

**UNIVERSITÀ DEGLI STUDI DI UDINE**

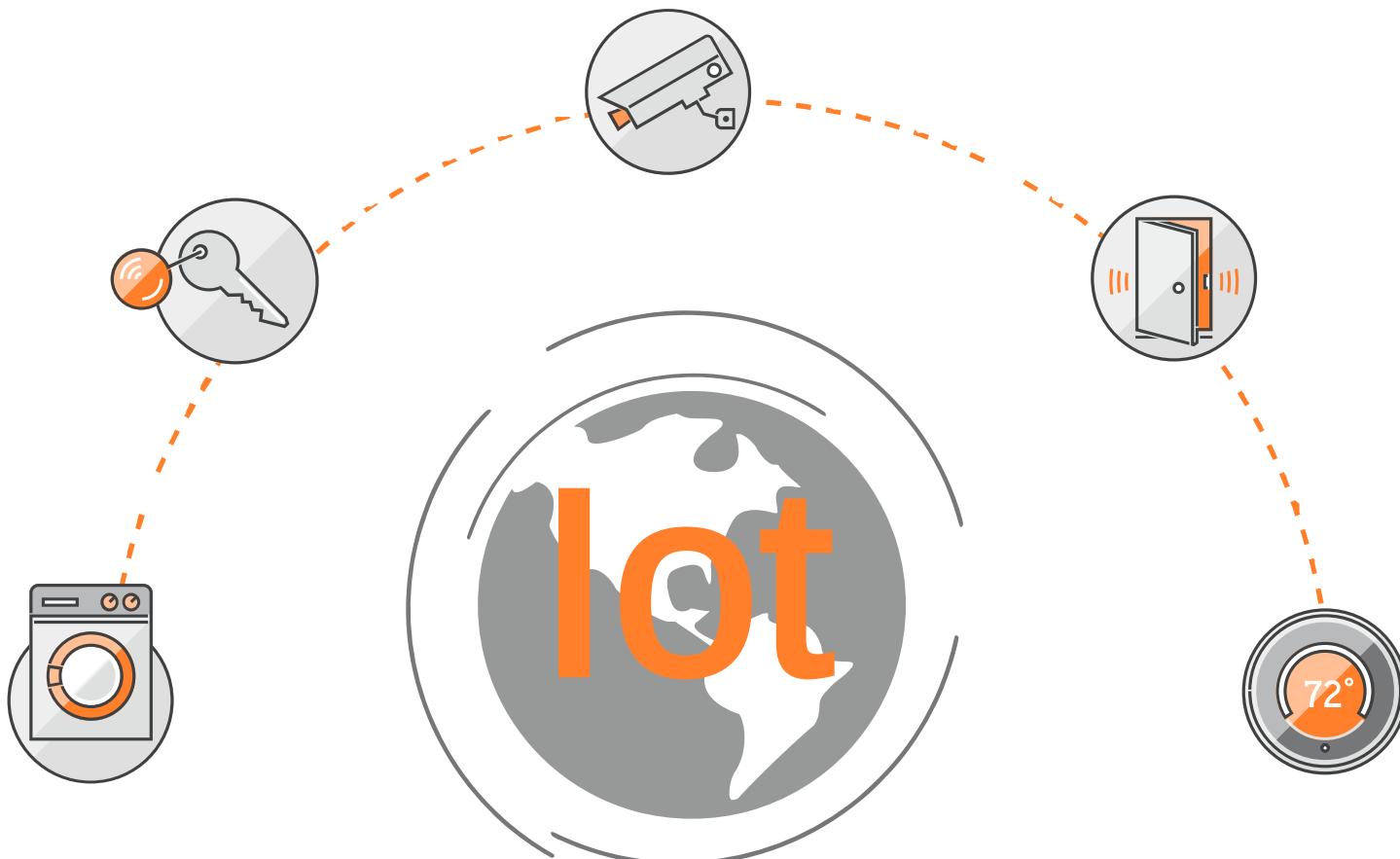
**Dipartimento POLITICO DI INGEGNERIA E ARCHITETTURA**  
Corso di laurea triennale in Ingegneria Elettronica

**TESI DI LAUREA  
LORA E INTERNET OF THINGS:  
EVERYWARE SOFTWARE COME CASO DI STUDIO**

Relatore: Prof. Antonio Abramo  
Laureando: Tolotto Enrico

A.A 2016 - 2017

# Internet of Things



# Rapida crescita



Kevin Ashton  
introduce il termine

1999

2008

2010

2014

2020



750 milioni  
di laptop.



2 miliardi  
di smartphone  
prodotti

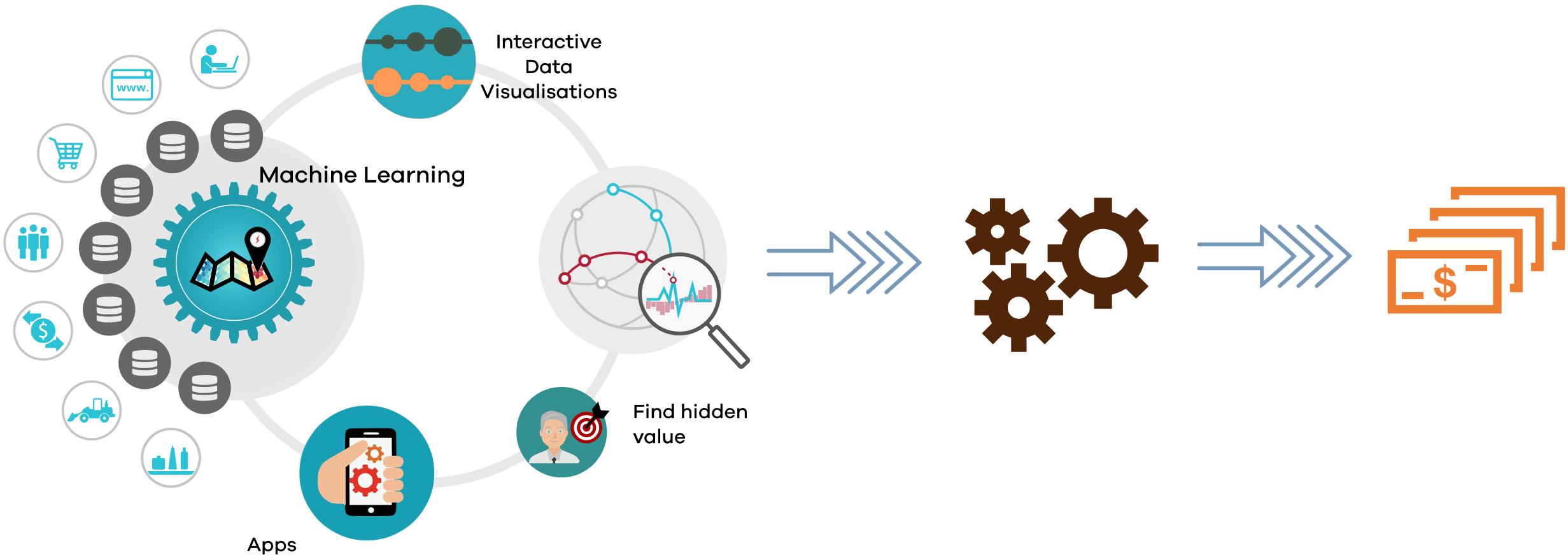


7.5 miliardi  
di wearable  
prodotti

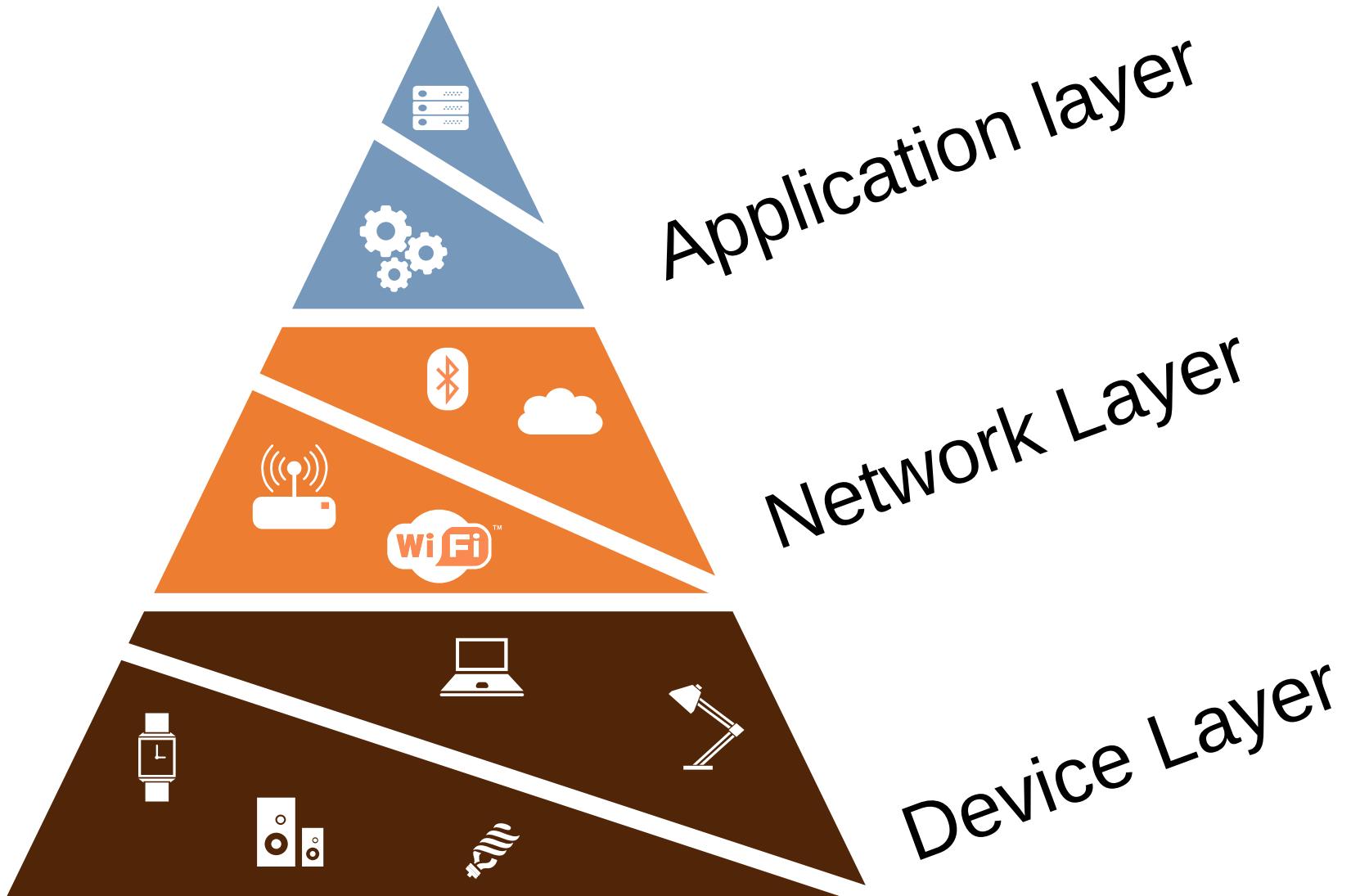


~20 miliardi  
di devices

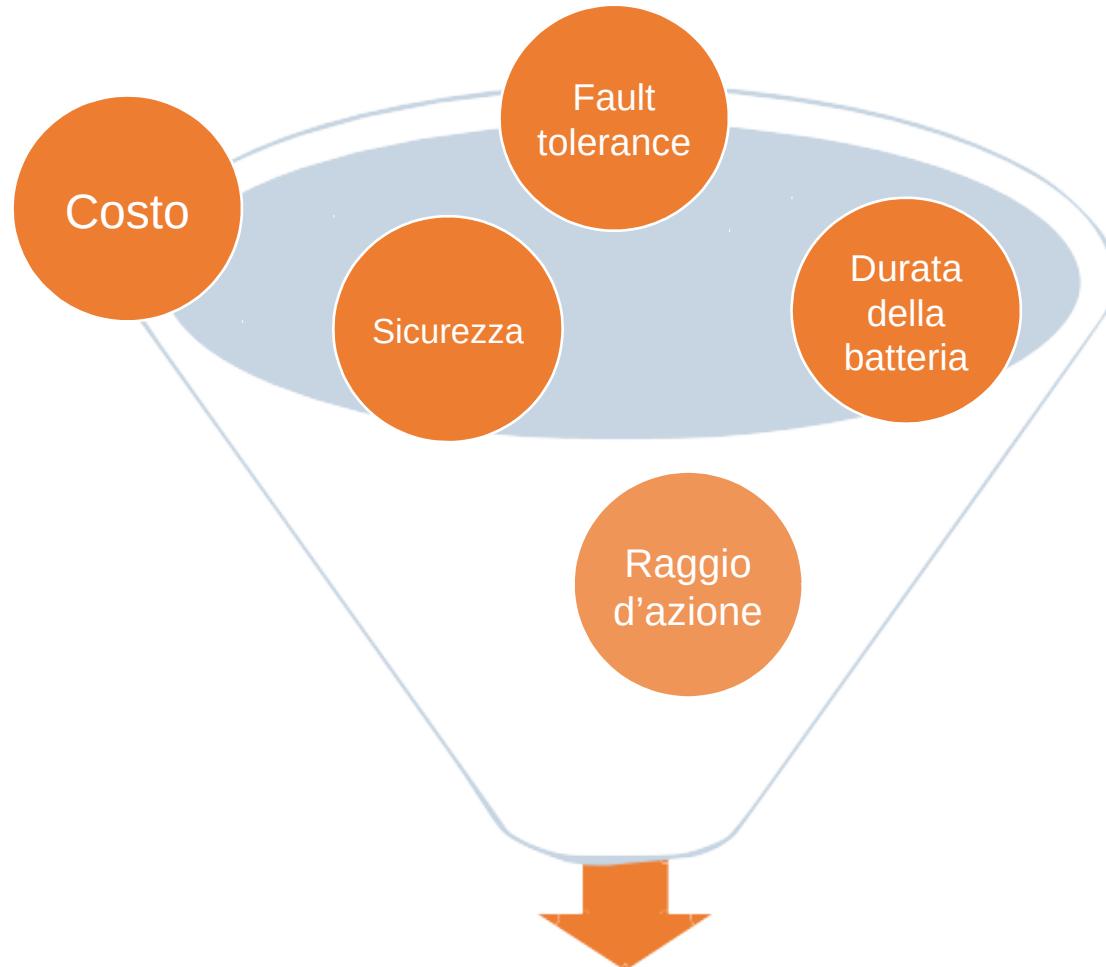
# Big Data



# Three layer



# Problematiche



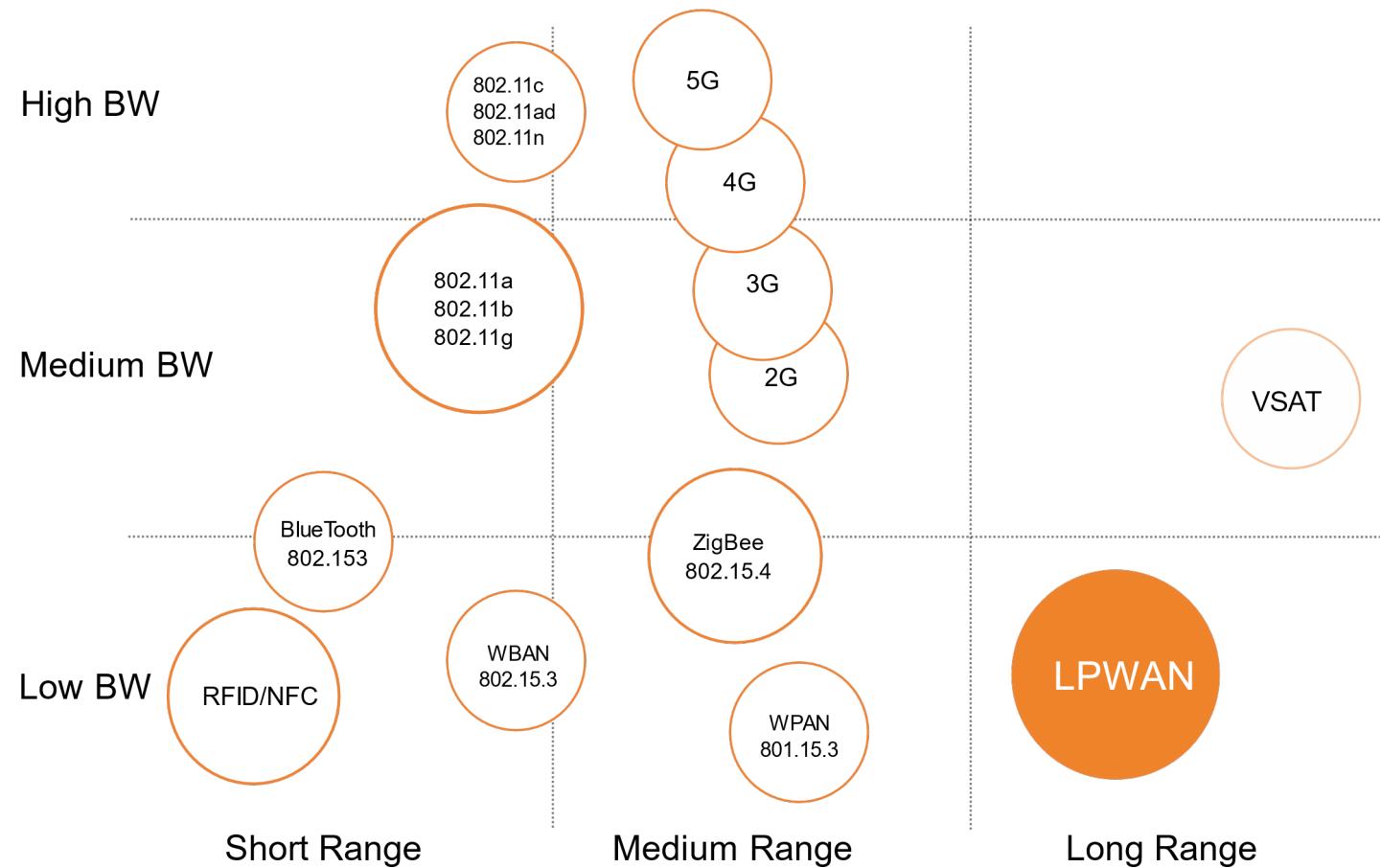
Necessità di ridisegnare il network layer

# LPWAN

## OOIRETAWORK

### WWDED

#### WER



# LoRa

## LoRa

Layer Fisico

- Frequenze ISM
- 10-12 [Km]
- Alta resistenza alle interferenze

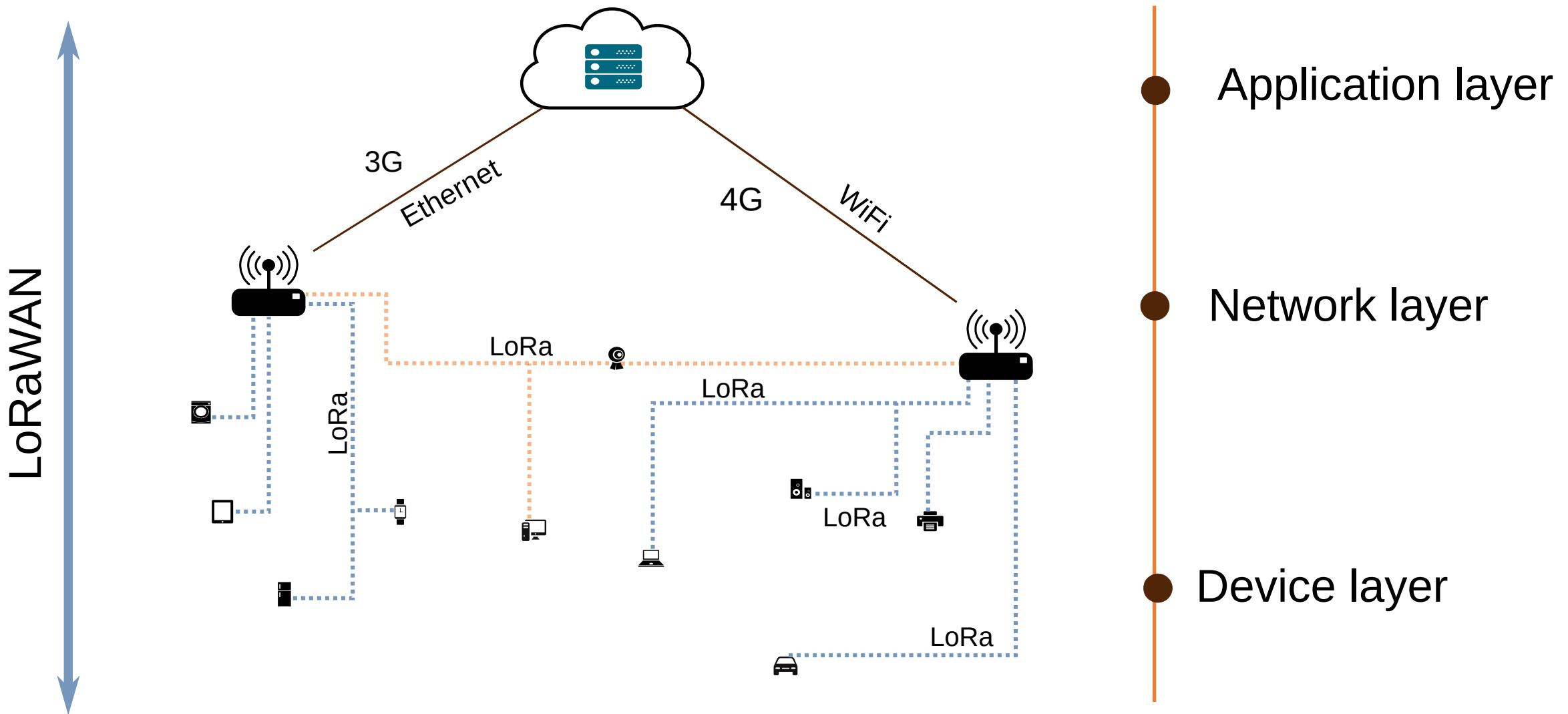
## LoRaWAN

Protocollo MAC

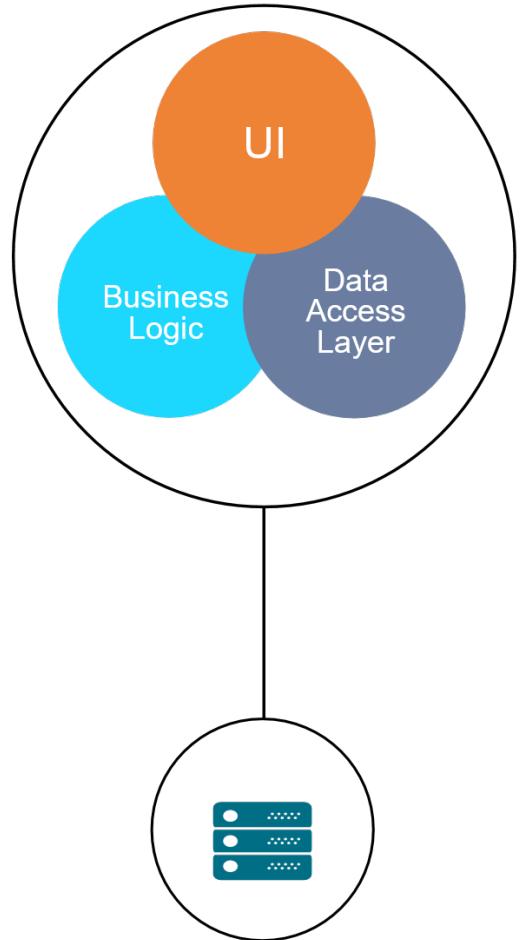
- 0.3-50 [kbps]
- topologia a stella
- Open source



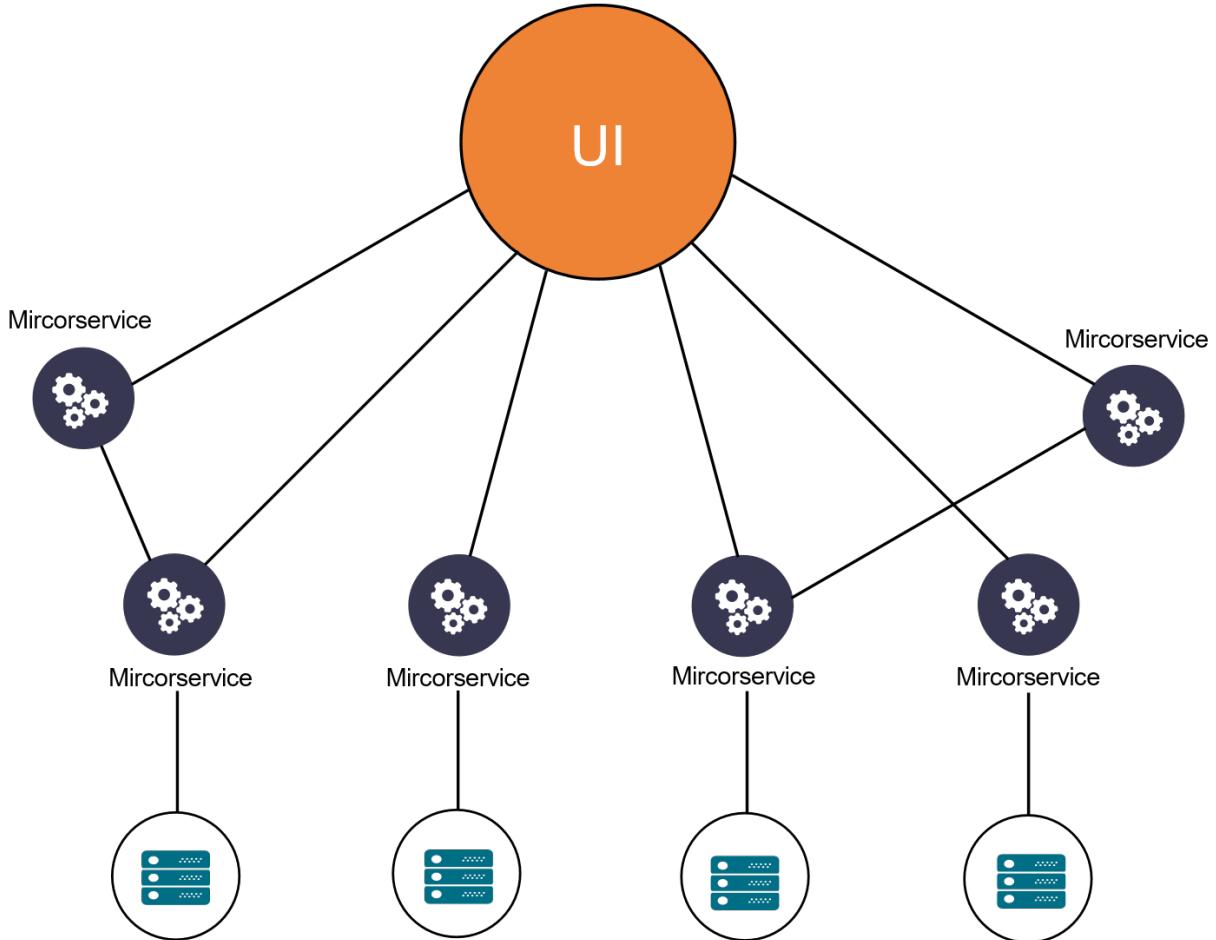
# Tipologia di rete



# Microservices

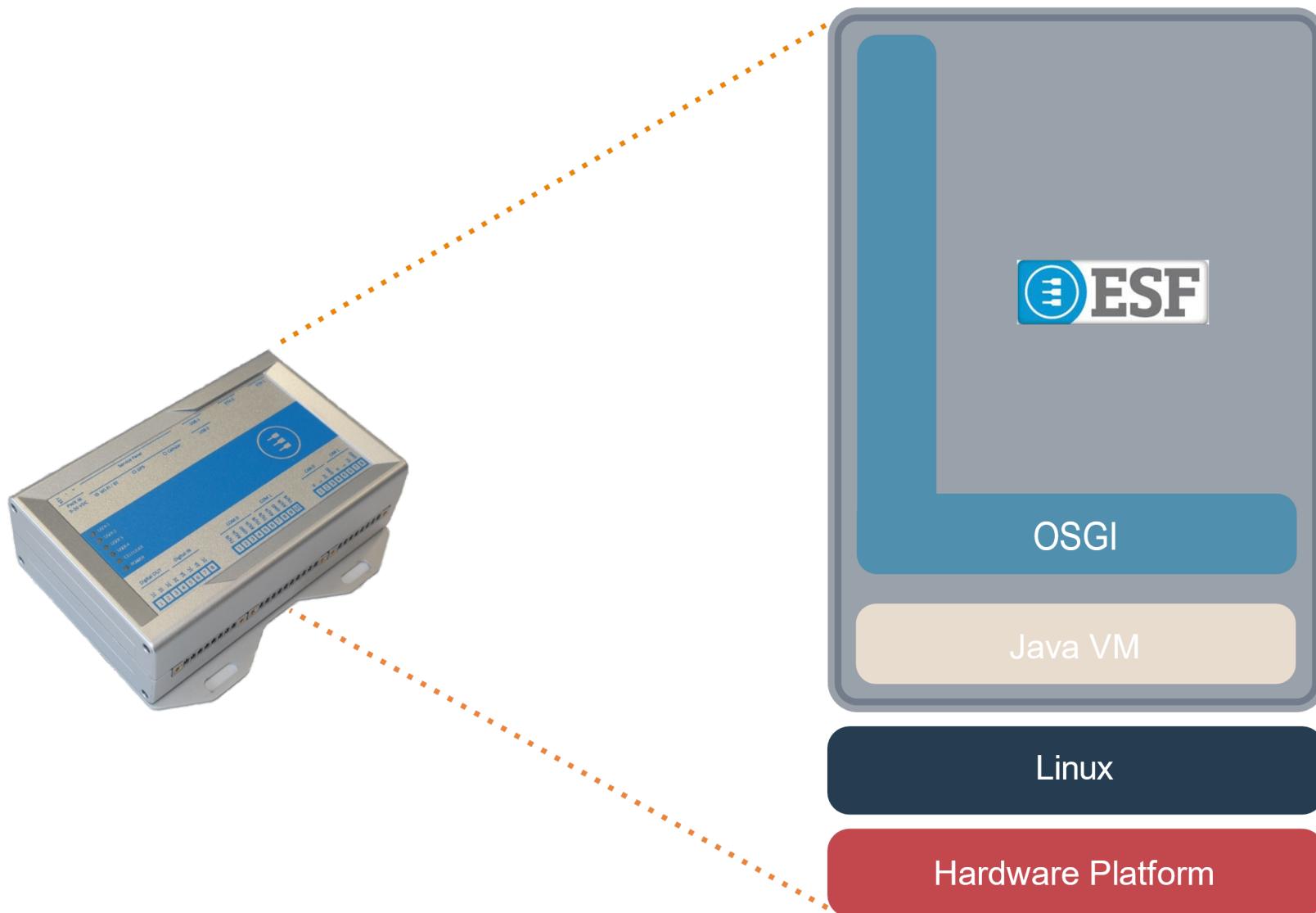


Monolithic Architecture

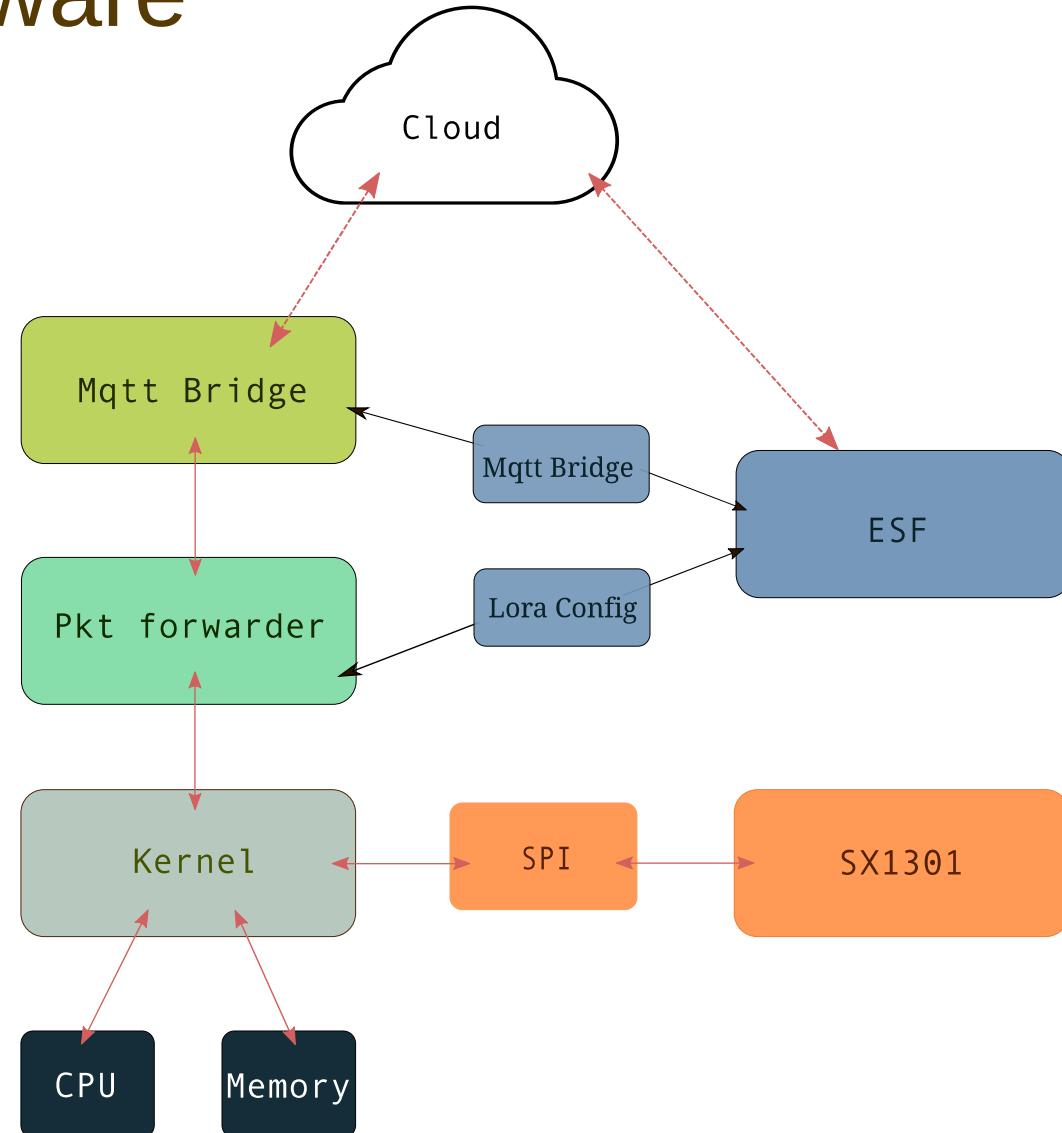


Microservice Architecture

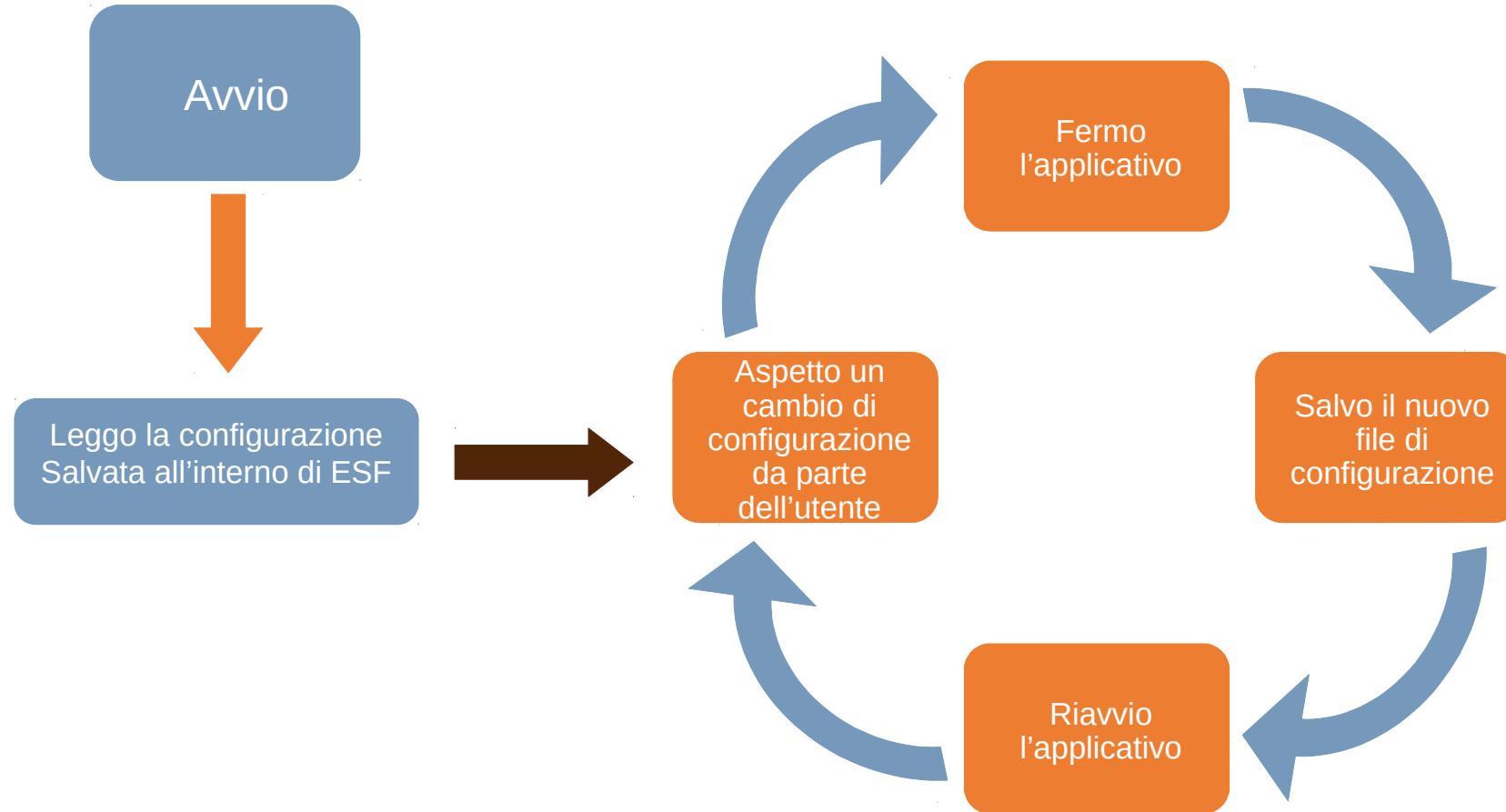
# ESF: Everyware Software Framework



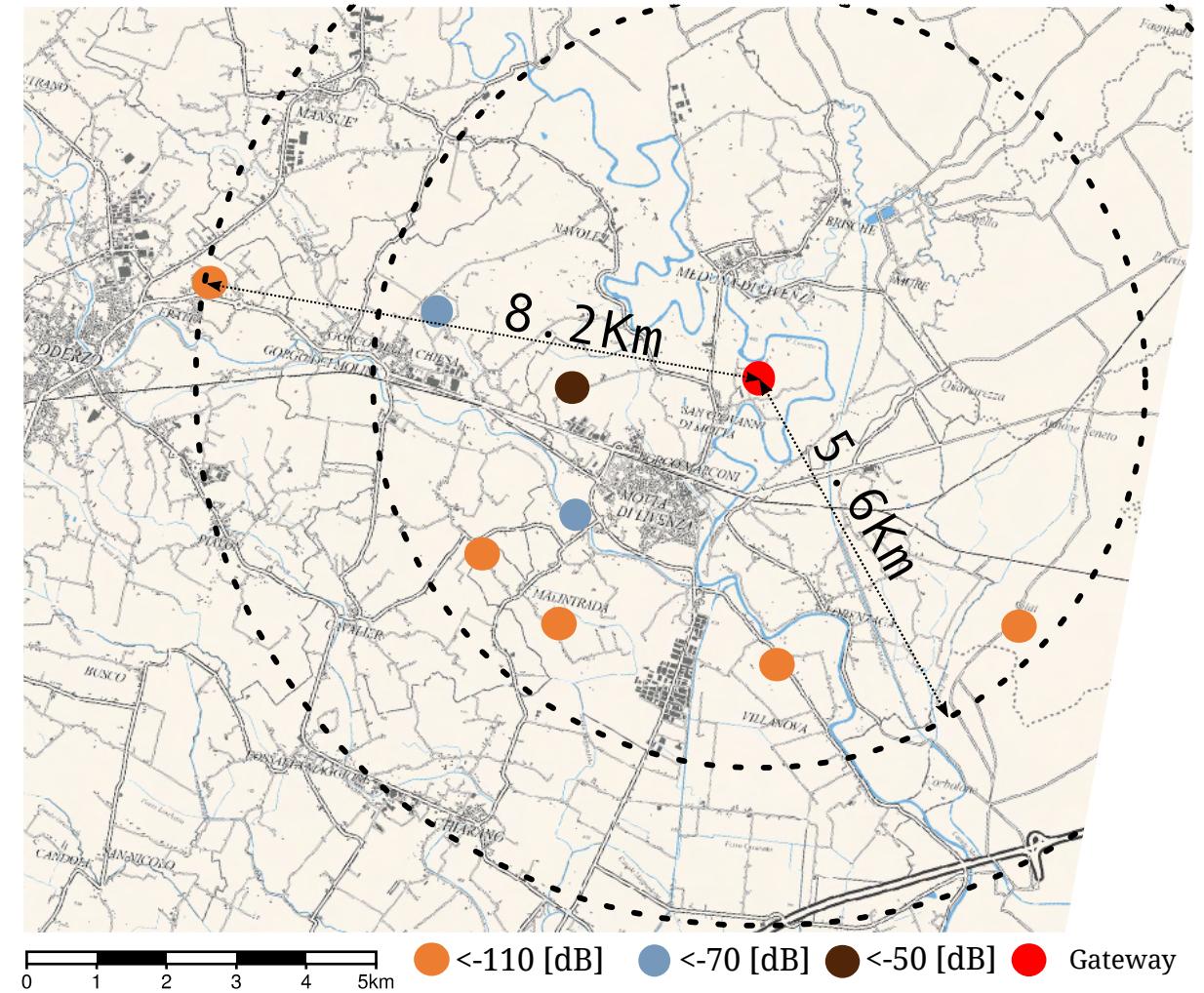
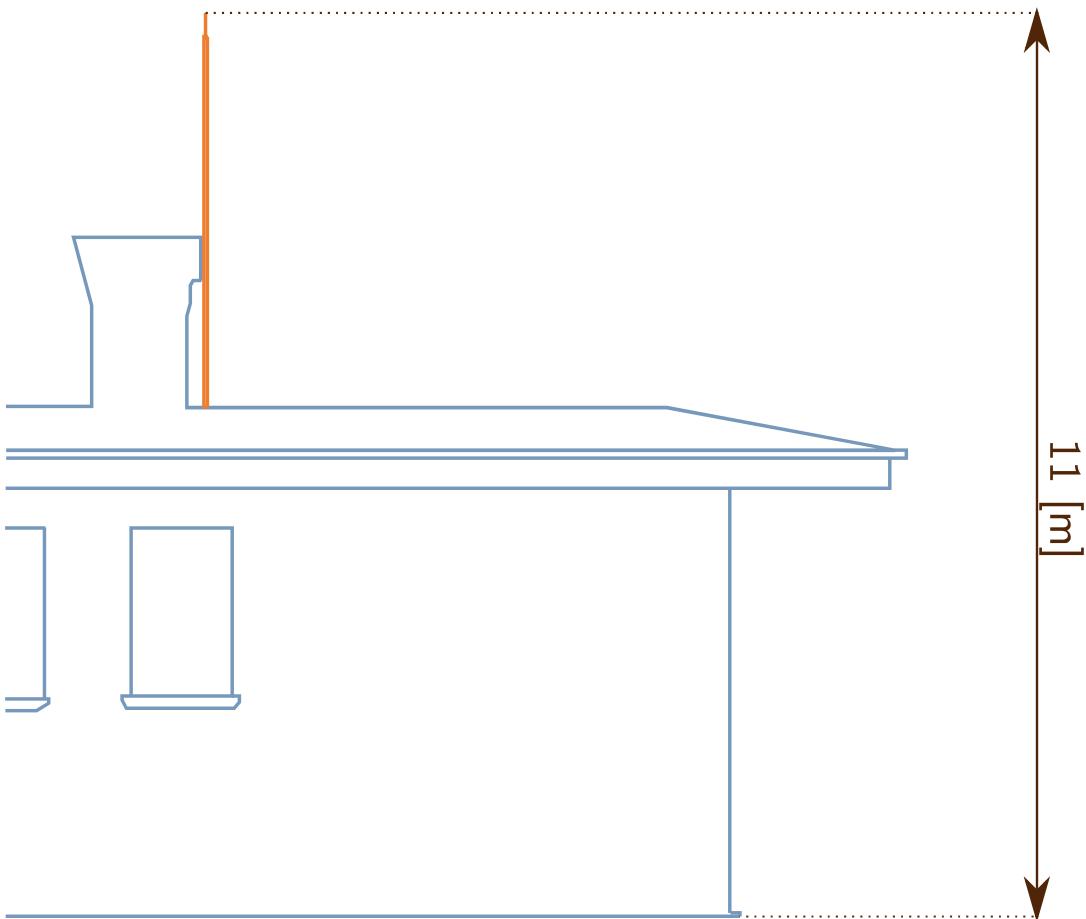
# Architettura del software



# Architettura del software



# Misurazioni



# Grazie per l'attenzione!



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