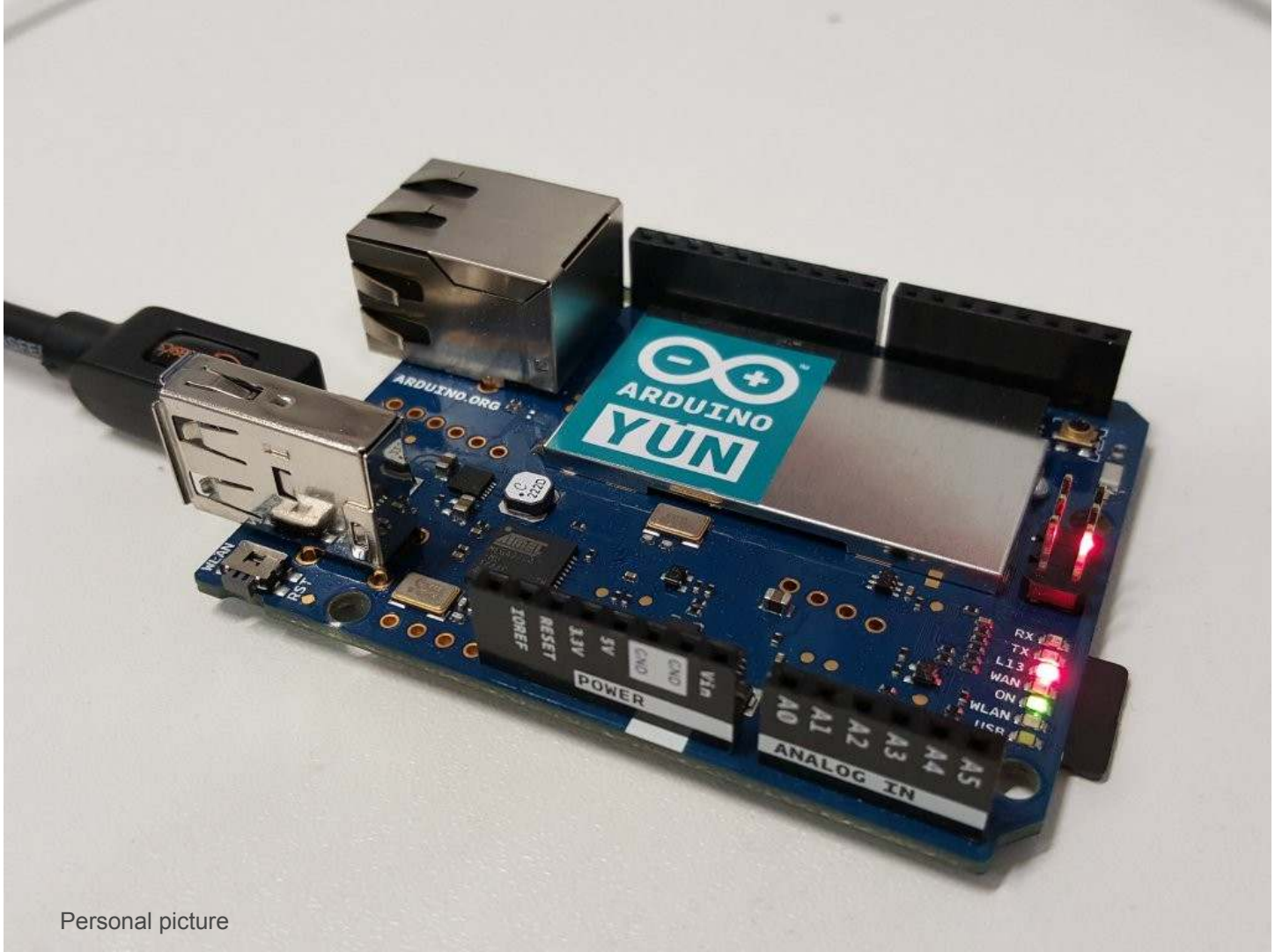
seeed
Grow the Difference

seeed
Grow the Difference

amazon web services

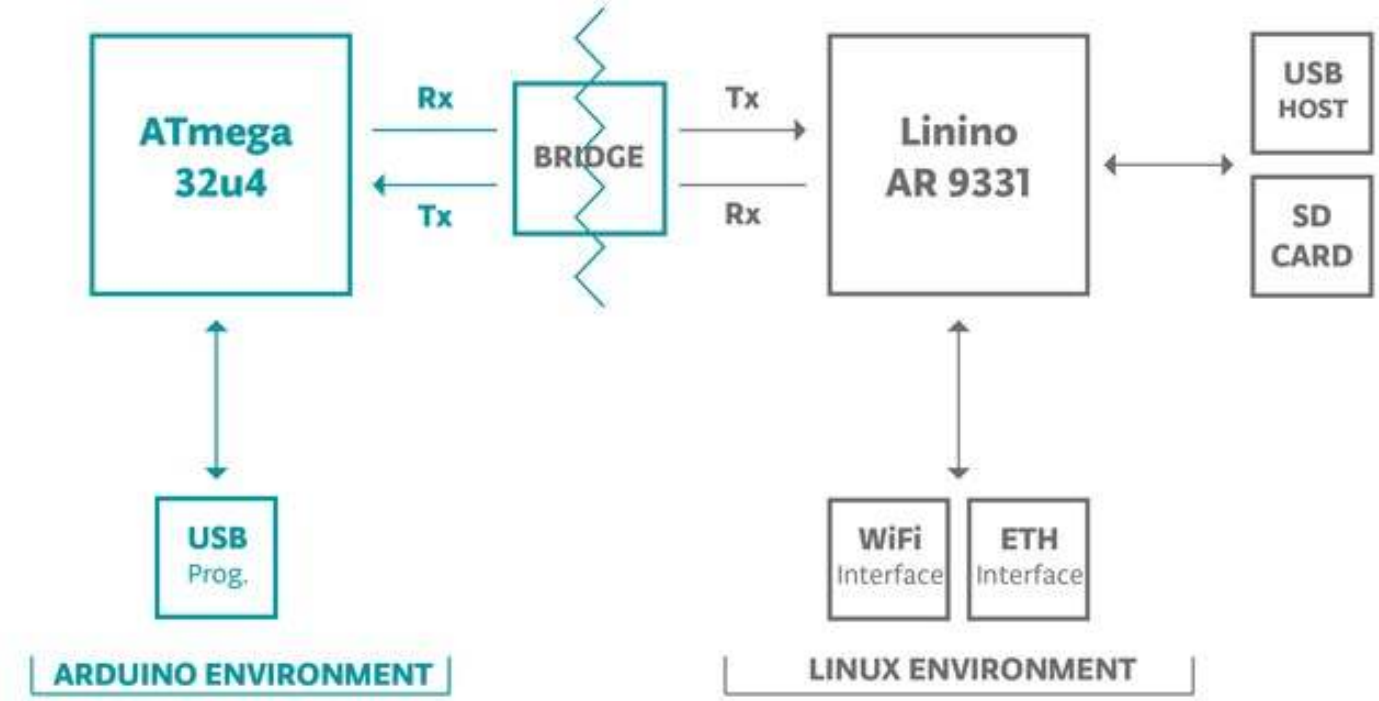
AWS IoT Sofware Development Kits

- Arduino: Arduino Yún platform
- Node.js: ideal for Embedded Linux
- C: ideal for embedded OS



Personal picture

Arduino Yún hardware



Amazon.com

Arduino Yun ATmega32u4 Microcontroller Board A000008

by Arduino Org

$65.66 ~~$74.95~~ Prime

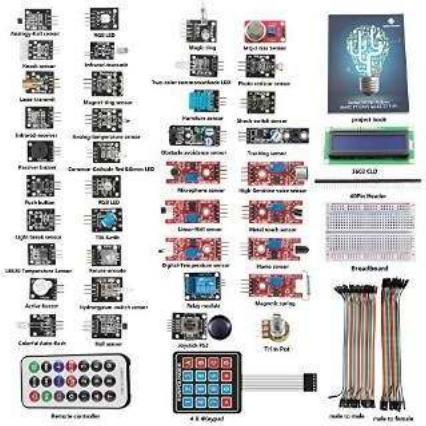
Get it by **Monday, Mar 21**

More Buying Choices
$65.00 new (17 offers)
$59.99 used (1 offer)

4.5 ▾ 68

FREE Shipping on eligible orders

Electronics: See all 153 items



SunFounder 37 modules Arduino Sensor Kit for Arduino UNO R3 Mega2560 Mega328 Nano (without controller)

by SunFounder

$68.99 Prime

Get it by **Monday, Mar 21**

More Buying Choices
$68.99 new (64 offers)

4.5 ▾ 92

FREE Shipping on eligible orders

Electronics: See all 76 items

Not an official endorsement by AWS. Just a personal preference ☺

amazon web services

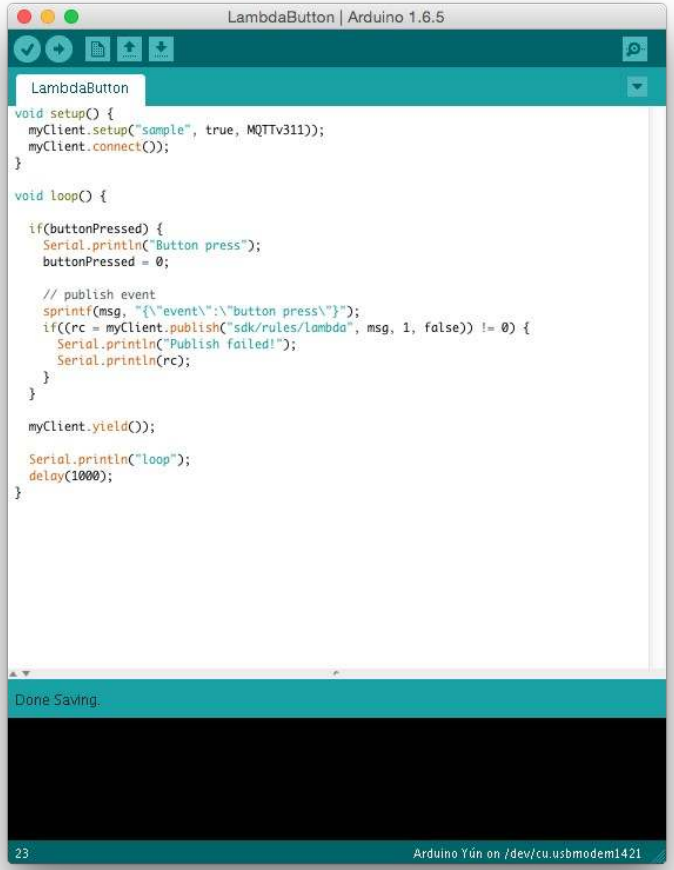
Arduino Yún SDK

Arduino IDE and librairies

http://arduino.org/software

AWS IoT SDK

https://github.com/aws/aws-iot-device-sdk-arduino-yun



amazon web services

Protocols

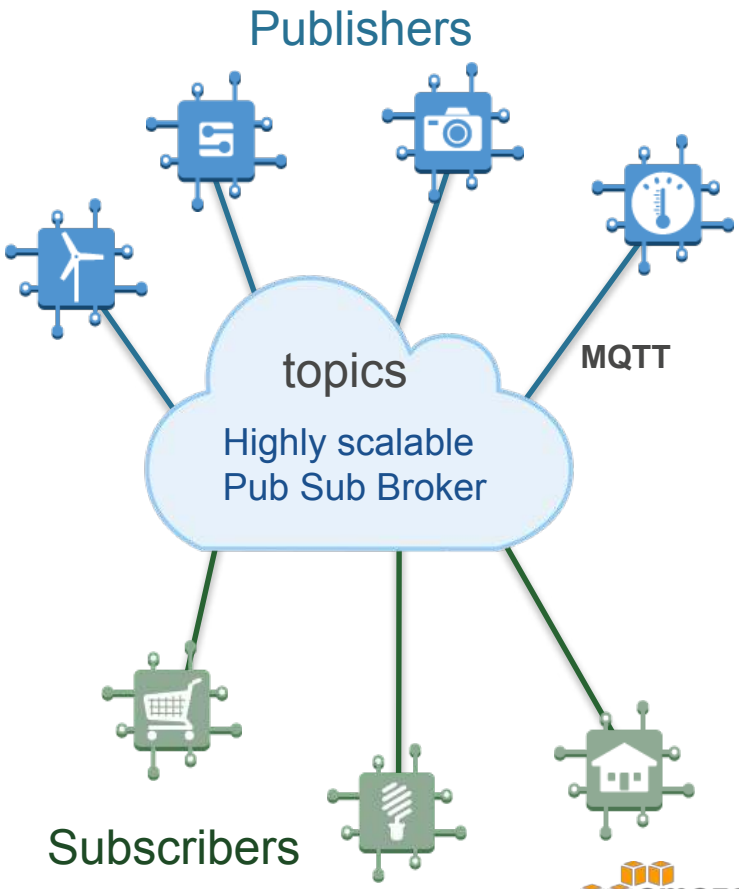
AWS IoT: Securely Connect Devices

Device Registry
Cloud alter-ego of a physical device.
Persists metadata about the device.

Multi-protocol Message Gateway
Millions of devices and apps can connect over MQTT or HTTP

Elastic Publish Subscribe Broker
Go from 1 to 1-billion long-lived connections with zero provisioning

Secure by Default
Connect securely via X509 Certs and TLS v1.2 Client Mutual Auth



amazon web services

MQTT Protocol

- OASIS standard protocol (v3.1.1)
- Lightweight, transport protocol that is useful for connected devices
- **Publish-subscribe** with **topics**

- MQTT is used on oil rigs, connected trucks, and many more critical applications
- Customers have needed to build, maintain and scale a broker to use MQTT with cloud applications

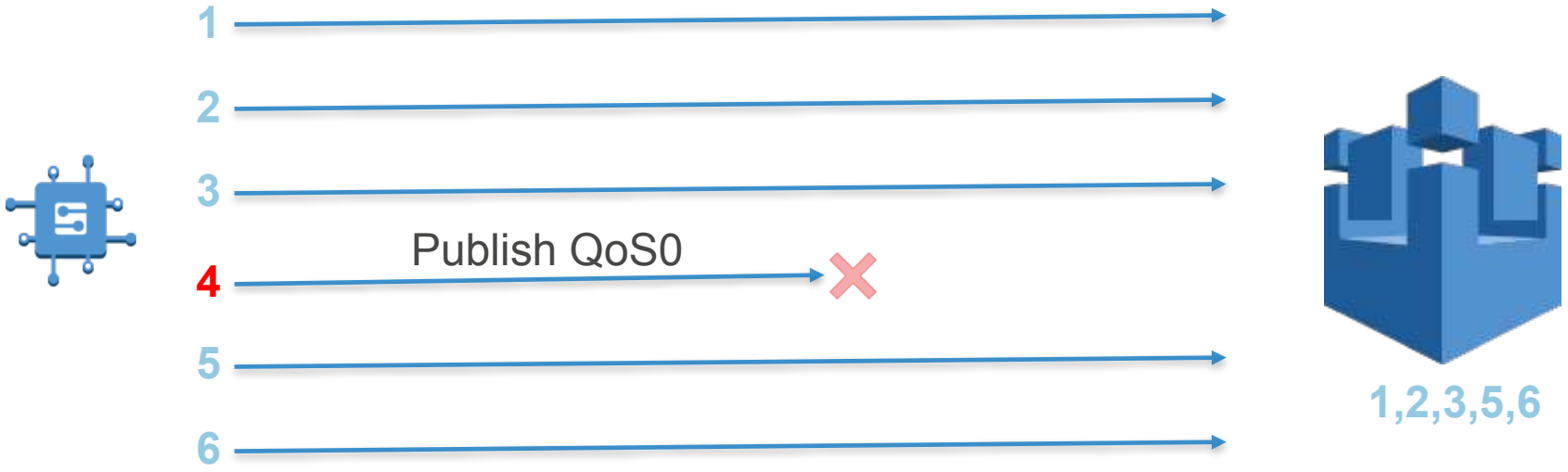
MQTTS vs HTTPS:

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

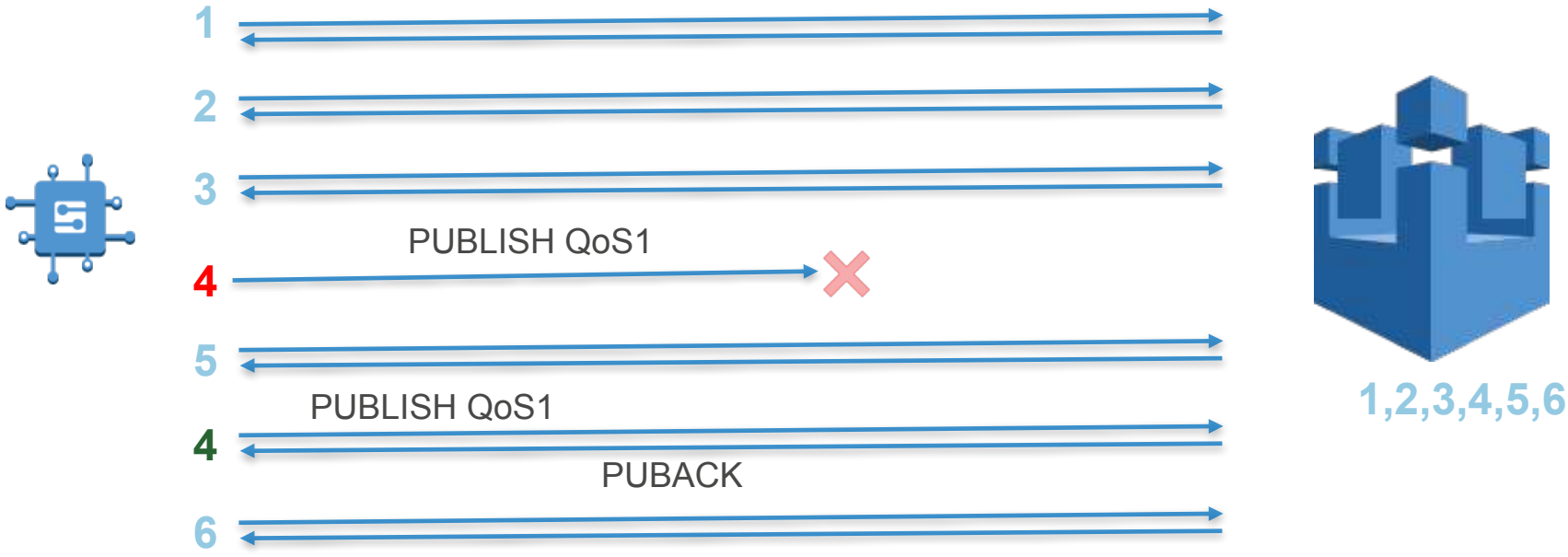
Source: http://stephendnicholas.com/archives/1217

amazon web services

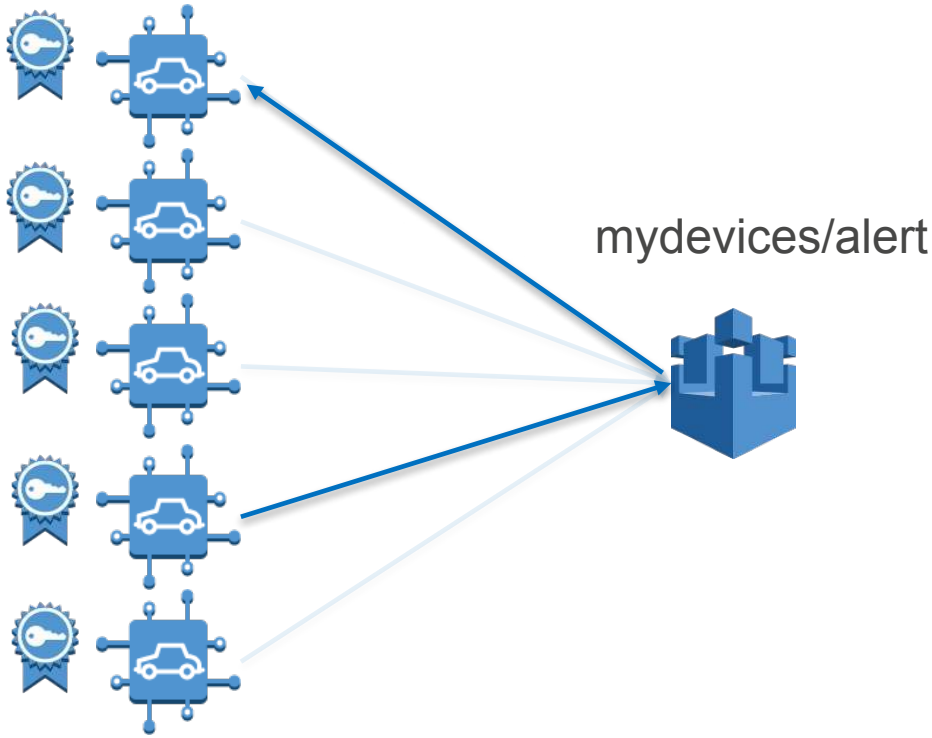
MQTT: QoS 0 (at most once)



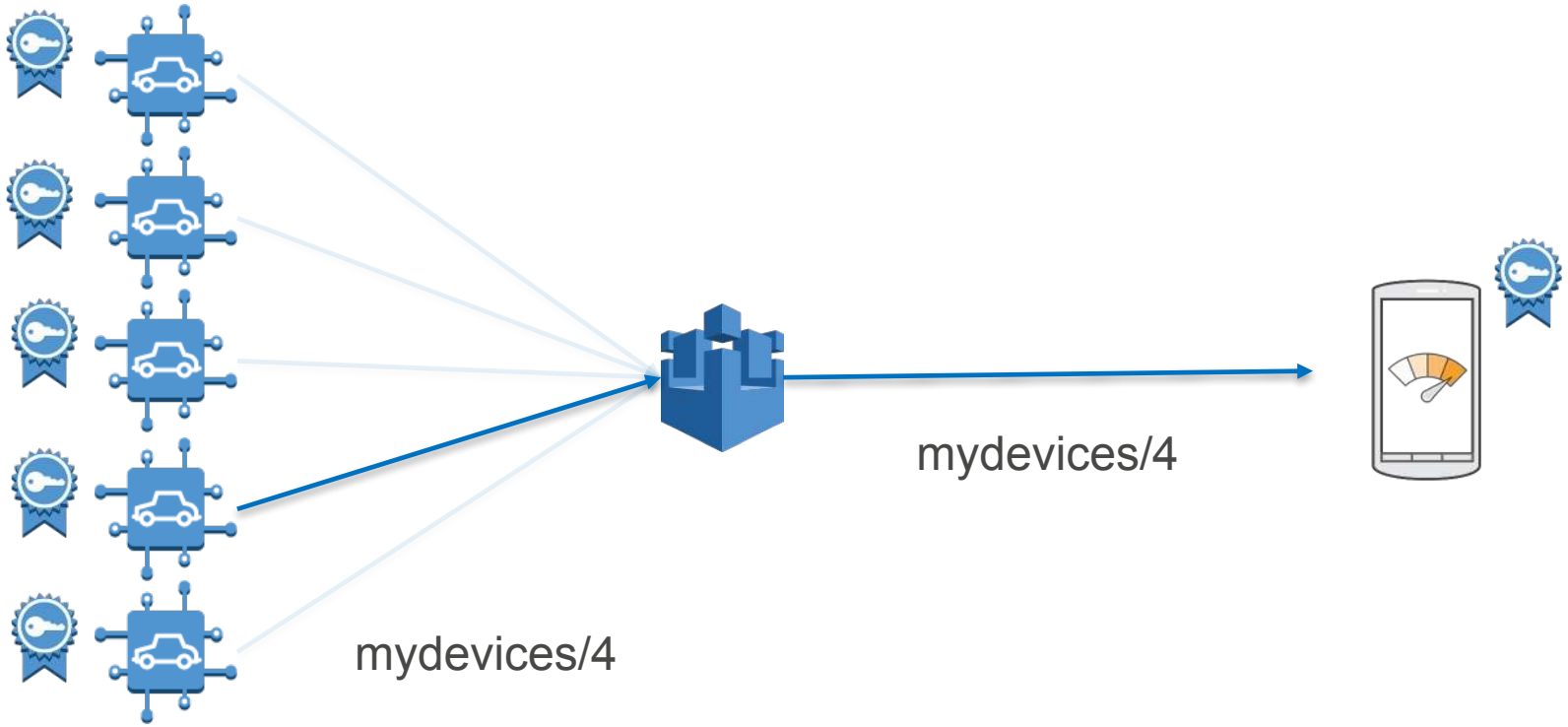
MQTT: QoS 1 (at least once)



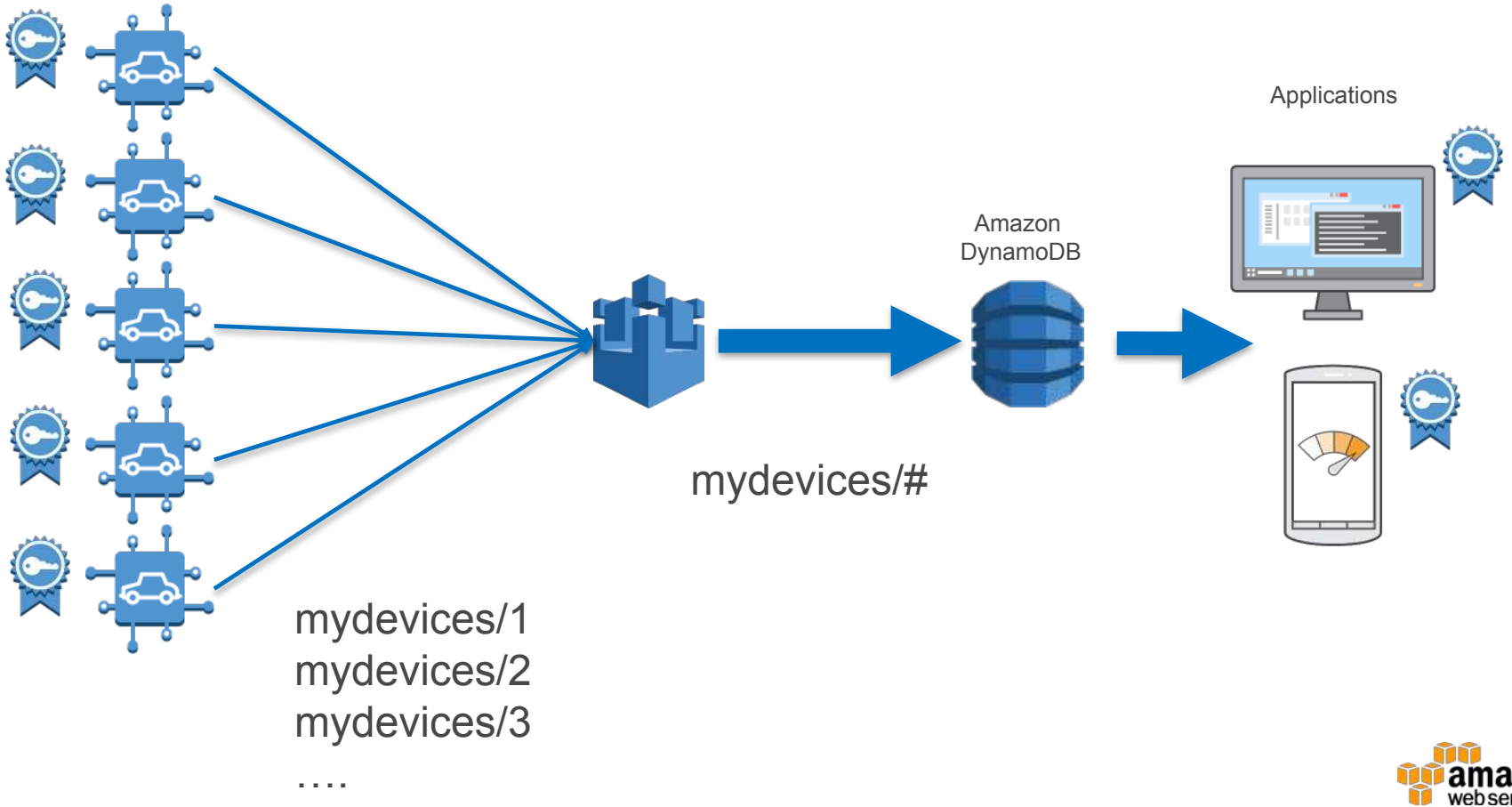
MQTT: device-to-device communication



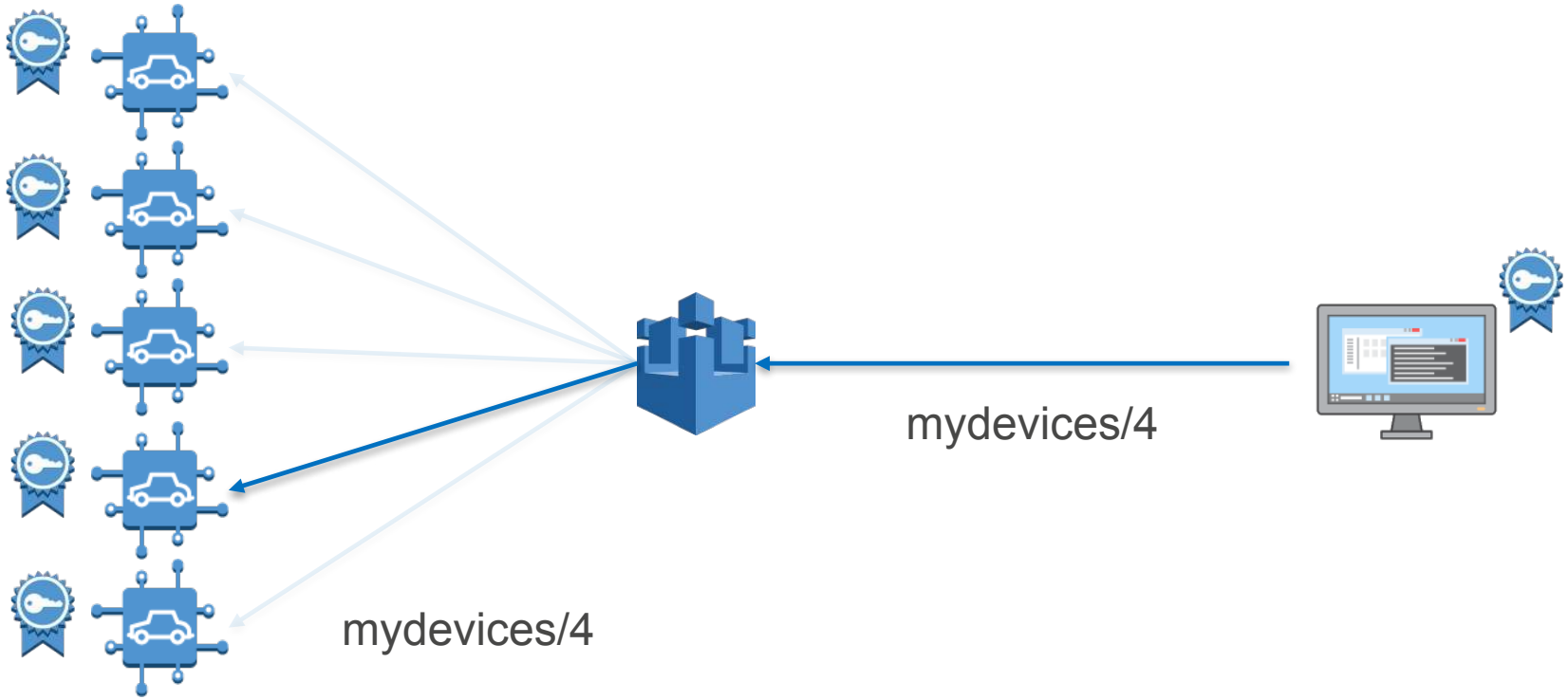
MQTT: collect data from a device



MQTT: aggregate data from many devices



MQTT: update a device



Arduino SDK: connecting to AWS IoT

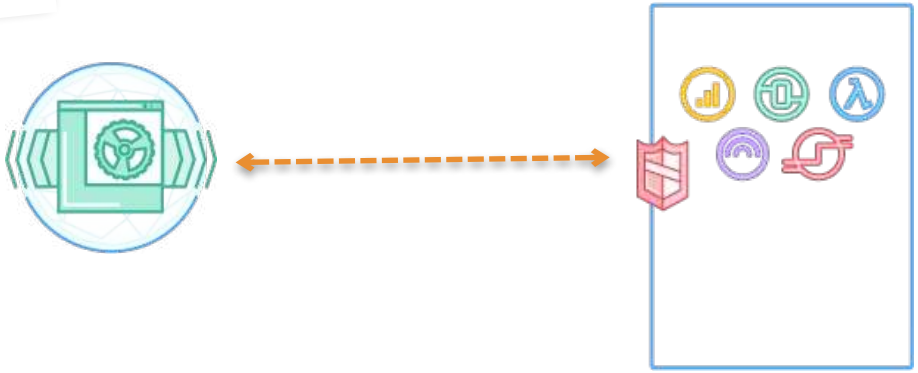
```
aws_iot_mqtt_client myClient;

if((rc = myClient.setup(AWS_IOT_CLIENT_ID)) == 0) {
  // Load user configuration
  if((rc = myClient.config(AWS_IOT_MQTT_HOST,
AWS_IOT_MQTT_PORT, AWS_IOT_ROOT_CA_PATH,
   AWS_IOT_PRIVATE_KEY_PATH, AWS_IOT_CERTIFICATE_PATH)) == 0) {
      if((rc = myClient.connect()) == 0) {
         // We are connected
         doSomethingUseful();
      }
   }
}
```

Arduino SDK: subscribing and publishing to a topic

```
if ((rc=myClient.subscribe(”myTopic", 1, msg_callback)) != 0)
{
   Serial.println("Subscribe failed!");
   Serial.println(rc);
}
```

```
if((rc = myClient.publish(”myTopic", msg, strlen(msg),
   1, false)) != 0)
{
   Serial.println("Publish failed!");
   Serial.println(rc);
}
```

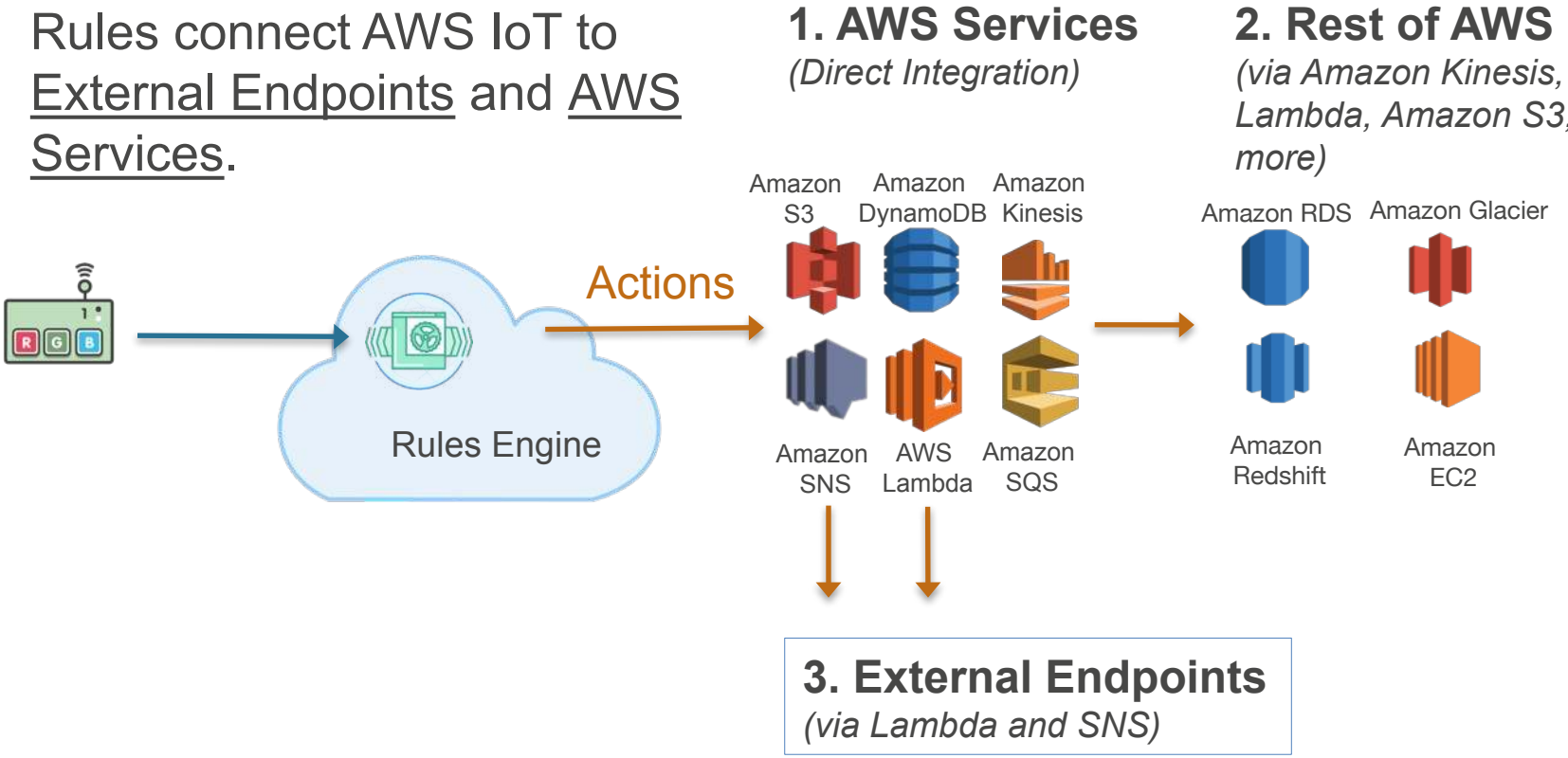
amazon web services



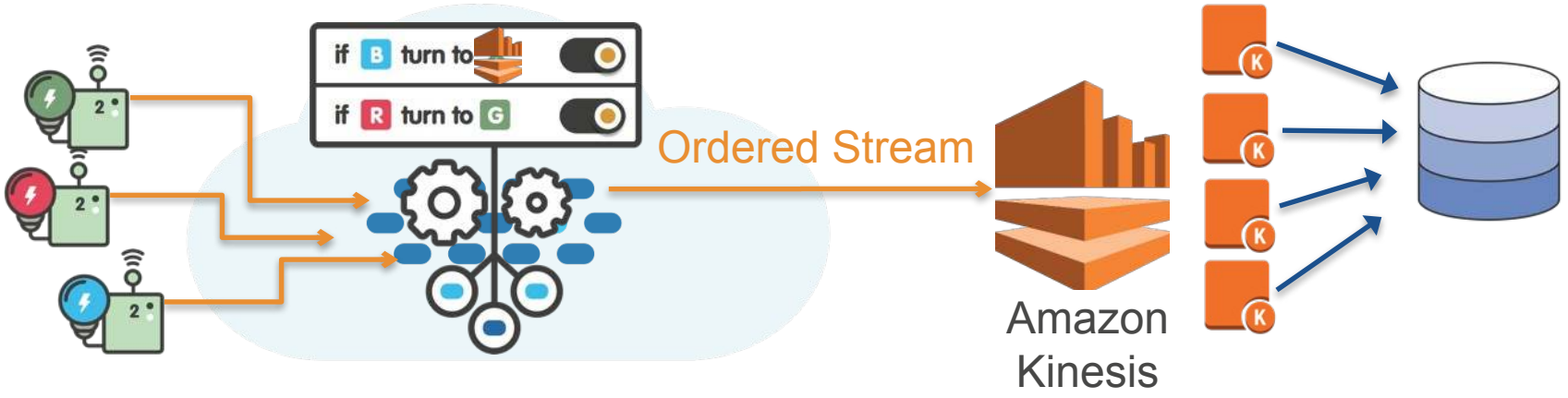
Rules

AWS IoT Rules

Rules connect AWS IoT to External Endpoints and AWS Services.



AWS IoT Rules: Streaming Data



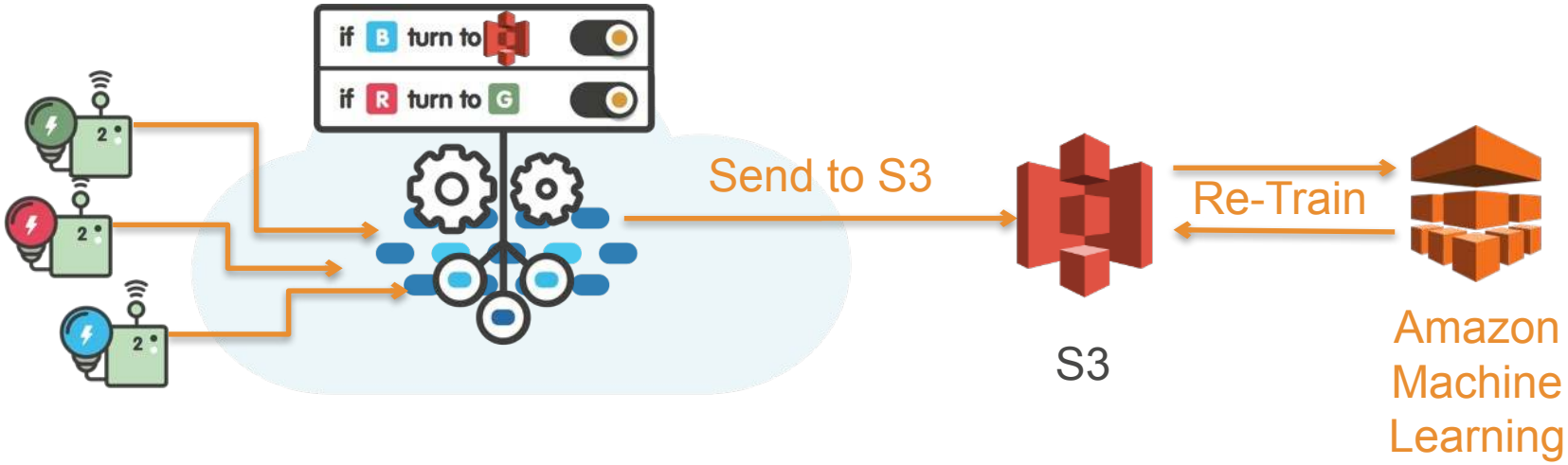
N:1 Inbound Streams of Sensor Data

Rules Engine filters, transforms sensor data then sends aggregate to Amazon Kinesis

Amazon Kinesis Streams to Enterprise Applications

Simultaneously stream processed data to databases, applications, other AWS Services

AWS IoT Rules: Machine Learning



Anomaly Detection

The Rules Engine can feed data to Amazon Machine Learning, for example to predict device failure

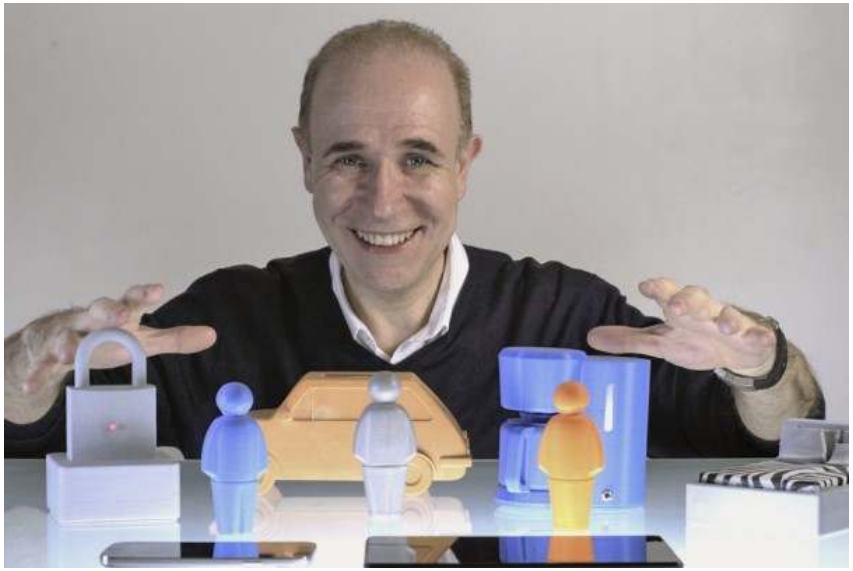
Continuous Improvement

Re-train the Amazon Machine Learning model periodically on new data

amazon web services

Z#BRE

www.zbre.fr



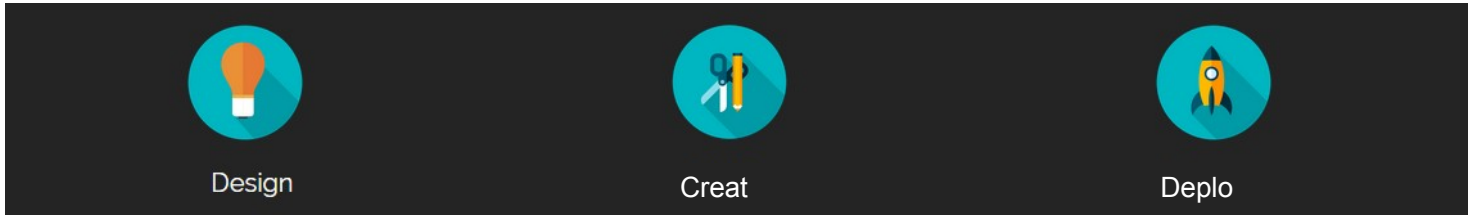
Jean-Paul HUON – CTO

amazon web services

IoT has a deep impact on business models

Physical re-intermediation

Increasing global value



Z#BRE

amazon web services

The project: improving quality of life for elderly people

Customer

Intermediary

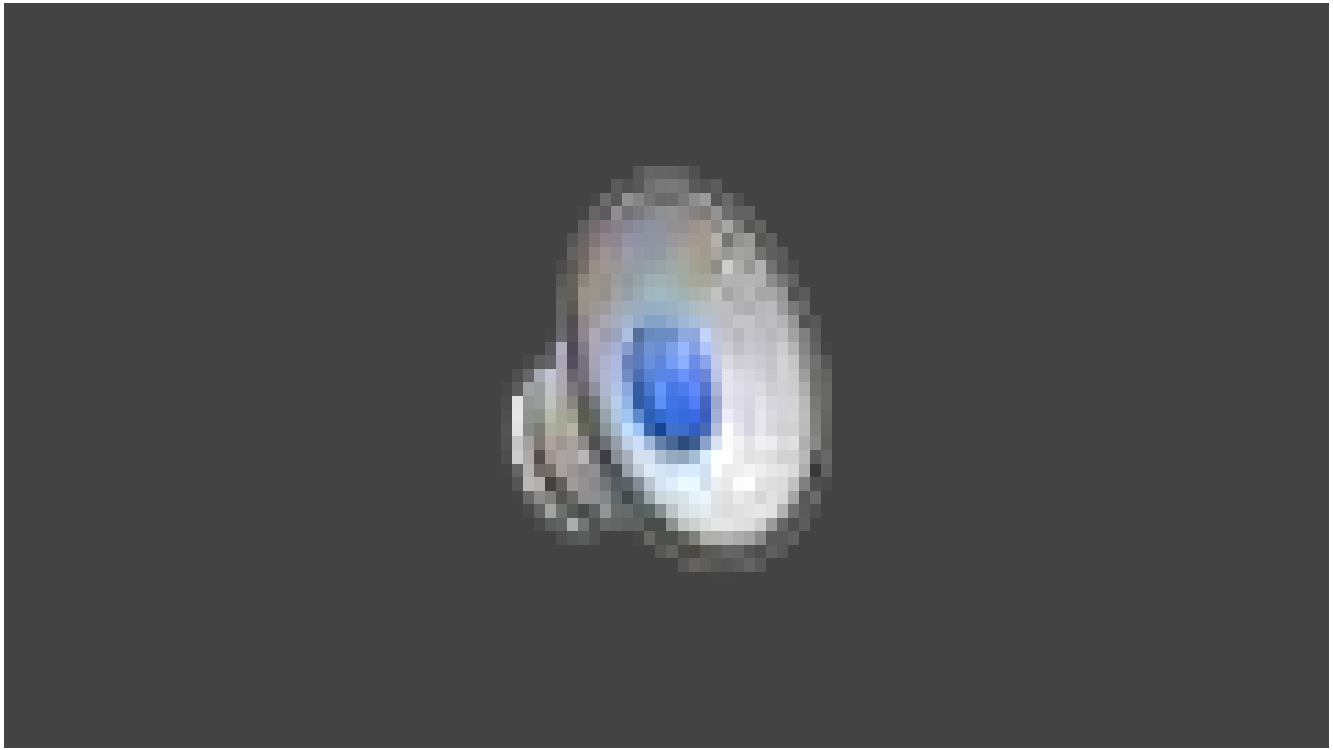
Loiret
votre Département

Provider

Our solution: the Lysbox

amazon web services

Our solution: the Lysbox

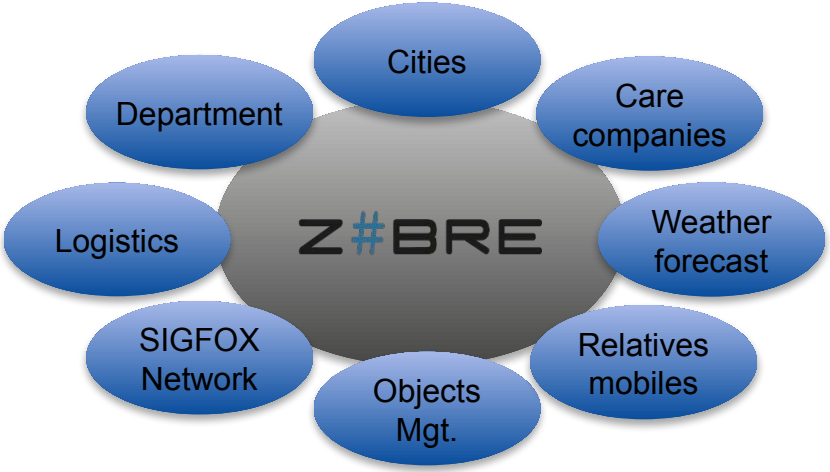


Achievements

- 100% elderly people equipped
- 10.000 boxes deployed in 6 months
- Quality of service improved
- 3 M€ savings / year
- ROI < 1 year

Challenges

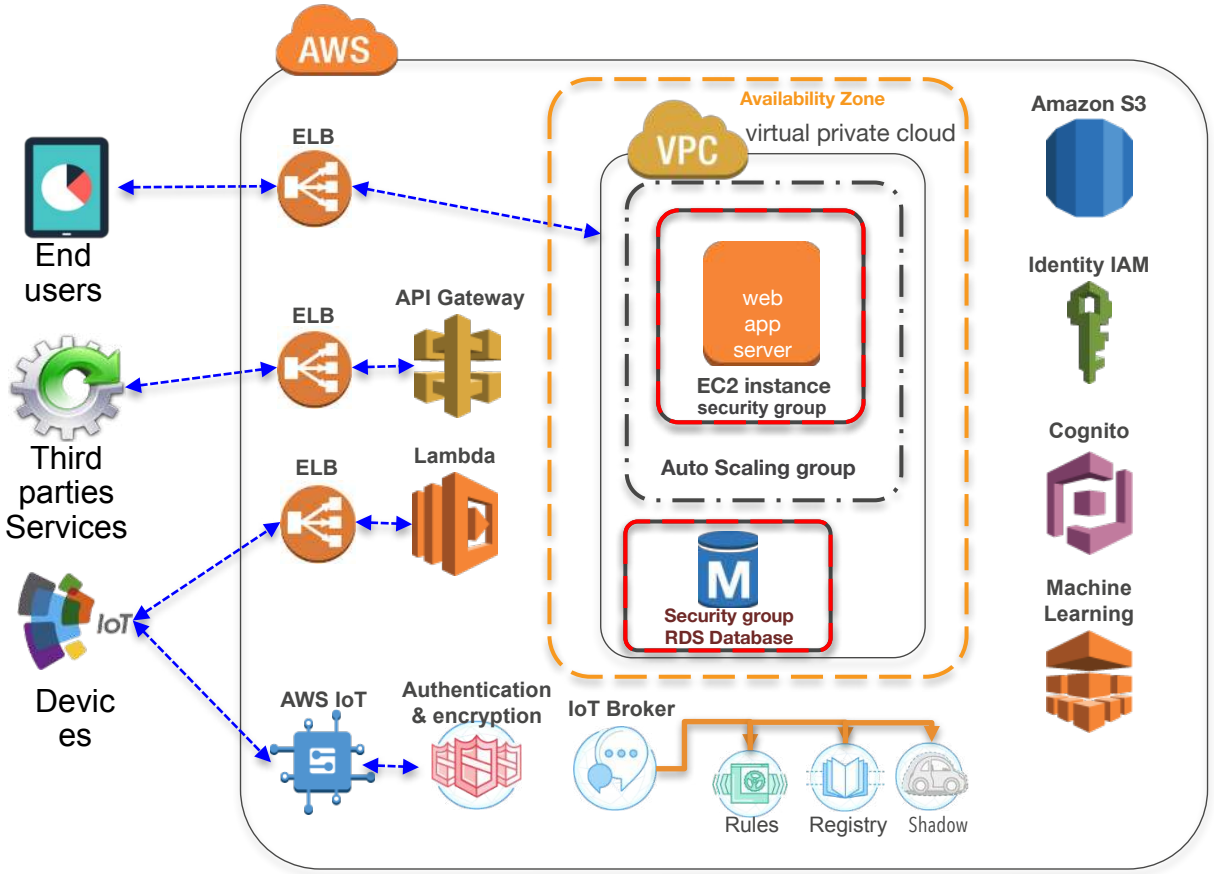
Complex interactions



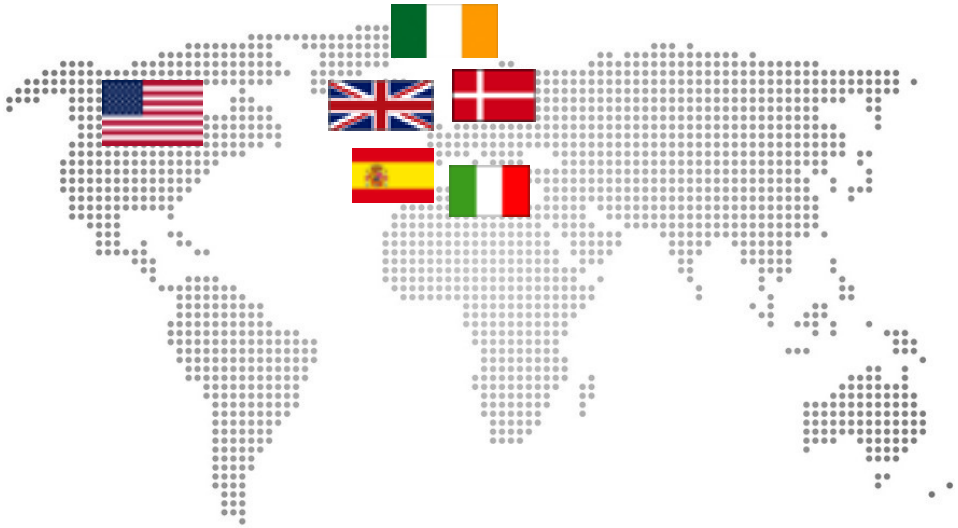
Constraints

- Deployment time: 6 months
- Security and encryption
- Evolutivity: DevOps (tests / stability)
- Scalability: from 0 to 10.000 objects in 6 months

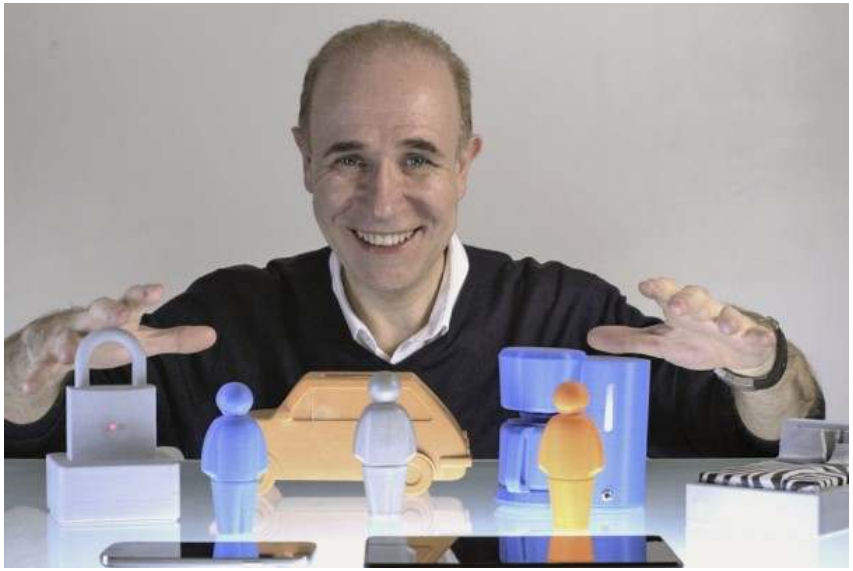
The Z#BRE platform on AWS



Upcoming projects



- Deployment in US & Asia
- Integrate AI features
- Increase variety of managed objects
- Systematic integration of SE

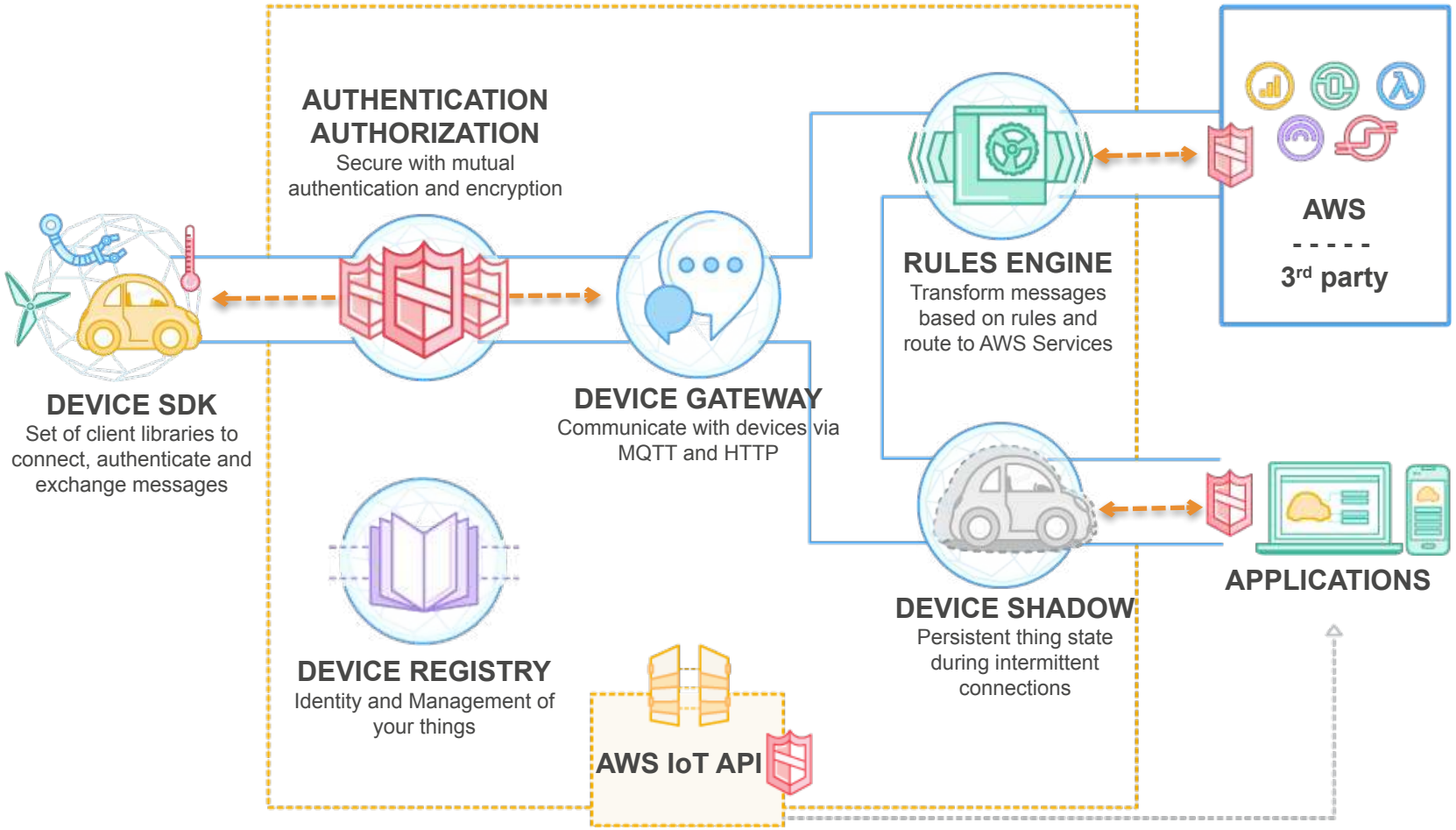


www.zbre.fr

Jean-Paul HUON, CTO
jp.huon@zbre.fr

amazon web services

AWS IoT


AUTHENTICATION
AUTHORIZATION
Secure with mutual authentication and encryption
DEVICE SDK
Set of client libraries to connect, authenticate and exchange messages
DEVICE GATEWAY
Communicate with devices via MQTT and HTTP
RULES ENGINE
Transform messages based on rules and route to AWS Services
AWS
- - - - -
3rd party
DEVICE SHADOW
Persistent thing state during intermittent connections
APPLICATIONS
DEVICE REGISTRY
Identity and Management of your things
AWS IoT API

AWS sessions @ IoT World

Today and tomorrow at **10:30** AM

« Architecture of the AWS IoT platform »

with Jean-Paul HUON, CTO, Z#BRE

Today and tomorrow at **3:15** PM

« Connected Agriculture with AWS IoT »

Michael GARCIA, EMEA SA Specialist Mobile/IoT, AWS

See you at the AWS booth!

Next events

sido
The Connected Business

April 6-7 (Lyon)

DEVOXX France

April 20-22

dot Scale

April 25

May 31st

AWSome Day

June 28
September 27
December 6

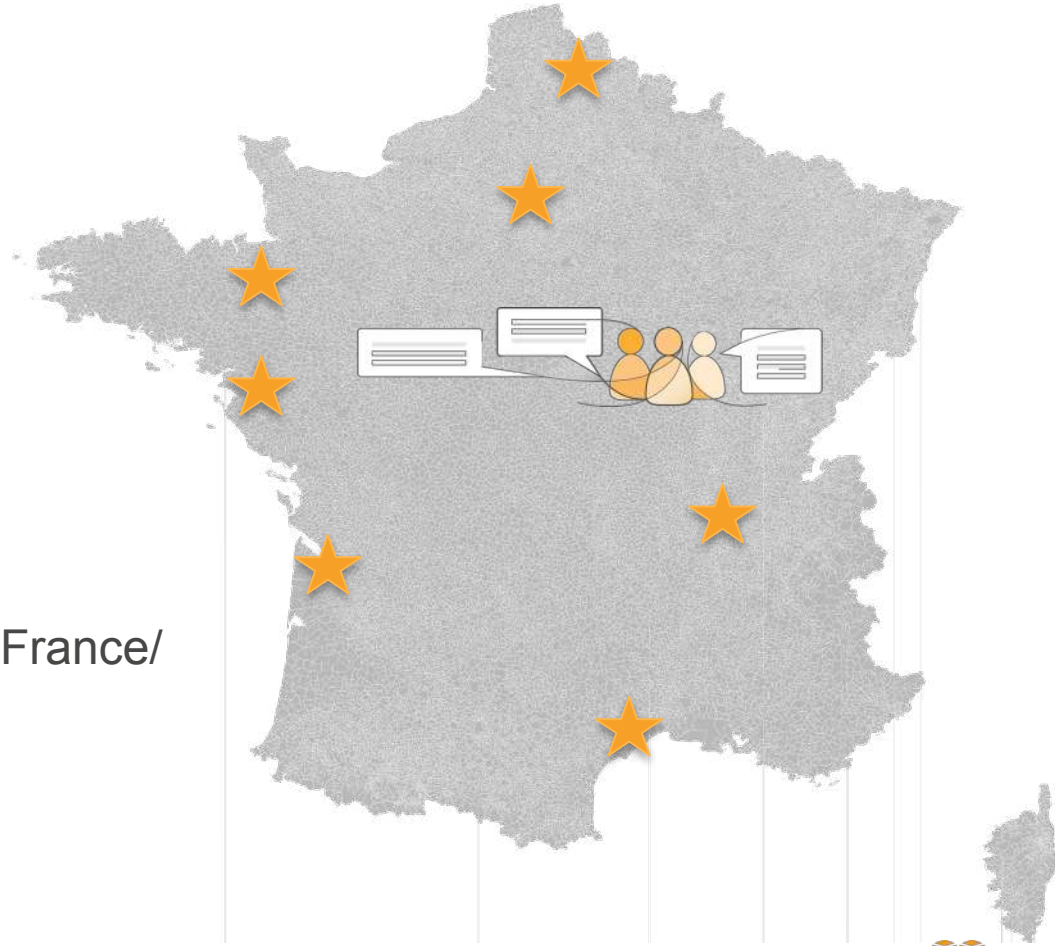
amazon web services

AWS User Groups

Lille
Paris
Rennes
Nantes
Bordeaux
Lyon
Montpellier

facebook.com/groups/AWSFrance/

@aws_actus



amazon web services

Merci !

Julien Simon
Principal Technical Evangelist, AWS
julsimon@amazon.fr
@julsimon

Jean-Paul Huon
CTO, Z#bre
jp.huon@zbre.fr

amazon web services