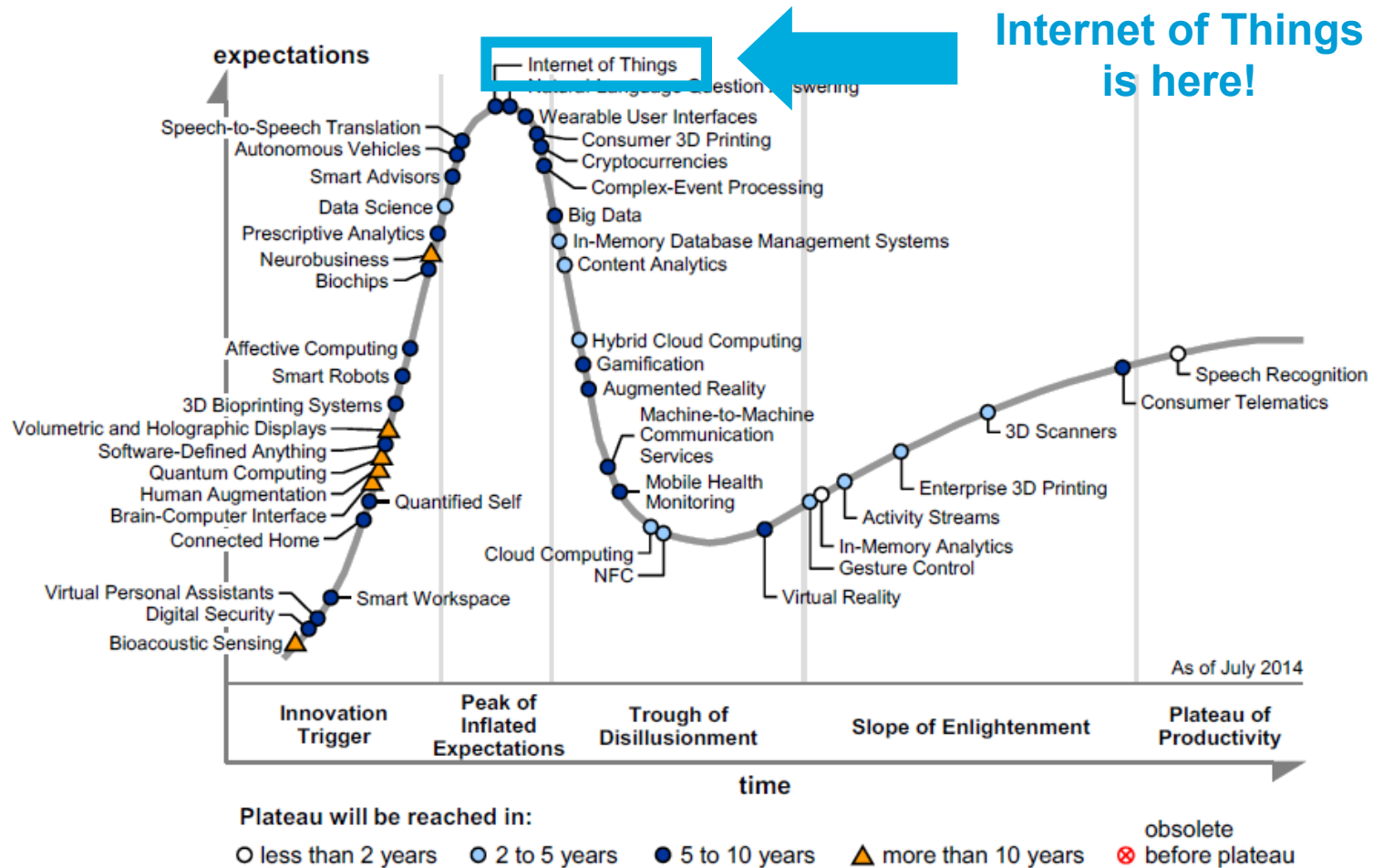




Internet of Things IoT Foundation

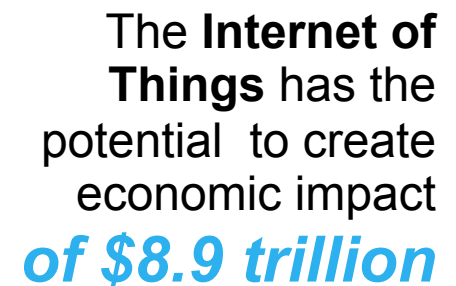
Luca Della Giovanna

Hype cycle for emerging technologies 2014



Source: Gartner (July 2014)

The number is expected to increase dramatically within the next decade, with estimates ranging from **30 billion devices**



Everything is connected...

My  tells my  that the  is over

My  tells my  to open the garage and start my 

My  tells my  that an intruder is entered

A  tells my  to tell my  that a  arrived

MQTT, a messaging protocol for IoT

Open (standard, 40+ client implementations)

Lightweight (minimal overhead, efficient format, tiny clients)

Reliable (QoS for reliability in unreliable networks)

Simple (43-pages specification, connect/publish/subscribe)



MQTT brokers

Appliance

- **IBM Message Sight**



Up & running in <30 minutes
1 rack = 273M msg/sec
21M concurrent connections
DMZ-ready, FIPS 140-2
deny-based access control

Cloud

- **IBM IoT Foundation**
- HiveMQ
- Eurotech EDC
- Litmus Loop
- ...

Open Source

- Mosquitto (C)
- Mosca (NodeJS)
- Moquette (Java)
- RSMB (C)
- ...

Let's
Demo!!

Starfighter

Publish/subscribe MQTT through IBM MessageSight drives a real-time, massively multiplayer arcade experience.

How it works

MQTT 'Starfighters' publish their movements and actions to a dynamic topic structure in yet low-latency gaming experience. The 'Red' starfighters are other players (desktop/mobile) running in BlueMix.

Try it

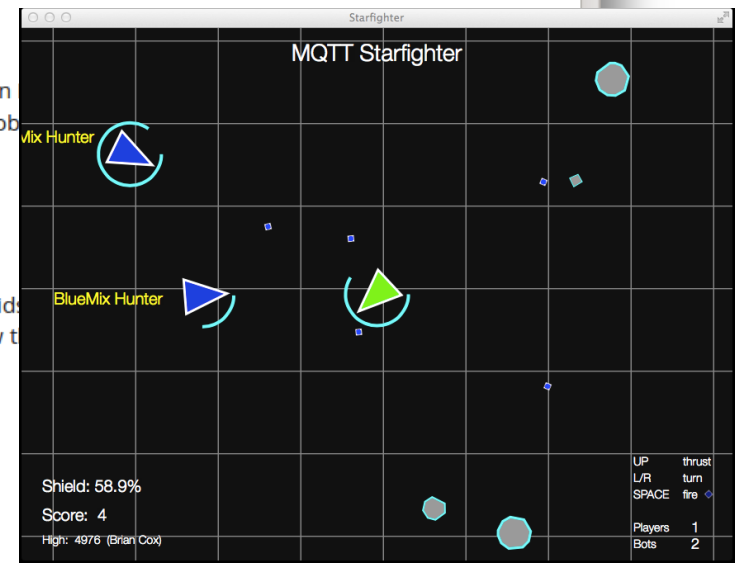
Press 'Play' to try out the game (optimized for Chrome/Safari). Blow up as many asteroids; shields are gone! 'View Game' takes you to a pan/zoom application where you can view the game to an MQTT client auto-subscribed to the Starfighter game data.

Play

View Game

See Data

Watch



<http://m2m.demos.ibm.com/collaboration.html#starfighter>

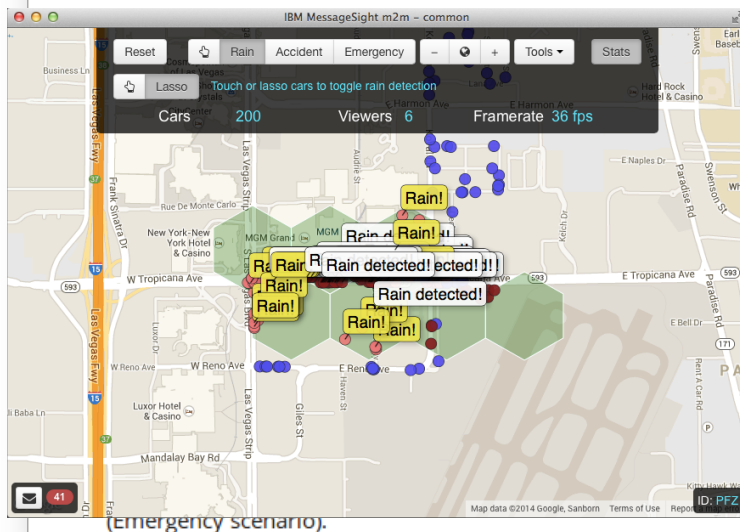
<https://hub.jazz.net/project/spirit/MQTT%20Starfighter%20Server/overview>



Let's
Demo!!

Connected Car

Hundreds of cars drive through the city, publishing telemetry via MQTT to IBM MessageSight. Real-time Big Data and geospatial analytics is performed in microseconds by InfoSphere Streams for road conditions, accidents, and disaster zones. Alert events are delivered to each car dash and displayed in a HTML5 Worklight application.

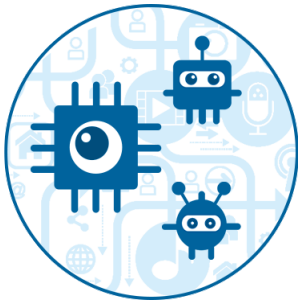


a robust
IBM
from simulated
y feed and
rs with the
d dashboard
overlays
command the
the Accident
alert regions



[connectedCar](http://tiny.cc/ws0zpx)
<http://tiny.cc/ws0zpx>

Simple, like 2+2



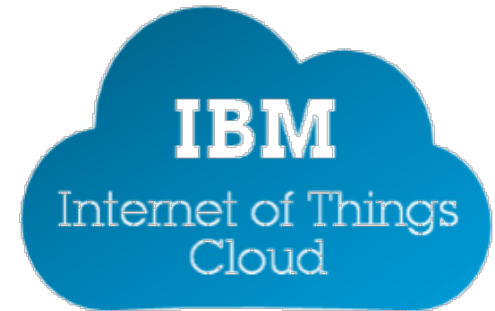
IBM IoT Foundation

+



IBM Bluemix

=



Try it!

IBM Internet of Things Foundation - Mozilla Firefox: IBM Edition

IBM Internet of Things Founda...

IBM Internet of Things Foundation

IoT Foundation Recipes Quickstart

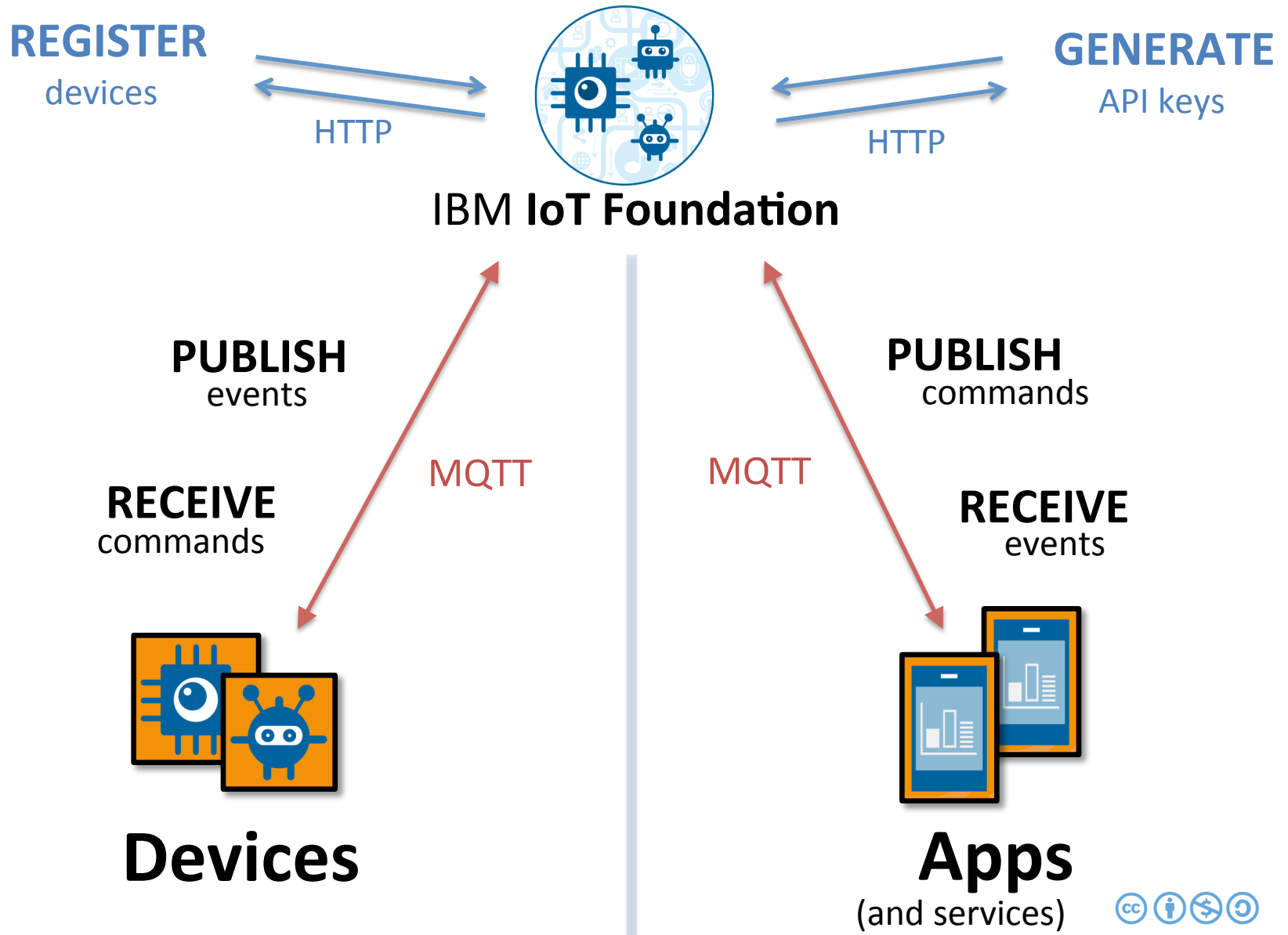
IBM Internet of Things Foundation (IoT Foundation)

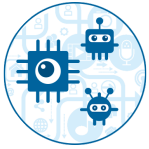
A fully managed, cloud-hosted service that is designed to simplify and derive the value from your IoT devices. Check the capabilities list to see the key features. Internet of Things Foundation is available through Bluemix and the IBM Marketplace. Try it out with a free 30 day trial.

- Device registration
- Device and application connectivity
- Securely receiving data and sending commands to devices
- Storage and access to historic data

Sign up

<https://quickstart.internetofthings.ibmcloud.com>





MQTT Host

tcp://<org-id>.messaging.internetofthings.ibmcloud.com:1883

ssl://<org-id>.messaging.internetofthings.ibmcloud.com:8883



Apps & Services

Example

key: a-myorg-hketyuionf

token: AB3ur51jL+3awe0kl

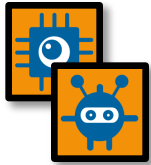
username → <key>

password → <token>

clientid → a:<orgid>:<app-id>

publishes → iot-2/type/<type-id>/id/<device-id>/cmd/<cmd-id>/fmt/<format-id>

subscribes → iot-2/type/<type-id>/id/<device-id>/evt/<event-id>/fmt/<format-id>



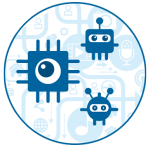
Devices

Example

```
org=myorg  
type=mydevicetype  
id=mydeviceid  
auth-method=token  
auth-token=Gh3e(EA998fart4
```

username → use-token-auth
password → <auth-token>
clientid → d:<orgid>:<type-id>:<divice-id>
publishes → iot-2/evt/<event-id>/fmt/<format>
subscribes → iot-2/cmd/<cmd-type>/fmt/<format-id>
payload → {“d”: {“name1”: “value1”, “name2”: intvalue } }





REST API Examples

View an organization (GET):

`https://internetofthings.ibmcloud.com/api/v0001/organizations/<org-id>`

List all devices (GET) / Registr a device (POST):

`https://internetofthings.ibmcloud.com/api/v0001/organizations/<org-id>/devices`

Historical data for a device (GET):

`https://internetofthings.ibmcloud.com/api/v0001/historian/<org-id>/<type-id>/<id>?filter`

Example: get all devices

```
curl --user "<key>:<token>" https://internetofthings.ibmcloud.com/api/v0001/organizations/<org-id>/devices
```

IoT Foundation Organization



IBM Internet of Things Foundation

[Quickstart](#)[Service Status](#)[Documentation](#)







IBM

Organization: sg7uxg (Bluemix Free)

[Home](#)[Devices \(6\)](#)[API Keys](#)[People](#)[Usage](#)

This table shows the devices that have been added to your organization. Add and remove devices, or see more information on a device to view and chart the data being received by the IoT Foundation. If you want to share the data from your devices outside of the IoT Foundation, use the [API Keys](#) tab.

[Add Device](#)[Remove Device\(s\)](#)

<input type="checkbox"/>	Device Type	Device ID	Last Event	Message Rate	Date Added	Added By	
<input type="checkbox"/>	arduinoyun	giulioyun	<input type="checkbox"/> 10 days ago +	-	Tuesday, April 14, 2015	giulio_santoli@it.ibm.com	
<input type="checkbox"/>	iotsample-arduino	20A2D0FE10F	<input checked="" type="checkbox"/> 4 months ago +	-	Saturday, November 15, 2014	giulio_santoli@it.ibm.com	
<input type="checkbox"/>	iotsample-raspberrypi	00-0C-29-92-40-F9	<input type="checkbox"/> 5 days ago +	-	Monday, November 3, 2014	giulio_santoli@it.ibm.com	
<input type="checkbox"/>	nodejsexample	AABCCDDEEFF	<input type="checkbox"/> 6 hours ago +	-	Sunday, April 26, 2015	giulio_santoli@it.ibm.com	
<input type="checkbox"/>	pippo	pippo123	<input checked="" type="checkbox"/> Unavailable +	-	Thursday, December 18, 2014	giulio_santoli@it.ibm.com	
<input type="checkbox"/>	testdevice	mydeviceid	<input type="checkbox"/> 6 hours ago +	-	Tuesday, November 4, 2014	giulio_santoli@it.ibm.com	

[Add Device](#)

Example: app (subscriber) & device (publisher)



```
> mosquitto_sub -d -h org.messaging.internetofthings.ibmcloud.com -p 1883  
-i "a:org:myapp" -u "key" -P "token" -t "iot-2/type/+/id/+/evt/+/fmt/json"  
  
> mosquitto_pub -d -h org.messaging.internetofthings.ibmcloud.com -p 1883  
-i "d:org:type:id" -u "use-token-auth" -P "auth-token" -q 0  
-t "iot-2/evt/status/fmt/json" -m "hello"
```

device

```
org=myorg  
type=mydevicetype  
id=mydeviceid  
auth-method=token  
auth-token=Gj6e(EA998fart4
```

app

```
key: a-myorg-hketyuionf  
token: AB3ddr51jL+3ape0kl
```



Example: device (subscriber) & app (publisher)



```
> mosquitto_sub -d -h org.messaging.internetofthings.ibmcloud.com -p 1883  
-i "d:org:type:id" -u "use-token-auth" -P "auth-token"  
-t "iot-2/cmd/reboot/fmt/json"
```

```
> mosquitto_pub -d -h org.messaging.internetofthings.ibmcloud.com -p 1883  
-i "a:org:myapp" -u "key" -P "token"  
-t "iot-2/type/type/id/id/cmd/reboot/fmt/json" -m "test123"
```

device

```
org=myorg  
type=mydevicetype  
id=mydeviceid  
auth-method=token  
auth-token=Gj6e(EA118fart4
```

app

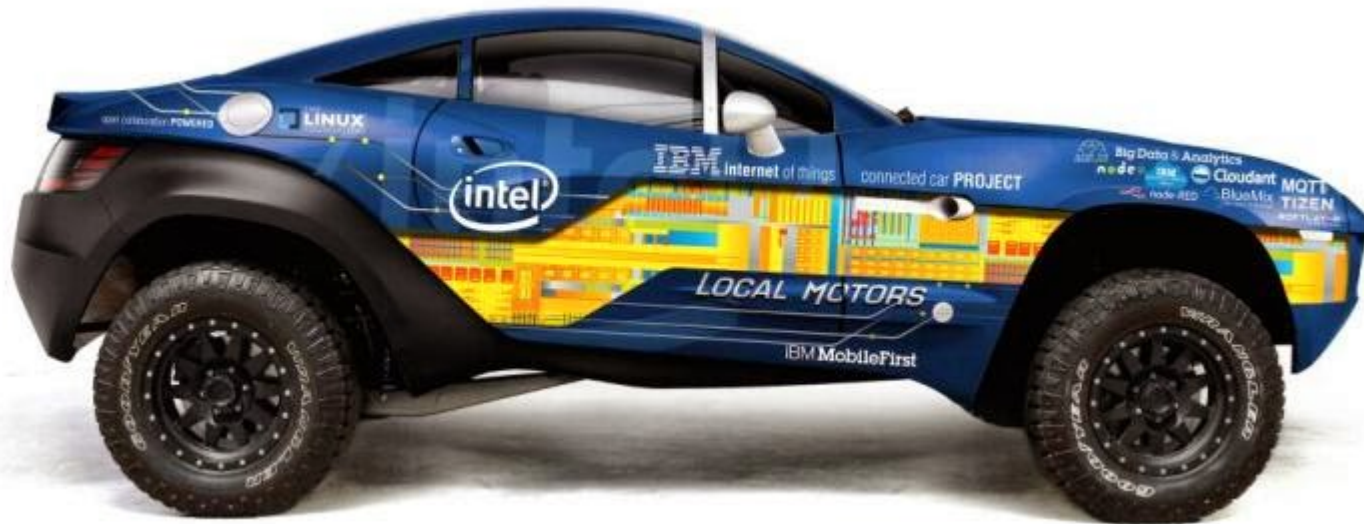
```
key: a-myorg-hjetyuionf  
token: AB3ffr51jL+3ape0kl
```



Example: node.js registered client

```
1  var mqtt    = require('mqtt');
2  var clientId = 'd:sg7uxg:mytype:mydeviceid';
3  var username = 'use-token-auth';
4  var password = 'mypassword';
5  var topic    = 'iot-2/evt/status/fmt/json';
6  var server   = 'mqtt://sg7uxg.messaging.internetofthings.ibmcloud.com';
7  var client   = mqtt.connect(server, { clientId: clientId, username: username, password: password});
8
9  function start() {
10     setTimeout(start, 1000);
11     var temperature = Math.random() * 2 + 20;
12     var jsonData    = {'d':{'myName': 'NodeJS Client', 'temperature': temperature}};
13     var payload     = JSON.stringify(jsonData);
14     console.log(payload);
15     client.publish(topic, payload);
16 }
17
18 start();
```

Create your **Internet of Things** application with IBM **Bluemix**!





Thank you for
attending