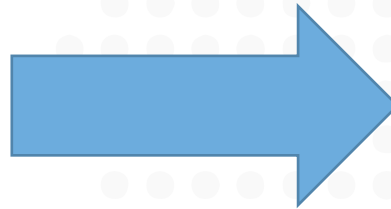


IPv6 & Smart Cities



Adevice in a nutshell



```
1 {
2   "id": "thing:PlazaSpana",
3   "type": "thing",
4   "ATV61_Active_PlazaSpana": {
5     "type": "string",
6     "value": "965.00",
7     "metadata": {
8       "timestamp": {
9         "type": "ISO8601",
10        "value": "2016-06-28T16:45:00Z"
11      }
12    }
13  },
14  "ATV61_Current": {
15    "type": "string",
16    "value": "1407.98",
17    "metadata": {
18      "timestamp": {
19        "type": "ISO8601",
20        "value": "2016-06-28T17:00:00Z"
21      }
22    }
23  },
24  "ATV61_Power_PlazaSpana": {
25    "type": "string",
26    "value": "65.00",
27    "metadata": {
28      "timestamp": {
29        "type": "ISO8601",
30        "value": "2016-06-28T16:45:00Z"
31      }
32    }
33  },
34  "ATV61_RPM": {
35    "type": "string",
36    "value": "1320.00",
37    "metadata": {
38      "timestamp": {
39        "type": "ISO8601",
40        "value": "2016-06-28T16:45:00Z"
41      }
42    }
43  }
44 }
```

Intro & Context

- Adevice is trying to solve Cities' problems
- We have partnered with Telefonica
 - We forecast that IoT will rely on Telco infrastructure
- Some Cities' problems needs lots of endpoints
 - That's where IPv6 began to be interesting for us
- Therefore we needed to pilot IPv6

Main characters



Carlos Pardo



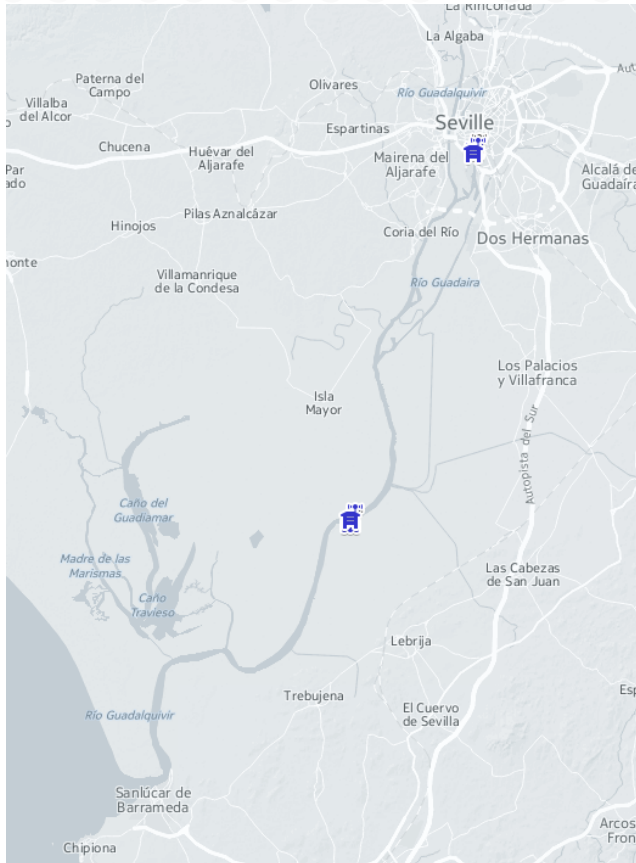
Carlos Ralli



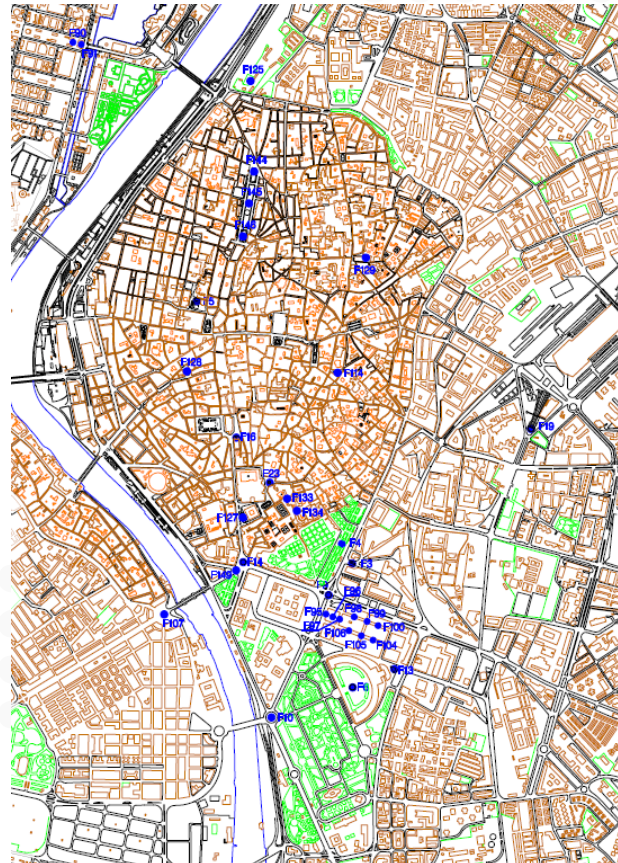
Joaquín Cabezas (me)



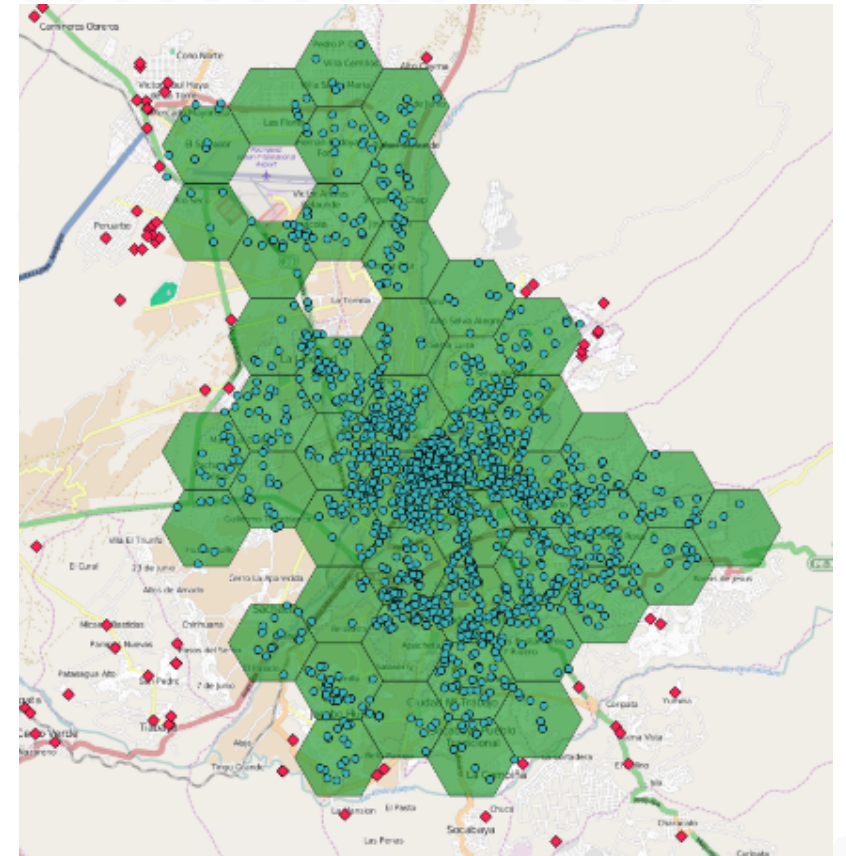
Experience and Use Cases



Water quality



Smart Fountain



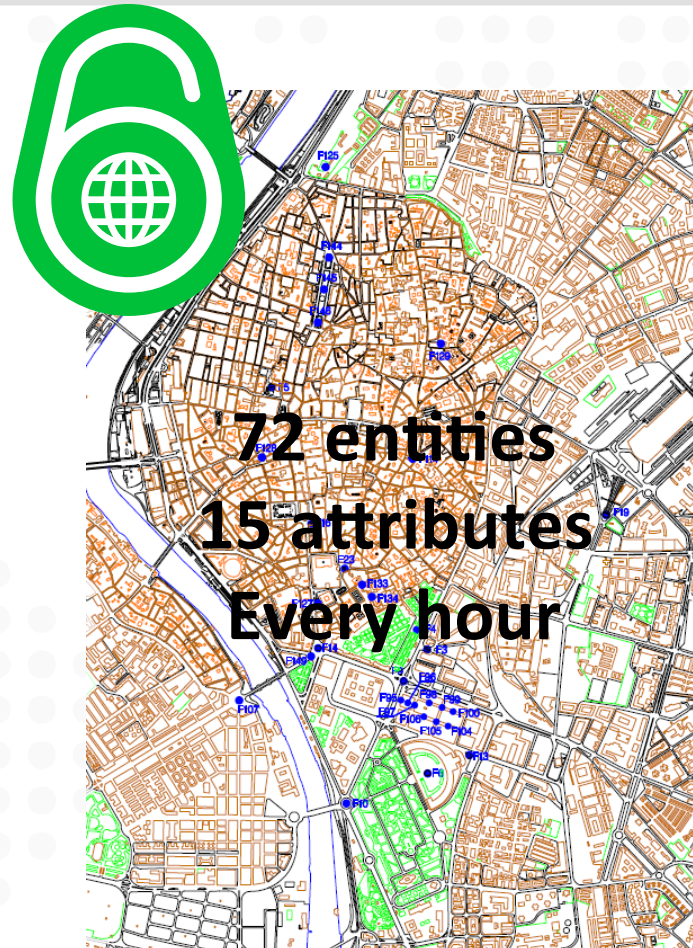
Smart Metering

Experience and Use Cases



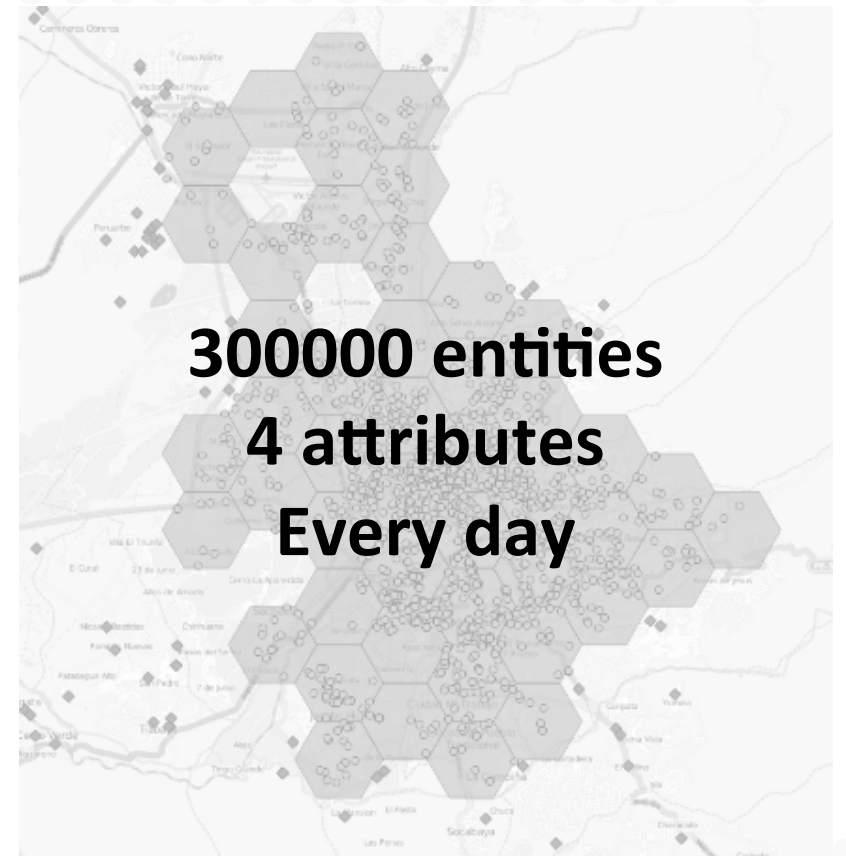
2-3 entities
30 attributes
Every minute

Water quality



72 entities
15 attributes
Every hour

Smart Fountain



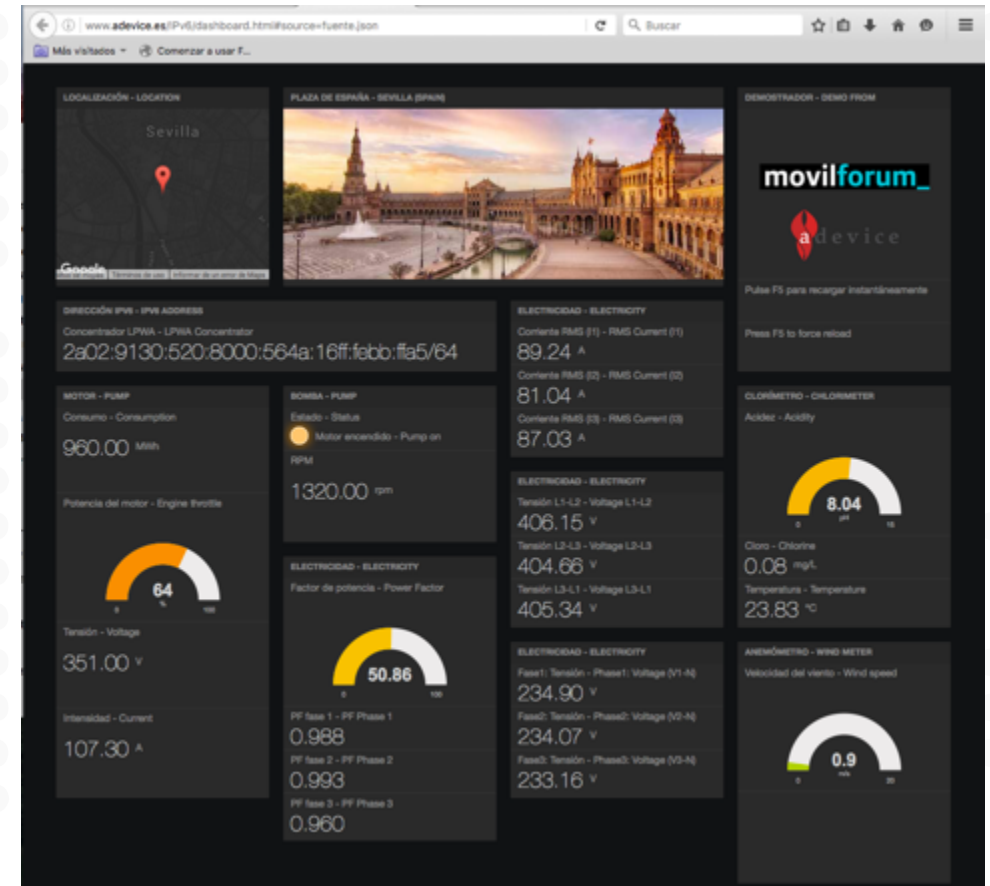
300000 entities
4 attributes
Every day

Smart Metering



Example: Smart Fountain

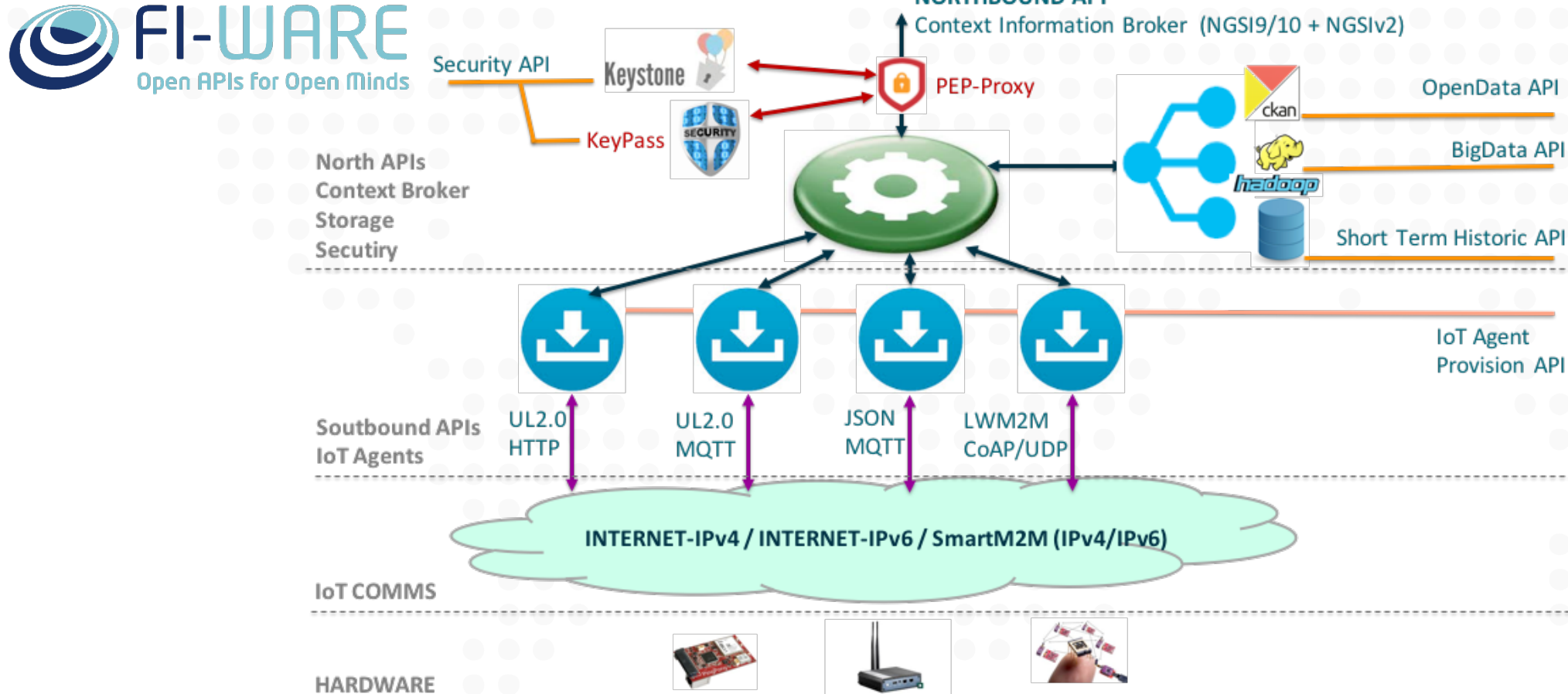
- Is it working properly?
- Do I have to clean it?
- Is there any leak?
- Am i using the pump too much?



Question

Can we go native IPv6 for
our Smart Fountain?

Architecture



Datacenter

- IPv6 compatible datacenter from RedIRIS
- OpenStack based deployment (work in progress)
- Update maintenance scripts
- Convince lots of people to join our cause!!

Mobile network

- Creation of an APN for the pilot
- Configuration of HLR – Home Location Register
- Configuration of GGSN – Gateway GPRS Support Node
- Addressing & Routing on Mobile Network
- Connection to RIMA (Advanced IP Network Multi-service from Telefonica)

Mobile Terminal

- OnePlus One with Cyanogen 12
- LG Nexus 5 with Android 5.0
- Samsung Galaxy Core LTE
- Configure APN and try to connect to ipv6.google.com

IPv6 & Smart Cities



After a few tries...

Guardando captura de pantalla...

ipv6 test

ISP

IPv6 connectivity

IPv6 **Supported**

Address **2a02:9130:520:8000:1:1:b37a:fb2**

Type **Native IPv6**

SLAAC **No**

ICMP **Filtered**

Hostname **None**

ISP **Telefonica**

Score

ipv6-test.com

ipv6 test

ISP Telefonica

Speed 10.5 Mbit/s

Your speed test results

IPv4

IPv6 10.5 Mbit/s

MyIPv6 0.1.3
android@schoar.de

- Connectivity -
IP: **2a02:9130:520:0:1:0:b378:6ffa**

- Interfaces -
dummy0: **IPv6 missing**
lo: **Loopback only**
rmnet0: **The real thing!**
rmnet1: **IPv6 missing**
rmnet2: **IPv6 missing**
rmnet3: **IPv6 missing**
rmnet4: **IPv6 missing**
rmnet5: **IPv6 missing**
rmnet6: **IPv6 missing**
rmnet7: **IPv6 missing**
sit0: **IPv6 missing**

Network Info II

External IP:
Ext. Hostname (L):
Ext. Hostname (R):

INTERFACE	DEVICE	WIFI	BT	LOCATION	IPv6
Method: ip -o -f inet6 addr					
rmnet0					
IP:	2a02:9130:520:0:aab9:d8d0:464d:a018				
Prefix:	/64				
Scope:	global				
^	No IPv6 gateway found on device				
Info:	'ip -o -f inet6 route show' returned null.				
rmnet0					
IP:	fe80::aab9:d8d0:464d:a018				
Prefix:	/64				
Scope:	link				
^	No IPv6 gateway found on device				
Info:	'ip -o -f inet6 route show' returned null.				

Our own gateway

- Testing with IPv6-only local network:
 - Update some scripts and commands (if6up, ping6...)
 - Allow square brackets on address ([http://\[xxxxx\]](http://[xxxxx]))
- Testing with 3G modem:
 - Test PDP Context (AT+CDGCONT=?)
 - Configure CDGCONT and CGACT
 - Update connect-chat script, ppp configuration...
- Update internal website

3G Router

- Proroute GEM420 / Matrix Helios *II*
- TP-Link Archer MR200 AC750 Wireless Dual Band 4G
- MTX-3G-JAVA



Bugs



Internet

Internet Status:

Disconnected

Unknown failure reason. Please make sure your configuration is correct.

SIM Card Status:

SIM card prepared.

Network Type:

WCDMA

Data:

8.958GB (Monthly Used)

Signal Strength:

100%

IP Address:

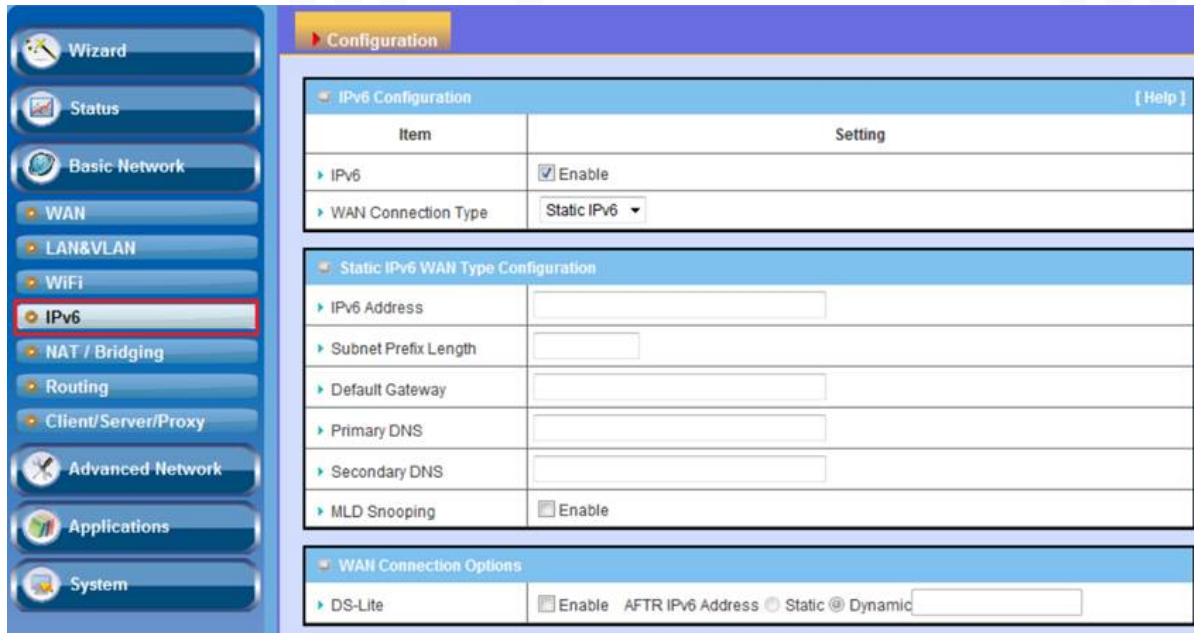
0.0.0.0 / 2a02:9130:520:0:b8f7:f1ff:fe57:6fd9

DNS Server:

0.0.0.0 0.0.0.0 / 2a02:9000::aaaa 2a02:9000::bbbb

Bugs

- Matrix Helios II does not connect (it keeps reconnecting). Maybe due to a check on the IPv4 world or a watchdog.



We have been working together to fix this.

Next try with:

HeliosII_OT001-BUTE0.1011_06131503.bin

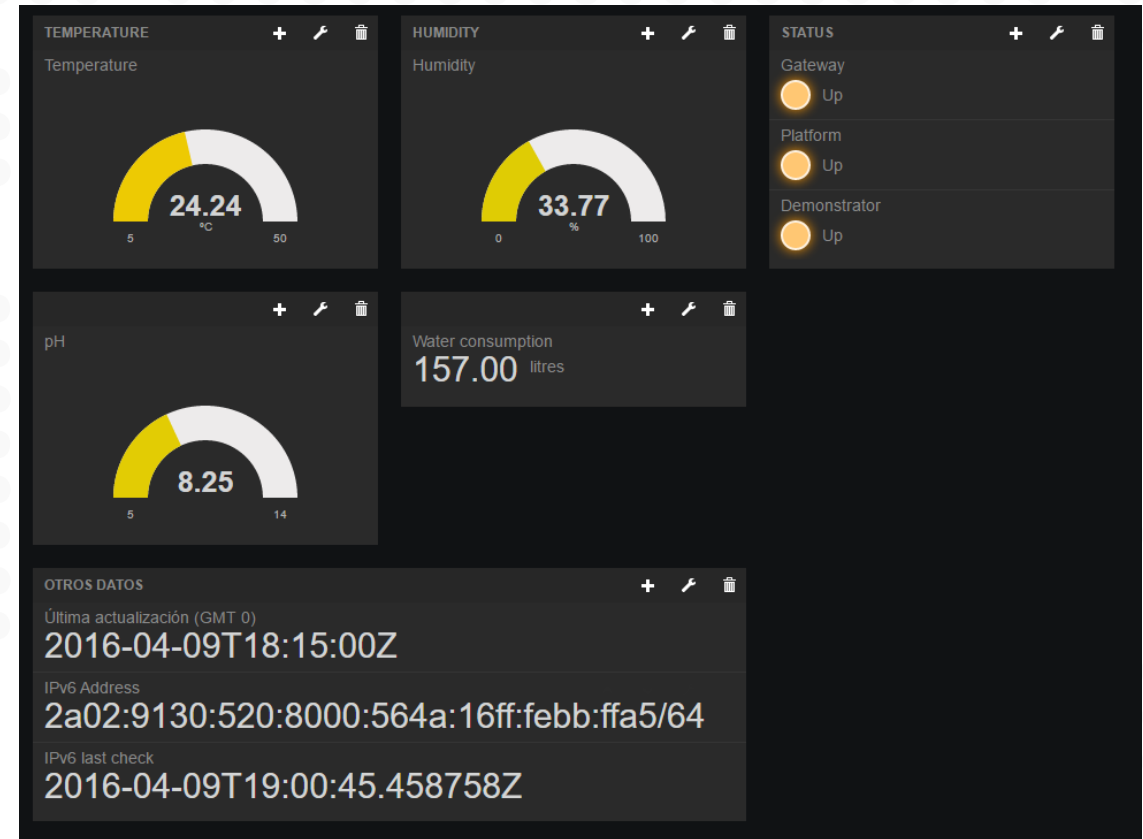
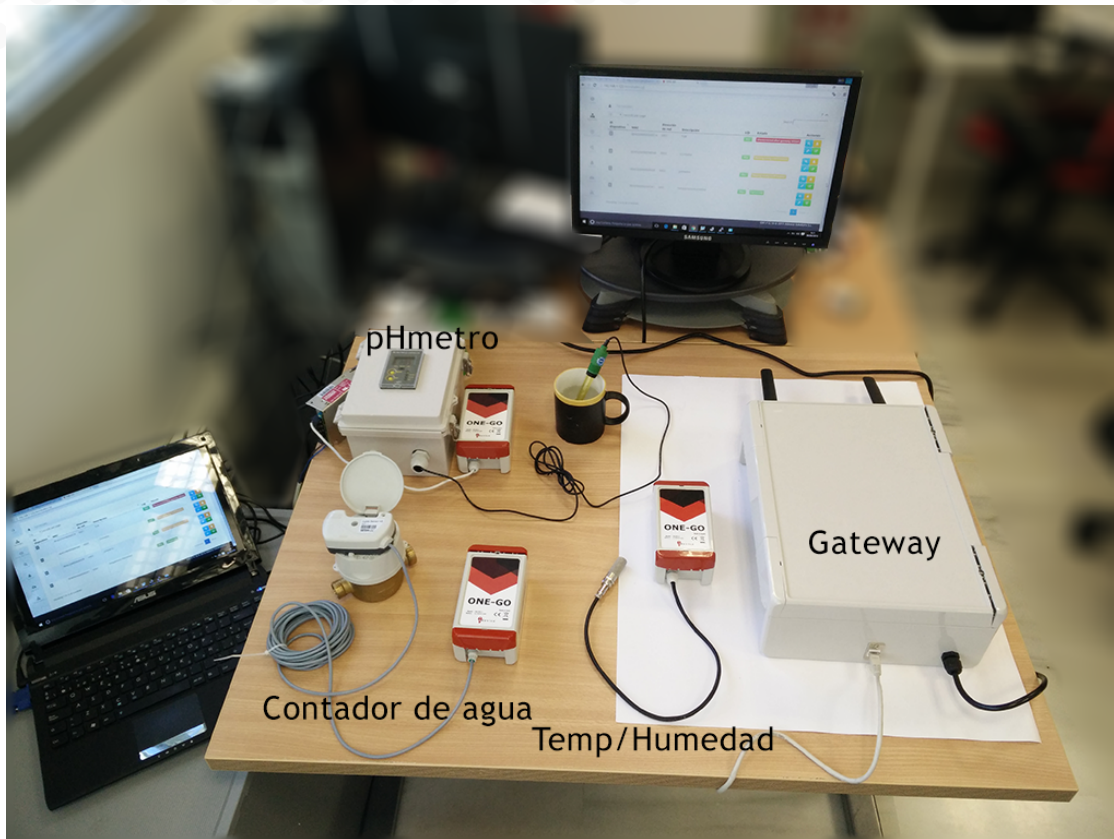
Bugs

- PPP package has a problem dealing with address assignment when we reconnect (typical scenario for mobile networks)

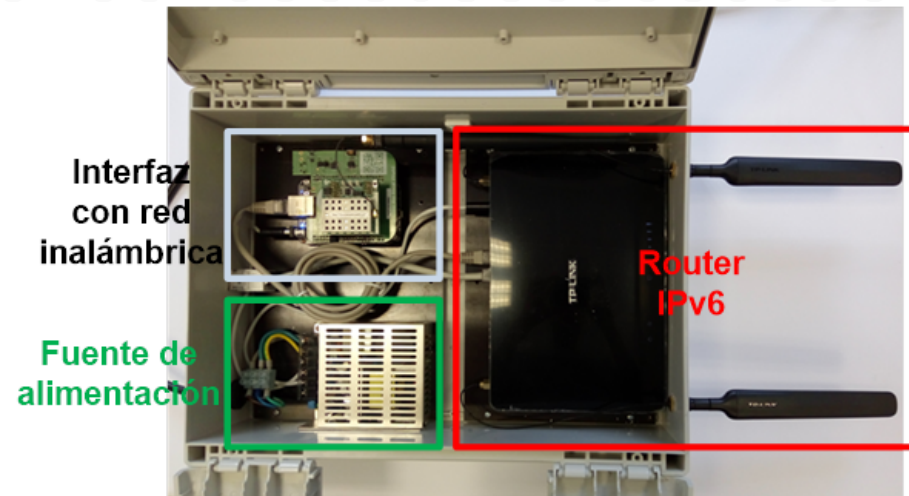
```
Nov 2 23:03:37 zotac01 pppd[3796]: cif6addr: ioctl(SIOCDIFADDR): No such address
Nov 2 23:03:37 zotac01 pppd[3796]: sif6addr: ioctl(SIOCADDRT): File exists (line
2607)
Nov 2 23:03:37 zotac01 pppd[3796]: sif6addr failed
Nov 2 23:03:37 zotac01 pppd[3796]: sent [IPV6CP TermReq id=0x2 "Interface
configuration failed"]
```

Reported, trying to contact with some of the developers. Right now we are using a workaround

First try at our offices



Deployment at the fountain



Devices



WiP



Our devices are connected to a hexaWAN LPWAN Base Station. Currently this is not using IPv6, but it is Work In Progress, as we are using IEEE 802.15.4g standard, already 6LoWPAN compatible.



Infrastructure



Testing

Telefonica

movilforum

hexaWAN

hexaWAN Base Station comprises a 3G modem with an IPv6 SIM and a hexaWAN radio. This is where IPv6 starts at this demonstrator, using a Linux Stack. On the mobile network, an APN has been created for IPv6 compatibility.



Platform



Testing



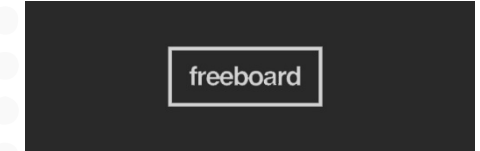
Both IDAS (Device Management) and ORION (Context Broker) are available at IPv6



Aplication



Idea



We are using IPv4 for publishing dashboards thanks to the dual-stack availability. We use Open Source tools, like Bootstrap or freeboard.



Dissemination

**Deploy360
Programme**

Home | START HERE! | IPv6 | DNSSEC | Other Topics | ION Conferences | Projects

Seville launches IPv6 Smartcity Pilot

IPv6
Overview
Basics
Case Studies
Other Sites
Security
Statistics
Training Resources

DNSSEC
Overview
Basics
Case Studies
Other Sites

« IPv6 Deployment Survey of Residential Services One Month until IPv6, DNSSEC, IETF and More at ION Hangzhou »

Seville launches IPv6 Smartcity Pilot



There's more happening in the IPv6 world this week with the launch of the Seville IPv6 Smartcity Pilot in Spain. The aim of the first phase is to monitor water quality, leaks and the pumping equipment within the city using IPv6 enabled 3G/4G devices using the IETF 6LoWPAN standard. 6LoWPAN enables wireless communications for devices with limited processing capabilities and power availability, such as those used for automation and monitoring devices, and is therefore an important enabling technology for the Internet-of-Things (IoT).

The Smartcity Pilot is an initiative of the Seville City Hall, Adevice which is a vendor providing IPv6 compliant IoT devices, FIWARE who provide the open source event and information bus components, as well as Telefonica. The pilot

**The IPv6 Forum
The New Internet**

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DIGITAL LIFE
19 May 2016 at 12:00
Discover Seville IPv6 Smartcity Pilot


In this post we describe how an IPv6 end-to-end solution has been implemented in the whole value chain of a given Smartcity Pilot.

In this pilot the following partners have participated:

**Carlos Ralli Ucendo**
Carlos Pardo Joaquín
Cabezas Rodríguez

TAGS: **DATACENTE, FIWARE, IPV6, SEVILLE, TELEFÓNICA**

Special Topics
Seen 'Digital Futures'?
The Gen Y code Technovate
Big Data Internet of Things
Business Hub Startups
#TechForGood

ThinkBig on Twitter
Tweets by @tedigital
**Telefónica Tech** @tedigital
IoT could save the Amazon
en blogthinkbig.com/2016/06/13/the...


Conclusions

- Pilot Phase I is completed. Connectivity is working
- Still difficult to find fully compatible IPv6 ready devices
- Increasing interest from cities and governments...
- Now for the phase II
 - 6LoWPAN
 - DHCPv6 – EAP/CoAP
 - IPv6-only website
 - Increase number of entities

Contact and thanks!

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Email: info@adevice.es

Twitter: @adevice