

Normalización y estandarización de soluciones IoT/Smart.

...

Curso Asesores COAG. 23 Junio 2022
Modulo 2: Internet de la Cosas. 2.3 La Nube



UNIVERSIDAD
DE
CÓRDOBA



Internet de las cosas: La Revolución.

- Electrónica.
- Comunicaciones.
- Computación.
- Programación.



“*las
cosas*”



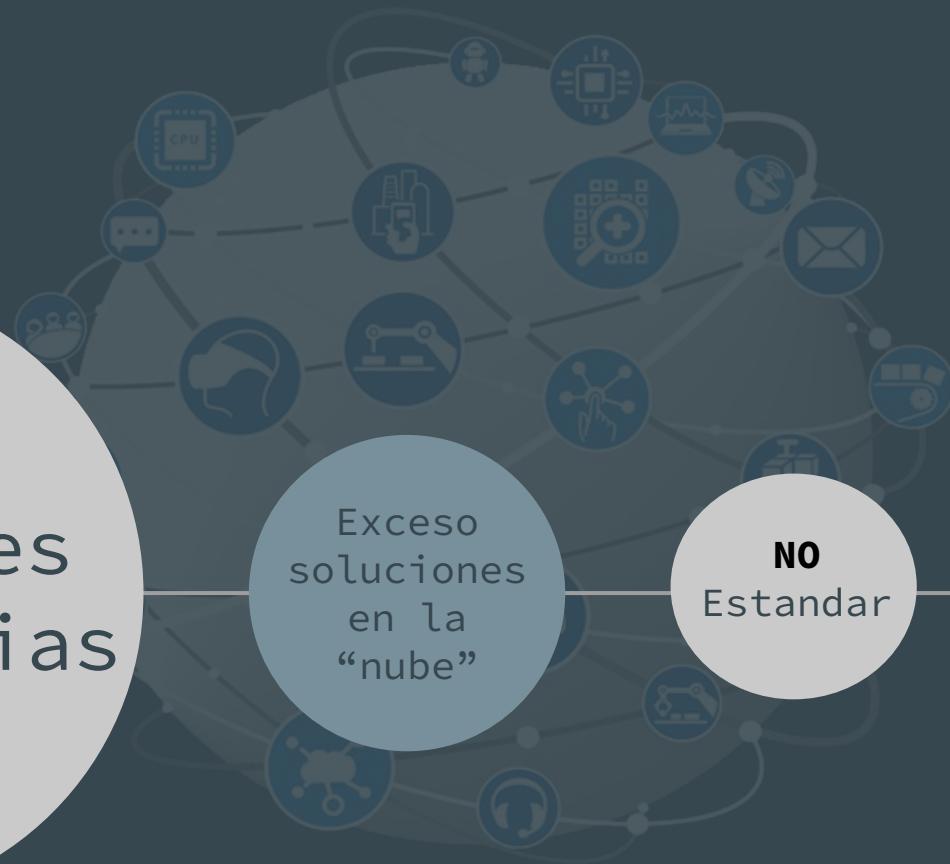
Contexto y Motivación.

Soluciones propietarias

Grandes
Compañías

Exceso
soluciones
en la
“nube”

NO
Estandar



General.



Objetivos.

.. Modelo de negocio **COMPLETO**.

.. Laboratorio **PROPIO**.

.. NODOS de éxito:

Innolivar.

Administración local.

ATDfiware.

HIBA.

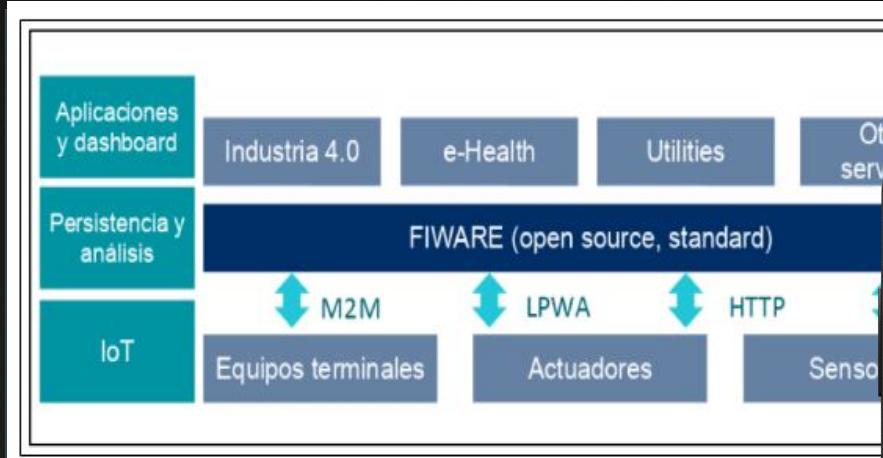


Figura 3.1: Modelo Genérico IoT.

chrome



Proyecto: Sensores IoT

1 Formación
Cursos adaptados

2 Comunicaciones LPWAN
Comunicaciones abiertas y gratuitas.

3 Plataforma FiWare
Servidor de contexto estándar y normalizado:

4 Plataforma de consumo
Punto de encuentro de soluciones.

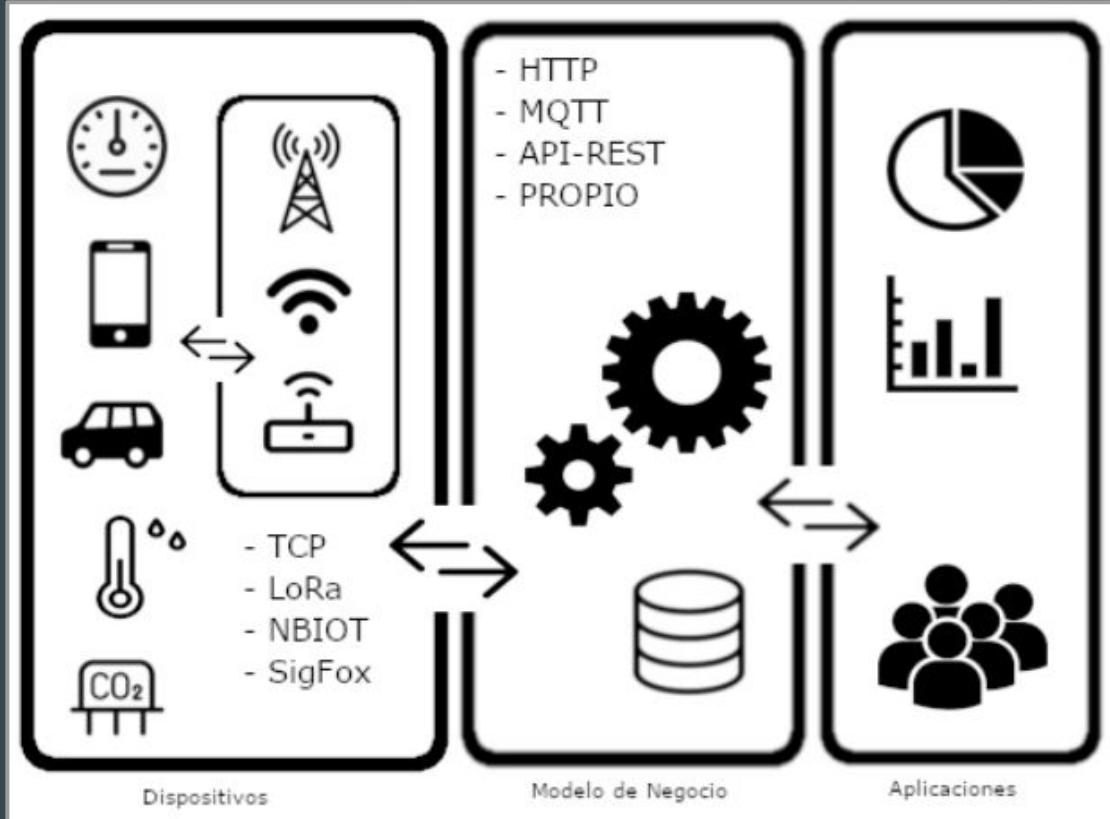


LoRaWAN

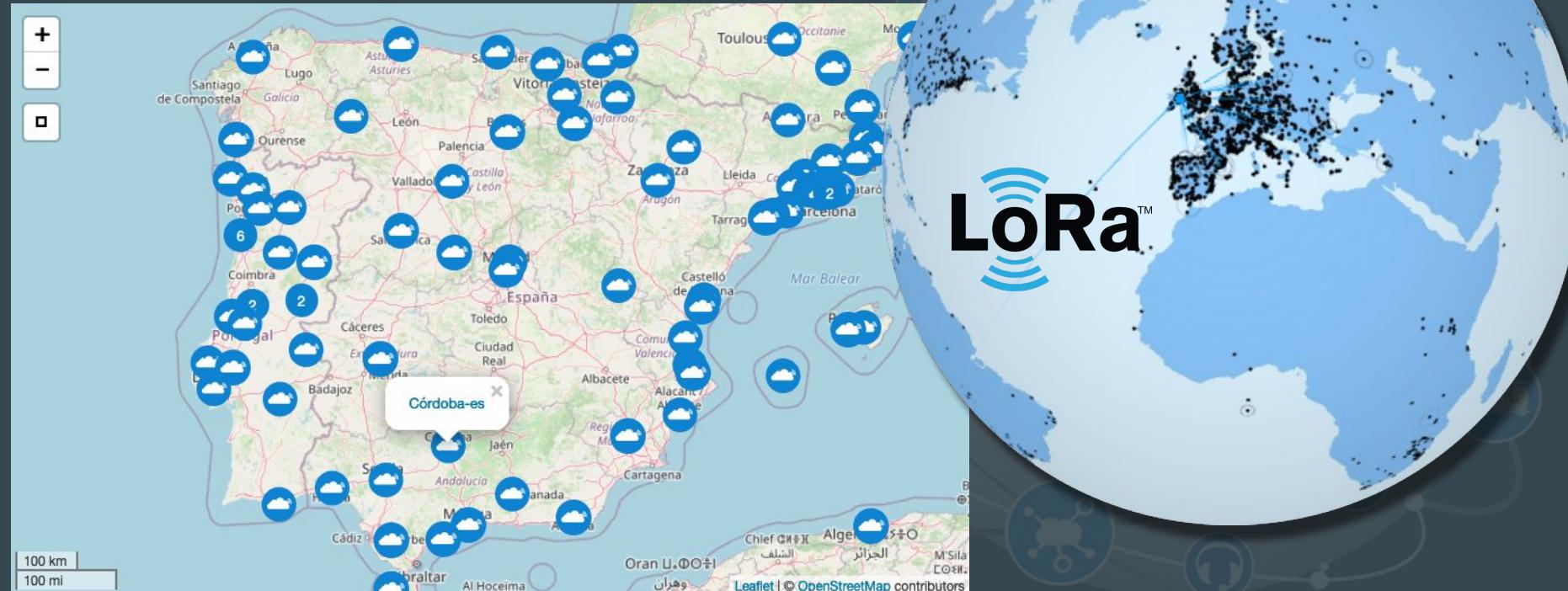
FIWARE

OPEN APIs FOR OPEN MINDS

Arquitectura: TRES (3) Pilares fundamentales.



Comunicaciones: LPWAN.



100 km
100 mi

46.9M
Messages today

151
Countries

1.1K
Certified developers

169.9K
Members

20.1K
Gateways

1.6M
YouTube views

14.8K
YouTube subscribers

693
GitHub stars

13.1K
GitHub commits

Comunidad LoraWan: “Córdoba-es” (desde Marzo 2020)



<https://www.thethingsnetwork.org/community/cordoba-es/>

THE THINGS NETWORK

Learn Hardware Forum Community Conference Enterprise atdfiware


i-Traffic Building en #hack4ermi2021
by ATDFiWare Universidad de Córdoba
Sep 25, 2021 - 370 views


Gateways LoRaWAN desplegados por el Aula de Transformación Digital FIWARE en Córdoba.
by Jose Checa
Jan 29, 2021 - 588 views


Dispositivos CO2 LoRaWAN integrados en el Aula de Transformación Digital FIWARE de la Universidad de Córdoba.
by Jose Checa
Jan 17, 2021 - 504 views

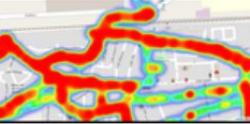

Simple integración FIWARE con Thingsboard
by Jose Checa
Aug 01, 2020 - 526 views


Comunidad TTN. Curso del CECODA.
by DarkLava
Jul 16, 2020 - 293 views


I'm a rookie
by Juan Pedro Romero
Jul 08, 2020 - 284 views


Workshop TTN :: Introducción Integración de Dispositivos.
Let's build this thing together.
Aula Transformación Digital
ATD.firebaseio
Universidad de Córdoba - Campus de Robledos


Pycom Lopy4 + The Things Networks
by Jose Checa
Mar 10, 2020 - 521 views


The Things Network y proyectos smart para la ciudad.
by Jose Checa

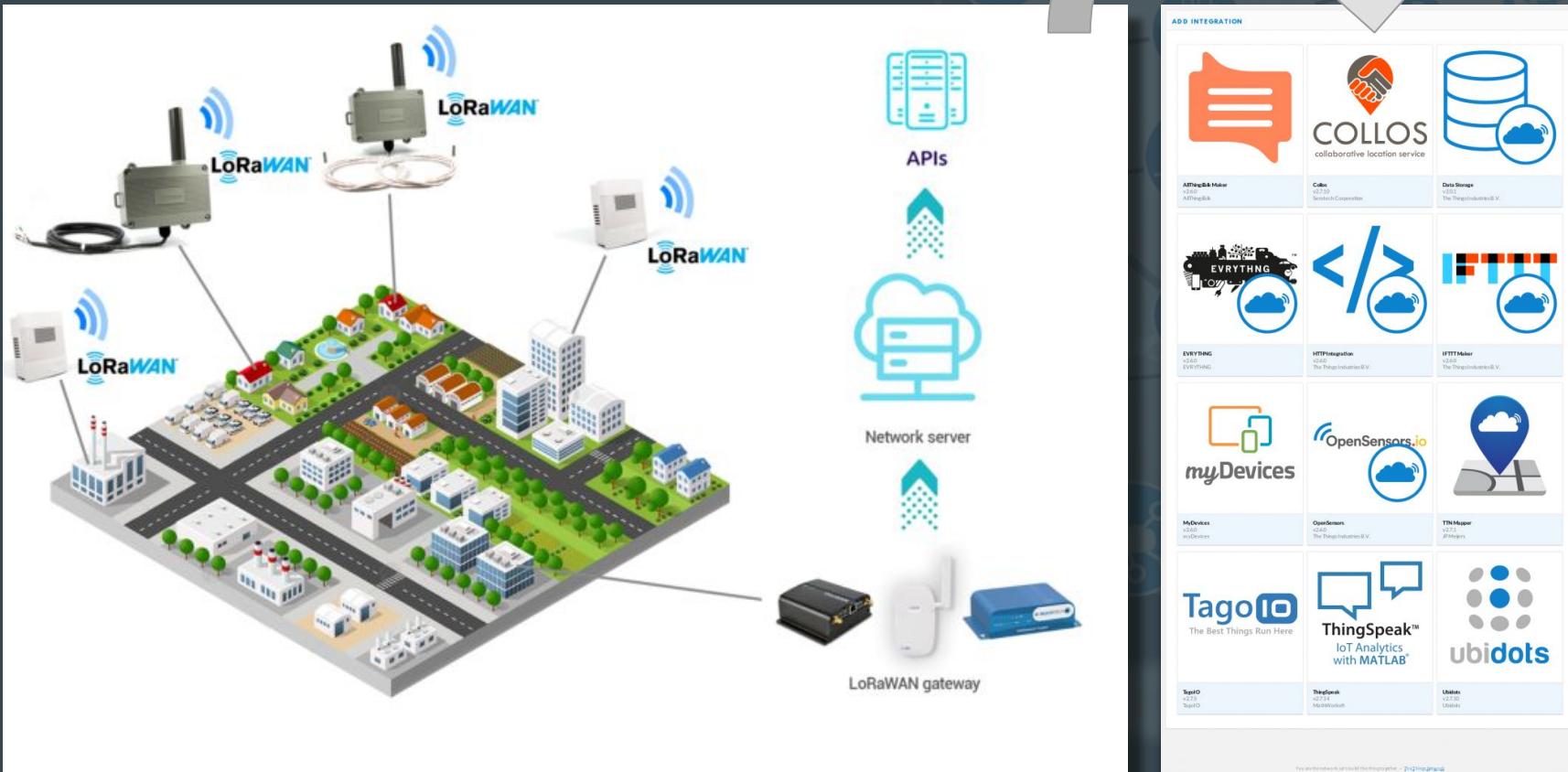
ABOUT THIS COMMUNITY

12 Gateways	41 Contributors	03/20 Founded
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DEMO

LoraWan: Integraciones. Ciclo del dato



LoraWan: Agente LoRa con FiWare



Modelo de negocio. FiWare.



OPEN APIs FOR OPEN MINDS

- Iniciativa Pública-Privada. 300 + 300 mill. euros
- Acelerar el desarrollo y adopción de tecnologías FI.

1 Fase 1 (2011-2014)

Definir la base tecnológica.

2 Fase 2 (2013-2015)

Desarrollo de la plataforma.

3 Fase 3 (2014-2016)

Centrada en Empresarios,
aceleradores y las PYMES.



Composición. FiWare.

- Comunidad FiWare.
- Plataforma FiWare.
- FiWare Lab.
- Catálogo de FiWare.
- Generic Enablers.
- FiWare Accelerate.
- FiWare Mundus.
- FiWare iHubs.



OPEN APIs FOR OPEN MINDS

OUR PLATINUM MEMBERS



Catálogo. FiWare. <https://www.fiware.org/developers/catalogue/>

 Application Mashup - Wirecloud
Offers a composition editor and execution engine that allows end users with little or no programming skills to create and run a composite web application front-end as

qa A
FIWARE GErIs
Applications/Services and Data

 Authorization PDP - AuthZForce
Reference Implementation of Authorization PDP (formerly Access Control GE)

qa A++
FIWARE GErIs
Security

 Backend Device Management - IDAS
Backend Device Management - IDAS (IoT Agents)

qa A
FIWARE GErIs
Internet of Things Services En

 BigData Analysis - Cosmos
Monitoring and control of the BigData Analysis GE

FIWARE GErIs
Data/Context Management

 Business API Ecosystem - Biz Ecosystem RI
The Business API Ecosystem offers support for selling apps, data, and services to both consumers and developers of Future Internet applications and

FIWARE GErIs
Applications/Services

 FIWARE CKAN Extensions
CKAN extensions developed within FIWARE

FIWARE GErIs
Data/Context Management

 FogFlow
Cloud-Edge Orchestrator to automatically and dynamically compose, configure, and deploy data processing flows of your IoT services over cloud and

Incubated GEs/GERIs
Data/Context Management

 Identity Management - KeyRock
Identity Management Generic Enabler - KeyRock

qa A+
FIWARE GErIs
Security

 OpenMTC
Is an IoT middleware that interconnects various sensors and actors, by unifying the data and forwarding such device information through

Incubated GEs/GERIs
Internet of Things Services En

 PEP Proxy - Wilma
Security PEP Proxy Generic Enabler allows you to secure your back-end services adding authentication and authorization based on FIWARE account

qa A++
FIWARE GErIs
Security



Catálogo. FiWare. <https://www.youtube.com/user/fiware>



Cloud Messaging - AEON
AEON is a cloud platform to create applications with real time communications channels.

Incubated GEs/GERis
Data/Context Management



Cygnus
Cygnus is a connector in charge of persisting certain sources of data in certain configured third-party storages, creating a historical view of such data.

FIWARE GEIs
Data/Context Management



Data Visualization - Knowage
Knowage is the professional open source suite for modern business analytics over traditional sources and big data systems.

qa A+
FIWARE GERis
Applications/Services and Data



Electronic Data Exchange - Domibus
Domibus implements a standardised message exchange protocol (based on an AS4 profile) that ensures interoperable, secure and reliable data

Incubated GEs/GERis
Data/Context Management



Fast RTPS
High Performance Protocol to share data

Incubated GEs/GERis
Advanced middleware and IoT



Publish/Subscribe Context Broker - Orion
Orion Context Broker is an implementation of NGSI9 and NGIS10 with persistence storage based in MongoDB

qa A++
FIWARE GERis
Data/Context Management



STH-Comet
FIWARE Short Time Historic (STH) - Comet, a component able to manage (storing and retrieving) historical context information as raw and

FIWARE GEIs
Data/Context Management



Stream-oriented - Kurento
Powerful software stack devoted to simplify the creation of complex interactive multimedia applications by exposing a rich family of APIs on top of

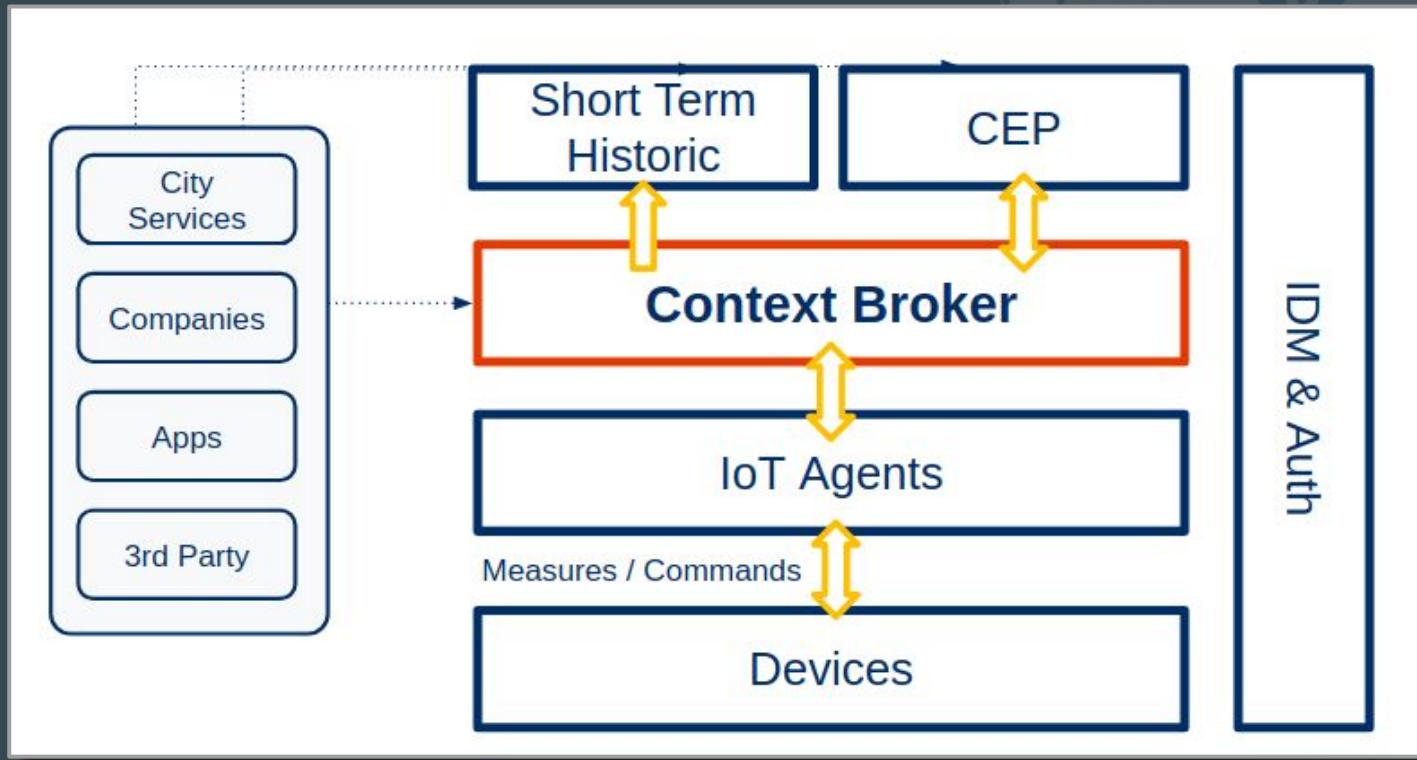
qa A
FIWARE GERis
Data/Context Management



Arquitectura FiWare.



OPEN APIs FOR OPEN MINDS



Información de contexto.



City Governance System
City Services
3rd Party apps

Application/Service



Context Broker

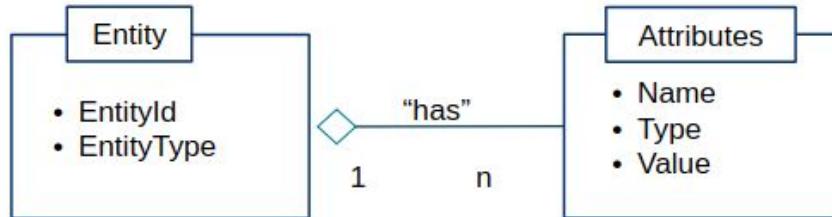
Bus
- Location
- N° Passengers
- Driver
- Licence plate



Citizen
- Name-Surname
- Birthday
- Preferences
- Location
- ToDo list



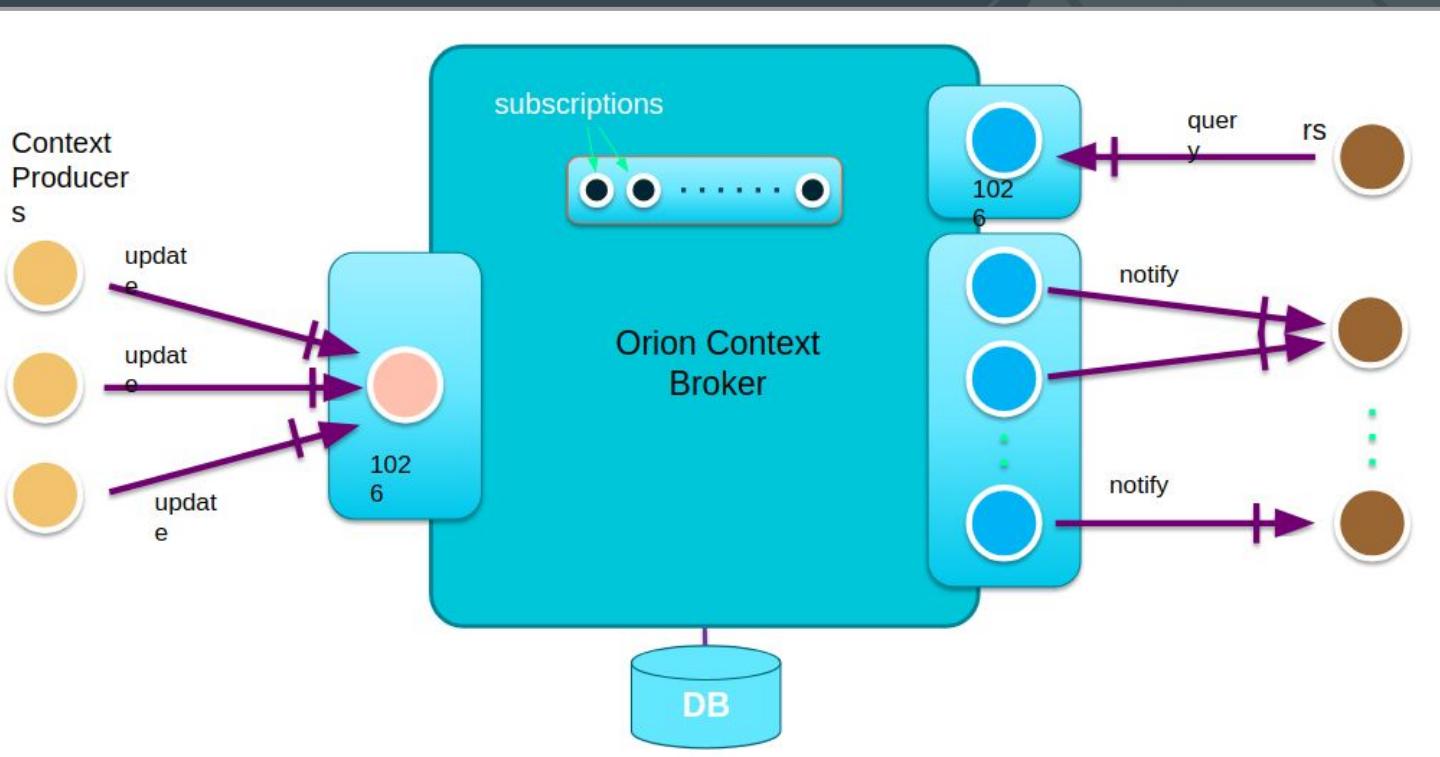
Shop
- Location
- Business name
- Franchise
- Offerings



Arquitectura interna CB.



OPEN APIs FOR OPEN MINDS



Envio datos al CB.

- GET /v2/entities
 - Obtiene todas las entidades
- POST /v2/entities
 - Crea una entidad
- GET /v2/entities/{entityID}
 - Obtiene una entidad dado su ID
- [PUT|PATCH|POST] /v2/entities/{entityID}
 - Actualiza una entidad
- DELETE /v2/entities/{entityID}
 - Borra una entidad

- GET /v2/entities/{entityID}/attrs/{attrName}
 - Obtiene el dato de un atributo
- PUT /v2/entities/{entityID}/attrs/{attrName}
 - Actualiza el dato de un atributo
- DELETE /v2/entities/{entityID}/attrs/{attrName}
 - Borra un atributo
- GET /v2/entities/{entityID}/attrs/{attrName}/value
 - Obtiene el valor de un atributo
- PUT /v2/entities/{entityID}/attrs/{attrName}/value
 - Actualiza el valor de un atributo

Creando entidad “car”

```
POST <cb_host>:1026/v2/entities
Content-Type: application/json
...
{
  "id": "Car1",
  "type": "Car",
  "speed": {
    "type": "Float",
    "value": 98
  }
}
```



Actualizando atributo “speed”

```
PUT <cb_host>:1026/v2/entities/Car1/attrs/speed
Content-Type: application/json
...
{
  "type": "Float",
  "value": 110
}
```

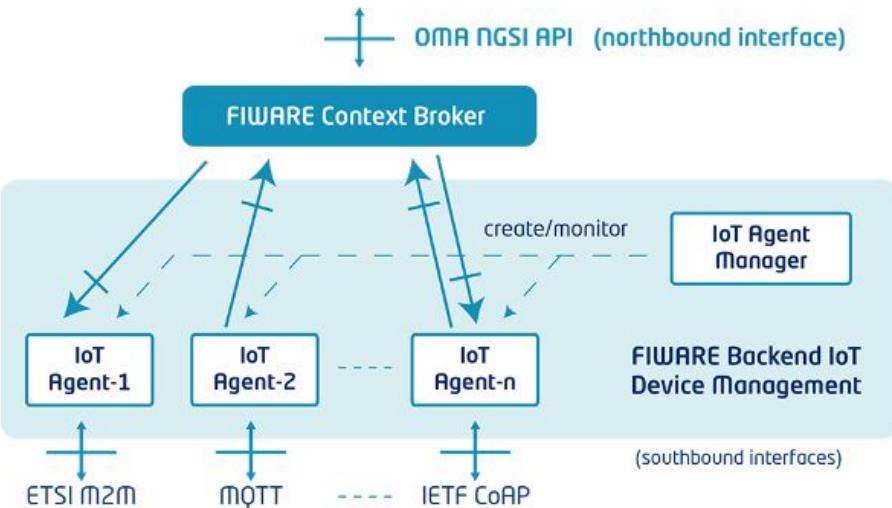


Envío datos al CB por IDAS.



OPEN APIs FOR OPEN MINDS

ENVÍO DE DATOS AL ORION CONTEXT BROKER UTILIZANDO IDAS 4.0 CON PROTOCOLO IOT Agent UL.2.0



Ultralight2.0:

<https://github.com/telefonicaid/fiware-IoT-Agent-Cplusplus>

- MQTT:

<https://github.com/telefonicaid/fiware-IoT-Agent-Cplusplus>

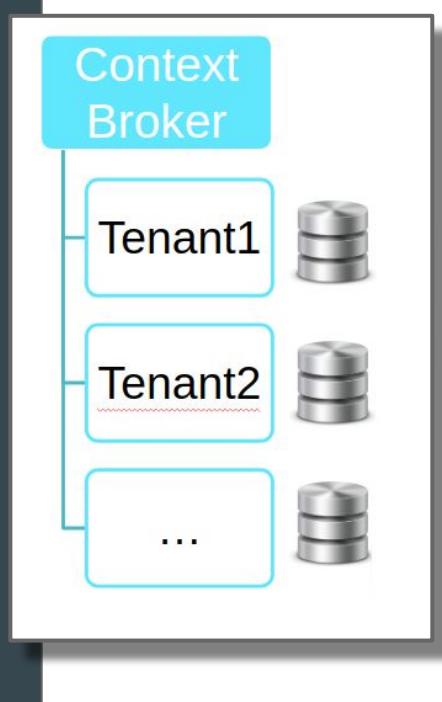
- LWM2M/CoAP:

<https://github.com/telefonicaid/lightweightm2m-iotagent>

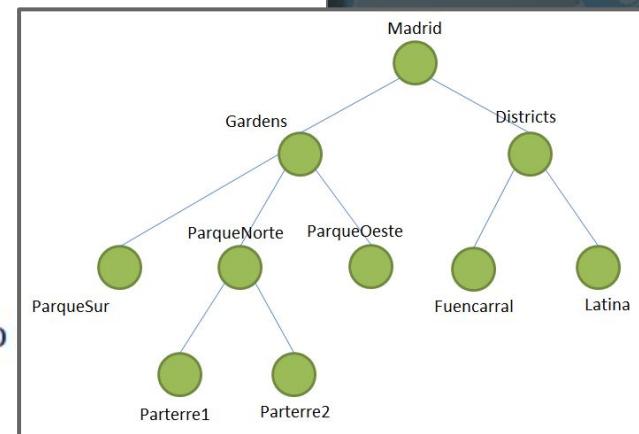
- SigFox:

<https://github.com/telefonicaid/sigfox-iot-agent>

Subservicios.



- Paginación
- Atributos compuestos/metadatos
- Filtros de búsqueda
- Geo-localización
- Soporte Fechas
- Filtros por metadatos
- Federación & provedores de contexto
- Servicios
- Subservicios y rutas de servicios



Entities

```
{  
    "device_id": "tube-00000",  
    "entity_name": "tube-00000",  
    "entity_type": "Tube",  
    "timezone": "Europe/Madrid",  
    "attributes": [  
        {  
            "object_id": "seqNumber",  
            "name": "seqNumber",  
            "type": "Number"  
        },  
        {  
            "object_id": "category",  
            "name": "category",  
            "type": "Number"  
        },  
        {  
            "object_id": "serialNumber",  
            "name": "serialNumber",  
            "type": "String"  
        },  
        {  
            "object_id": "temperature",  
            "name": "temperature",  
            "type": "Number"  
        },  
        {  
            "object_id": "humidity",  
            "name": "humidity",  
            "type": "Number"  
        },  
        {  
            "object_id": "responsible",  
            "name": "responsible",  
            "type": "String"  
        },  
        {  
            "object_id": "owner",  
            "name": "owner",  
            "type": "String"  
        }  
    ],  
},
```

```
{  
    "device_id": "noderln-001",  
    "entity_name": "noderln-001",  
    "entity_type": "Ambient",  
    "timezone": "Europe/Madrid",  
    "attributes": [  
        {  
            "object_id": "diginp01",  
            "name": "digital_in_1",  
            "type": "Number"  
        },  
        {  
            "object_id": "diginp02",  
            "name": "digital_in_2",  
            "type": "Number"  
        },  
        {  
            "object_id": "diginp03",  
            "name": "digital_in_3",  
            "type": "Number"  
        },  
        {  
            "object_id": "anainp01",  
            "name": "analog_in_4",  
            "type": "Number"  
        },  
        {  
            "object_id": "temperature",  
            "name": "temperature_5",  
            "type": "Number"  
        },  
        {  
            "object_id": "luminosity",  
            "name": "luminosity_6",  
            "type": "Number"  
        },  
        {  
            "object_id": "accelerometer",  
            "name": "accelerometer_7",  
            "type": "Number"  
        }  
    ],  
},
```

Suscriptions

```
{  
    "description": "IoTStacks Tube Subscriptions",  
    "subject": {  
        "entities": [  
            {  
                "idPattern": "tube-00000",  
                "type": "Tube"  
            }  
        ],  
        "condition": {  
            "attrs": [  
                "seqNumber"  
            ]  
        }  
    },  
    "notification": {  
        "http": {  
            "url": "http://uciot-quatum:8668/v2/notify"  
        },  
        "attrs": [  
            "temperature", "humidity"  
        ],  
        "metadata": ["dateCreated", "dateModified"]  
    },  
    "throttling": 5  
}
```

Modelo de datos Armonizado.



Alertas



Transporte



Parking



Contenedores



Alumbrado
Público



Medio
Ambiente

- En todos los **sectores**
- Propuestas a través de **GitHub**
- **Superconjunto** de los modelos de la **GSMA**

Enlaces con los modelos de datos

<https://www.fiware.org/developers/data-models/>

<http://fiware-datamodels.readthedocs.io/en/latest/guidelines/index.html>

<https://github.com/Fiware/dataModels>

<https://www.gsma.com/iot/wp-content/uploads/2016/11/CLP.26-v1.0.pdf>

Aplicaciones.



GRACIAS

