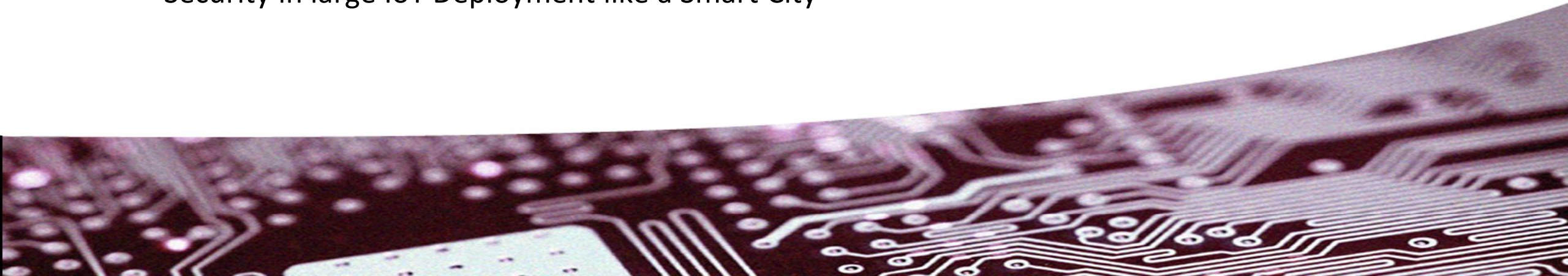# Agenda

- Introduction of use cases in CRITISEC
- Presentation: Sensative, Yggio
- Presentation: Applio, Sense
- Use case: Energy Distribution.
- Anomaly detection in IoT Networks, focus energy distribution
- Scale up use case: Smart City
- Security in large IoT Deployment like a Smart City

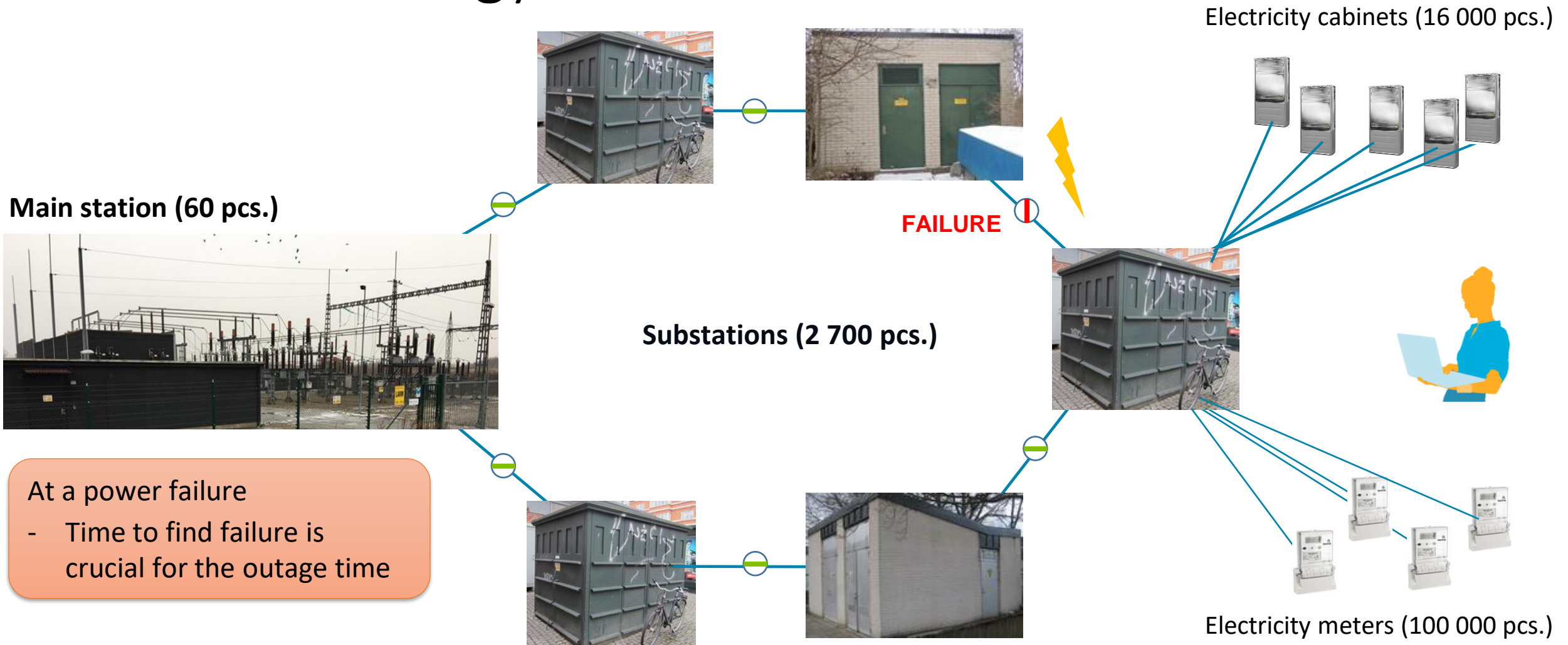Andreas Ohlsson          Håkan Lundström

# Critisec use cases

# Use case - Energy Distribution

- **Kraftringen – Energy company**
  - Infrastructure for electricity, gas, district heating and cooling, communication
  - Serves about 280 000 customers in south Sweden

- **CritiSec scope - Increase monitoring and control with IoT**
  - Sensors connected by sensor networks and open IoT-platform
  - Lower cost than existing solutions

  - ➢ **Benefits**
    - Improved quality – reduce power failures and outage time for customers
    - Improved efficiency – from scheduled to event-based maintenance

  - ➢ **But it has to be secure, robust and resilient... Classified as**
    - Security sensitive business (Protective Security Act)
    - Societal critical business (Authority for social protection and emergency preparedness)

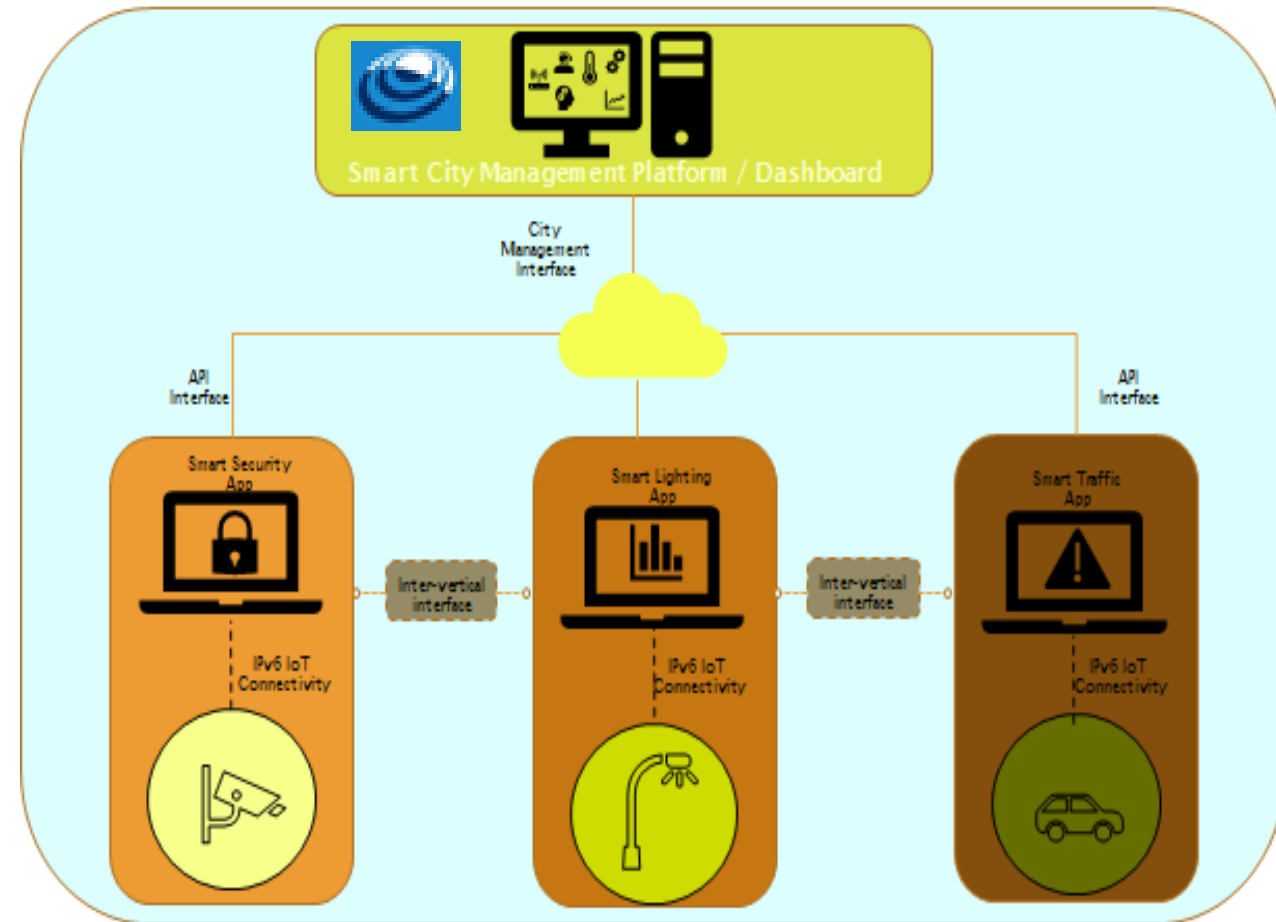# Use case - Energy Distribution



Electricity cabinets (16 000 pcs.)

**Main station (60 pcs.)**

**FAILURE**

**Substations (2 700 pcs.)**

At a power failure
- Time to find failure is crucial for the outage time

Electricity meters (100 000 pcs.)
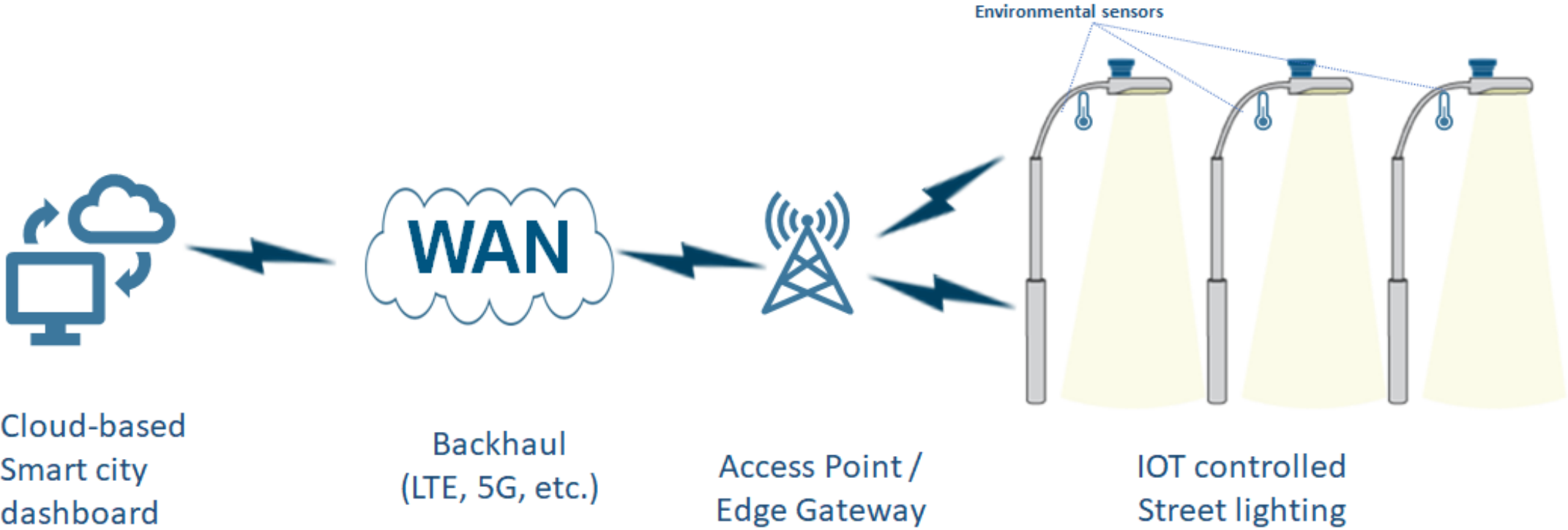
# Use case – Smart City

**Open IoT smart city platform**

- Deploying a managed street lighting system with wireless motion sensors based on 6LoWPAN

- Integrating street lighting system in a smart city open, horizontal platform

- Integrating environmental wireless sensors based on LoRa

- Enabling open smart city platform through a common API model

- Developing a prototype of a comprehensive security solution using ETSI standard **FIWARE APIs and data format**



Focus on managed street lighting system

# Use case – Smart City



Environmental sensors

Cloud-based
Smart city
dashboard

Backhaul
(LTE, 5G, etc.)

Access Point /
Edge Gateway

IOT controlled
Street lighting

6LoWPAN smart lighting connectivity

**SENSATIVE**

**YGGIO DiMS**
**Digitalization infrastructure Management System**

# ABOUT SENSATIVE

Founded in 2013 to make IoT easy and usable.

Sensative connects people and services to the physical world of cities, buildings, homes, and more.

- STRIPS – Smart sensor family for **digitizing real world**

- YGGIO – Advanced IoT Integration platform for **connecting to services and digital twins**

Technology made simple. Technology that makes sense.

## SENSATIVE STRIPS

- Technology made simple
- Install & forget (10 years battery life)
- Ultra thin design
- Indoor and outdoor use

## SENSATIVE YGGIO

- One open API to the real world
- Technology neutral LIVE data
- Horizontally integrated IoT management
- Multiple sensors shared between multiple services and users

Sensative AB Recognized for
**2021**
**Technology Innovation Leadership**
European
Internet of Things Sensors Industry
Excellence in Best Practices

FROST & SULLIVAN

BEST PRACTICES AWARD
2021

FROST & SULLIVAN

# Yggio - DiMS

Digitalization powered by Yggio

A **common DiMS** for the digitalization

- **Owned** and managed **by the business owner**

- Supporting ⊙FIWARE standard open API & Data models to normalize incoming data.

- Scalable, secure, robust, resilient and portable by using state of the art technologies.

- Deploy at edge or in cloud.

- An ecosystem of 3$^{rd}$ party Service Providers and partner

creating <u>value for employees, customers, tenants, citizens, partners and more</u>

**YGGIO**
**The common digitalization platform for any smart domain**
Data-driven services

Common Platform

API

YGGIO

Sensors, devices & data sources
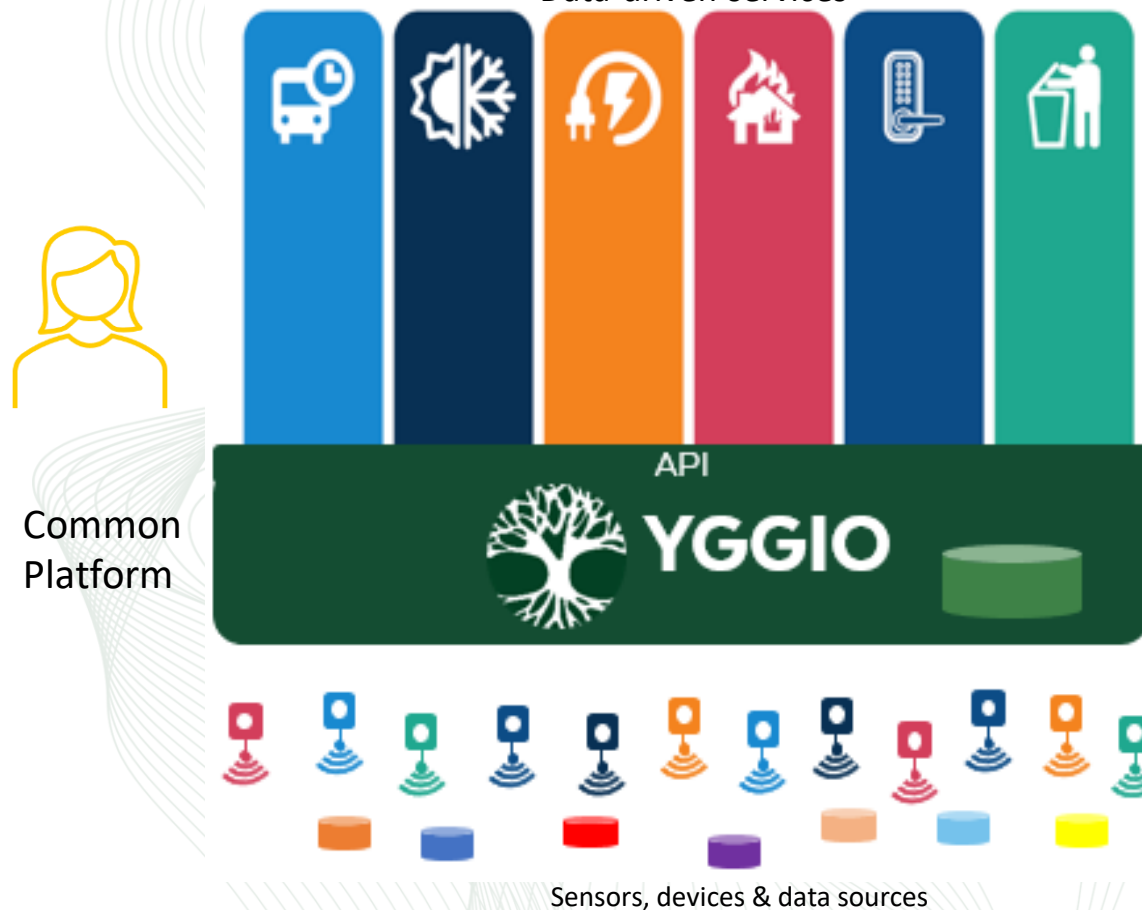
## Standardised open APIs, like FIWARE, minimize vendor lock in effects.

# ABOUT APPLIO TECH

Founded in 1993 as Q2D Solutions.
*Specialized in business-critical processes in large companies with customers as Sony Ericsson, Tetra Pak and Volvo.*

Started with development of
IoT Security solutions in 2015.

New owner and new company name in 2020.

Released **Applio Sense** and **Applio Free** as commercial products in 2021.

## Applio Sense

- An IoT Security management platform designed for both cloud and on-premise
- Centralized device and security lifecycle management
- Monitor all IoT-networks in a organization
- Insights and alarms in large IoT deployments

## Applio Free

- A simple and free to use IoT platform
- Supports end-to-end IoT-solutions built on LoRa
- Designed for fast development of small IoT applications

# Applio Sense

## Device Lifecycle Management

- **Onboarding** – deploy devices – one by one or as batch
- **Monitoring** – keep track that devices are working as expected
- Keep a log on each device
- **Manage** manufacturer, hardware- and software versions
- Put devices into an **organizational context** (hierarchy)
- **Security configuration** management
- **Removal** – take devices out of service

## IoT Insights

- **Dashboard** – Radio quality, security management, device and Infrastructure anomalies
- **Alarms** – Logs and escalating of incidents
- **Quality summary** of device manufacturers and models
- Insights as data source can be utilized in organization´s IoT Server (like Yggio)

Home > Dashboard

**Current Status**

Quick Status Check

Security | Server | Gateway | Devices

Changing Keys Overdue | Gateway Activity | Devices Activity

ElsysGW

ol-drag-4g

+1 Missed Reading

Use Case - Energy Distribution

# Use case - Energy Distribution
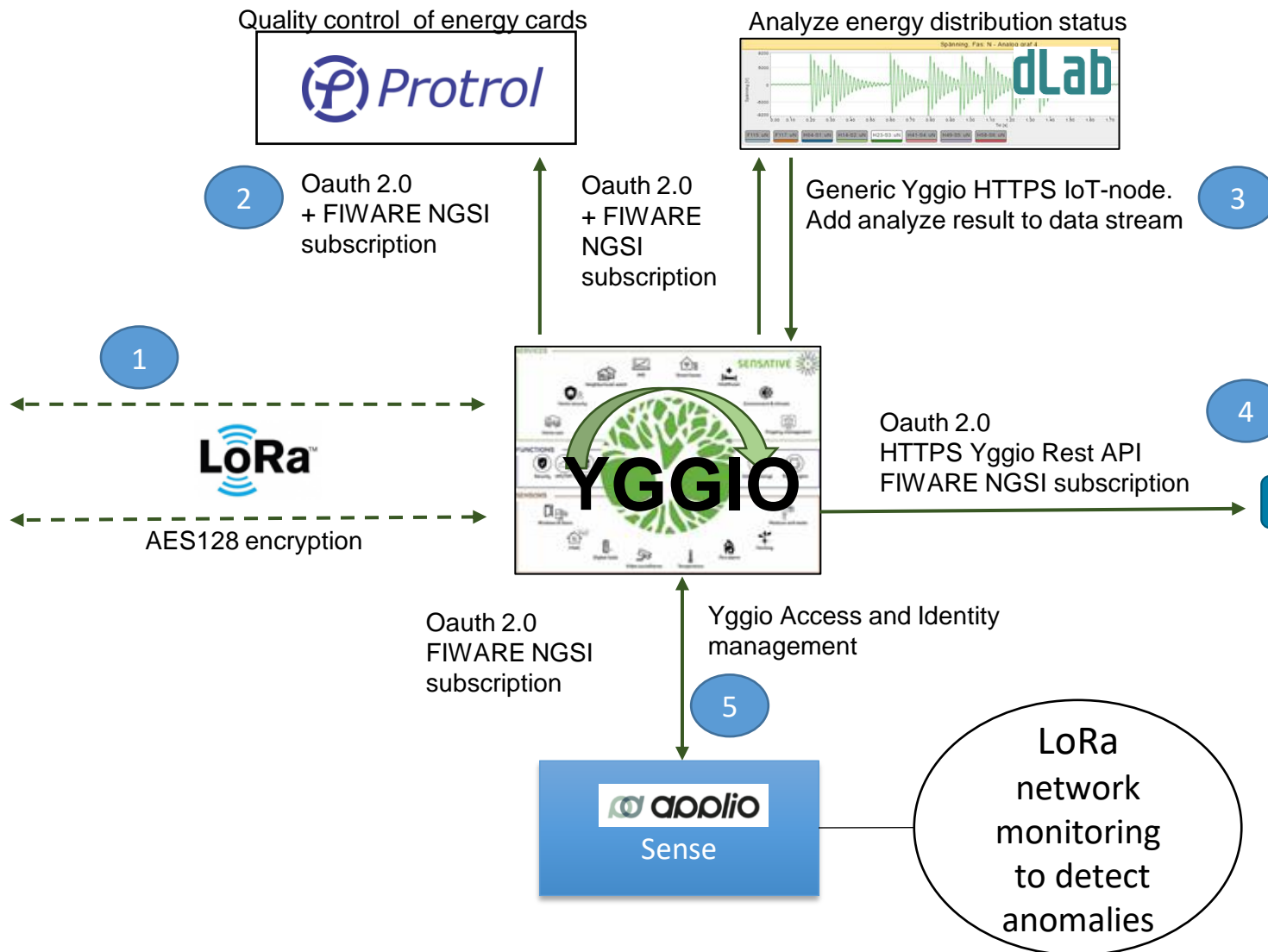
Quality control of energy cards

Analyze energy distribution status

Yggio is powered by RATATOSK. The FIWARE NGSI compliant publish/ subscribe context broker. Enforce zero trust access.

**2** Oauth 2.0 + FIWARE NGSI subscription

Oauth 2.0 + FIWARE NGSI subscription

Generic Yggio HTTPS IoT-node. Add analyze result to data stream **3**

**1**

**YGGIO**

**4**

Oauth 2.0 HTTPS Yggio Rest API FIWARE NGSI subscription

"SCADA"

SCADA | NIS | ...

AES128 encryption

Oauth 2.0 FIWARE NGSI subscription

Yggio Access and Identity management

**5**

Energy measurement Air quality / Access Security

Sense

LoRa network monitoring to detect anomalies

Energy measurement
Air quality / Access
Security

**1**

**AES128 encryption**

**YGGIO**

Oauth 2.0
FIWARE NGSI
subscription

Yggio Access and Identity
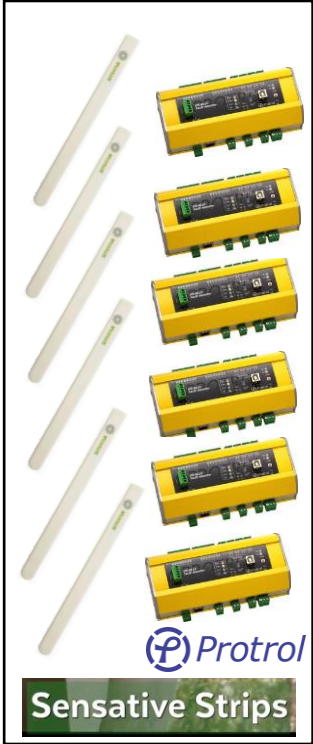management

**5**

Sense

LoRa
network
monitoring
to detect
anomalies

Yggio is powered by
RATATOSK. The FIWARE
NGSI compliant publish/
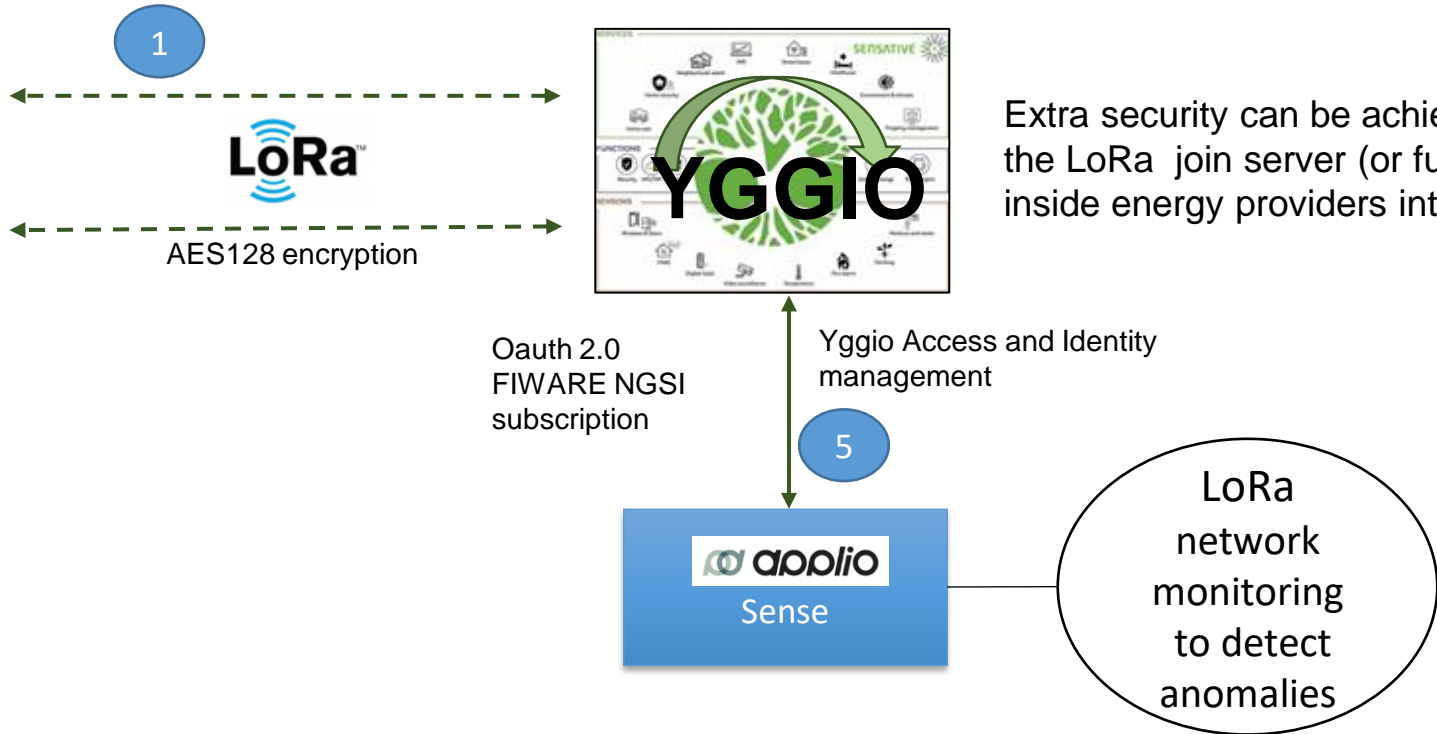subscribe context broker.
Enforce zero trust access.

Extra security can be achieved by placing
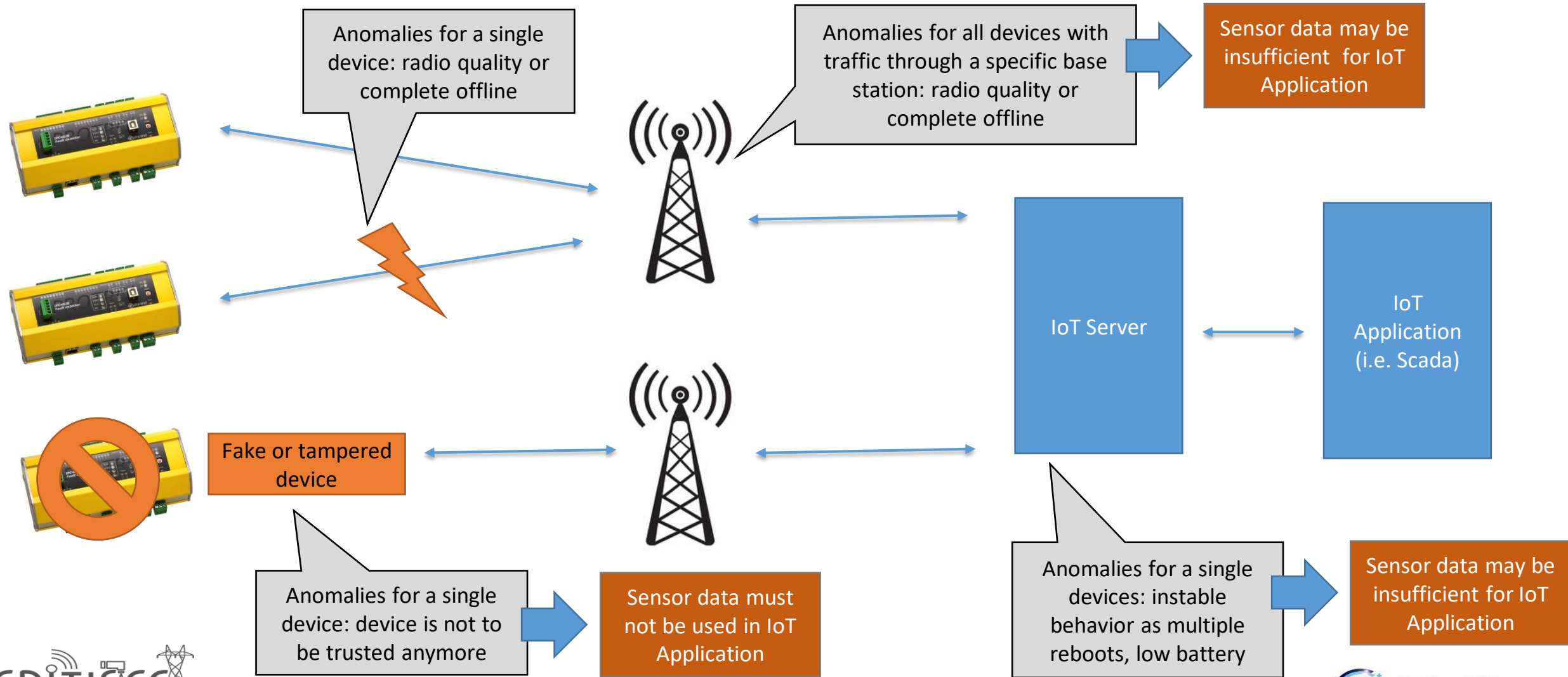the LoRa  join server (or full LoRa server)
inside energy providers intranet.

# Anomaly detection in IoT Network

Anomalies for a single device: radio quality or complete offline

Anomalies for all devices with traffic through a specific base station: radio quality or complete offline

Sensor data may be insufficient for IoT Application

IoT Server

IoT Application (i.e. Scada)

Fake or tampered device

Anomalies for a single device: device is not to be trusted anymore

Sensor data must not be used in IoT Application

Anomalies for a single devices: instable behavior as multiple reboots, low battery

Sensor data may be insufficient for IoT Application

CRITISEC

eltic-Plus
Smart Connected World

# Use case – Smart City

**Smart lighting control
for pedestrian, bicycle lanes,
parks and small streets**

# Use case – Smart City



**RATATOSK**

Yggio is powered by RATATOSK. The FIWARE NGSI compliant publish/ subscribe context broker. Enforce zero trust acess.

Street lighting Cloud solution
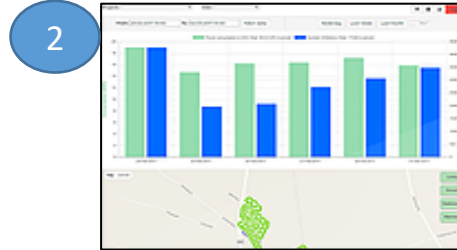
**4G**LTE

① Smart luminares (Street lighting)
Between luminaries 6LoWPAN, to cloud 4G LTE

②

③ Street lighting integration with FIWARE NGSI API and Dataformat

Two-way communication
Security integration feasible

**TYRÉNS**

**LoRa**

Smart City Vertical services
IoT sensors

④ (arbitrary protocol feasible)
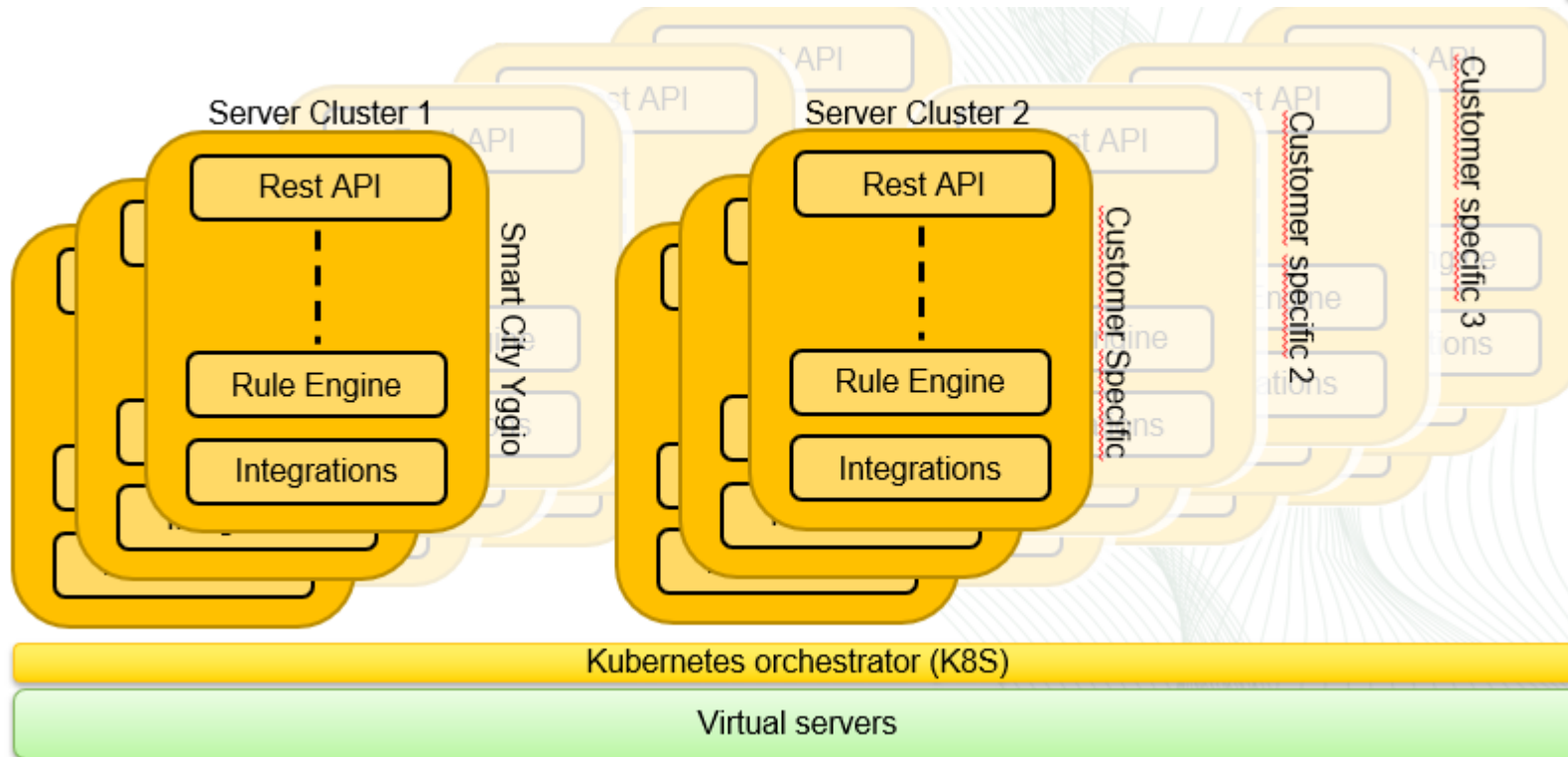
**YGGIO - DiMS**

**CRITISEC**

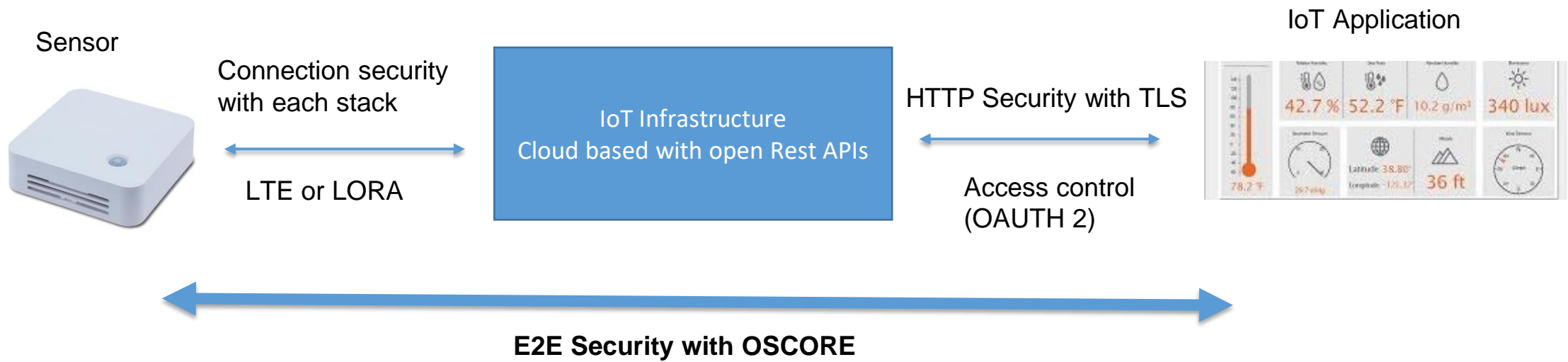**Celtic-Plus**
Smart Connected World

# Use case – Smart City

Scale up - Yggio DiMS benefits:

✔ Performance through horizontal scaling

✔ Robustness and resilience (multiple instances of every service)

✔ Access engine tuned for maximum performance (data models response time verified with 1 000 000 devices with 10 000 user account in just one server)

RATATOSK

Yggio is powered by RATATOSK. The FIWARE NGSI compliant publish/ subscribe context broker. Enforce zero trust acess.



CRITISEC

eltic-Plus
Smart Connected World

# Security in large scale IoT deployments

Sensor

Connection security
with each stack

LTE or LORA

IoT Infrastructure
Cloud based with open Rest APIs

HTTP Security with TLS

Access control
(OAUTH 2)

IoT Application

42.7 %  52.2 °F  10.2 g/m³  340 lux

Latitude 38.80°
Longitude -121.12°  36 ft

78.2 °F

**E2E Security with OSCORE**

- Protect sensible data with an extra layer of security
- Sensor data can be kept encrypted between ends (device and UI)
- Open and protected sensor data/devices can be managed in the same system
- Different IoT applications can have various access levels
- Different users of IoT applications can have various permissions

CRITISEC

eltic-Plus
Smart Connected World

# Thank you