OpenAIS Overview

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on behalf of the OpenAIS
Project Partners

THREAD | OpenAIS

Open **A**rchitectures for **I**ntelligent **S**olid-state Lighting

EU Horizon2020 precompetitive collaboration R&D project

42 months (Jan 2015 – June 2018)

Results available at http://openais.eu/en/results

THREAD | OpenAIS Project Partners

OpenAIS

Signify

Johnson Controls

NXP

ZUMTOBEL

dynniq

ARM

TRIDONIC
enlightening your ideas

TU/e

ESI

Supported by the Horizon 2020 funding of the European Union

THREAD | OpenAIS Project Partners

OpenAIS

Building control/installation

Johnson Controls

dynniq

Lighting

TRIDONIC

Signify

ZUMTOBEL

Non-profit academia

TU/e

ESI

IoT & Silicon

NXP

ARM

Supported by the Horizon 2020 funding of the European Union

THREAD | Drivers, Use Cases, Requirements

Easy Life

Create a solution that is easy to specify, design, install, commission, operate and maintain without making compromise on ease of use.

Increase Building Value

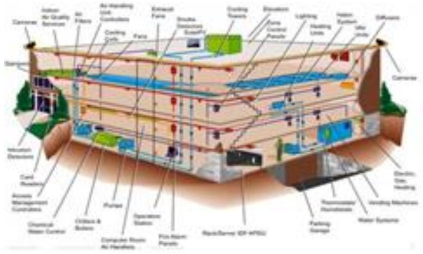
In the changing world of office space and provision owners will need to make their properties more attractive for businesses to lease or rent. ”Trophy workplaces” making visits to the office a luxury and a rewarding experience

Building Wide Ecosystem

In the future, systems in a building will be expected to share sensors and, interoperate to the benefit of the building and their stakeholders

EASY LIFE

INCREASE BUILDING VALUE



BUILDING WIDE ECOSYSTEM

THREAD | OpenAIS Vision

Lighting as the core IoT component in buildings

Lighting integrated in the building IoT infrastructure enables the delivery of additional functionality beyond lighting (safety, security, energy, HVAC, …)

Near future demands open and interoperable multi-vendor solutions

Today, the landscape of IoT-based Lighting systems for professional environments is mainly proprietary solutions.

Scalable evolvable architecture

Defining a IoT based lighting system and architecture and use cases for future connected lighting systems in buildings (2020 and beyond).

Software application updates to extend control functionality after installation

Moving the lighting industry ahead towards the vision for connected lighting

THREAD | OpenAIS Objectives

Create an *open* architecture standard for IoT connected lighting in commercial/professionally managed buildings:

- Applying IPv6 to the end nodes
- Allowing multi-vendor systems
- Enabling commercially differentiated solutions
- Based on (emerging) IoT-standards and ecosystems

Validate this approach by a large-scale pilot in a real office environment, demonstrating the promises of interoperability.

THREAD | OpenAIS Architecture Results

Existing IoT architectures do not fully meet the requirements from lighting industry & stakeholders, gaps identified:

Low latency secure group communication (IPv6 multicast)

Daily operation not dependent from central server

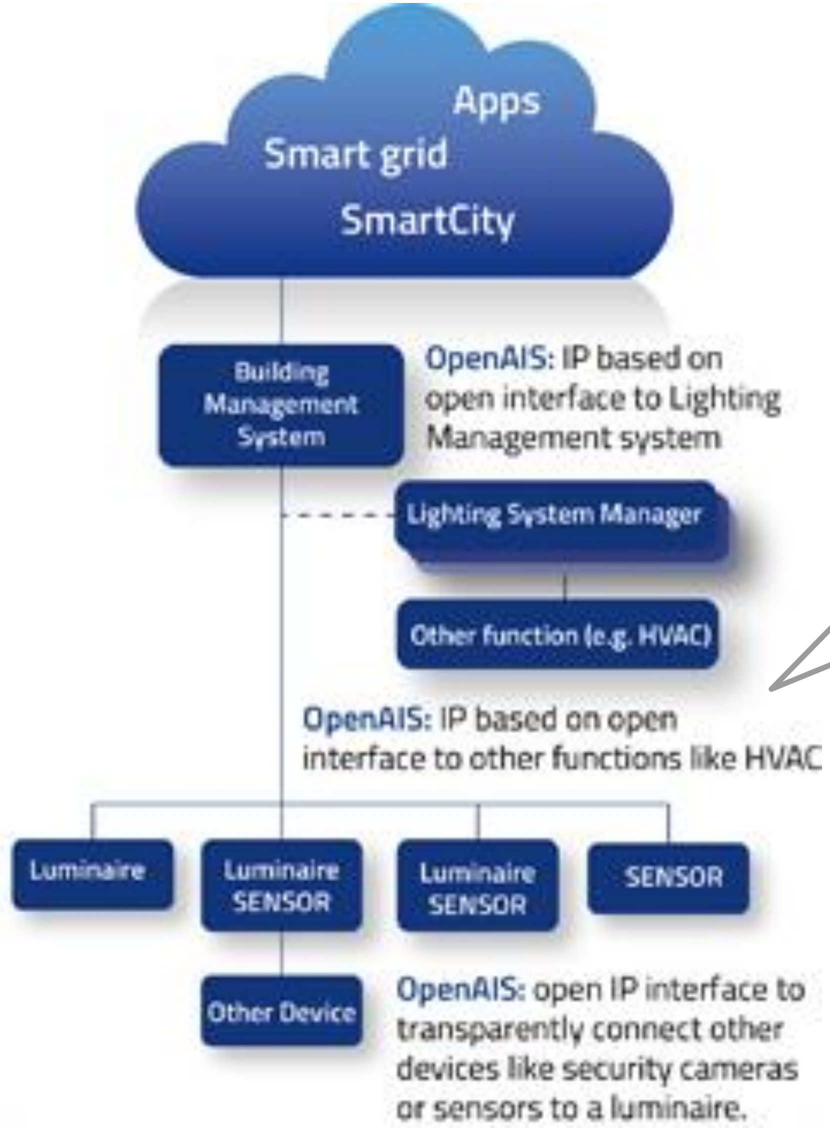
Object models for high quality lighting and integration into BMS.

Architecture solutions have been provided to resolve the gaps:

Open (secure) Group Communication (OGC)

Object data model (API)

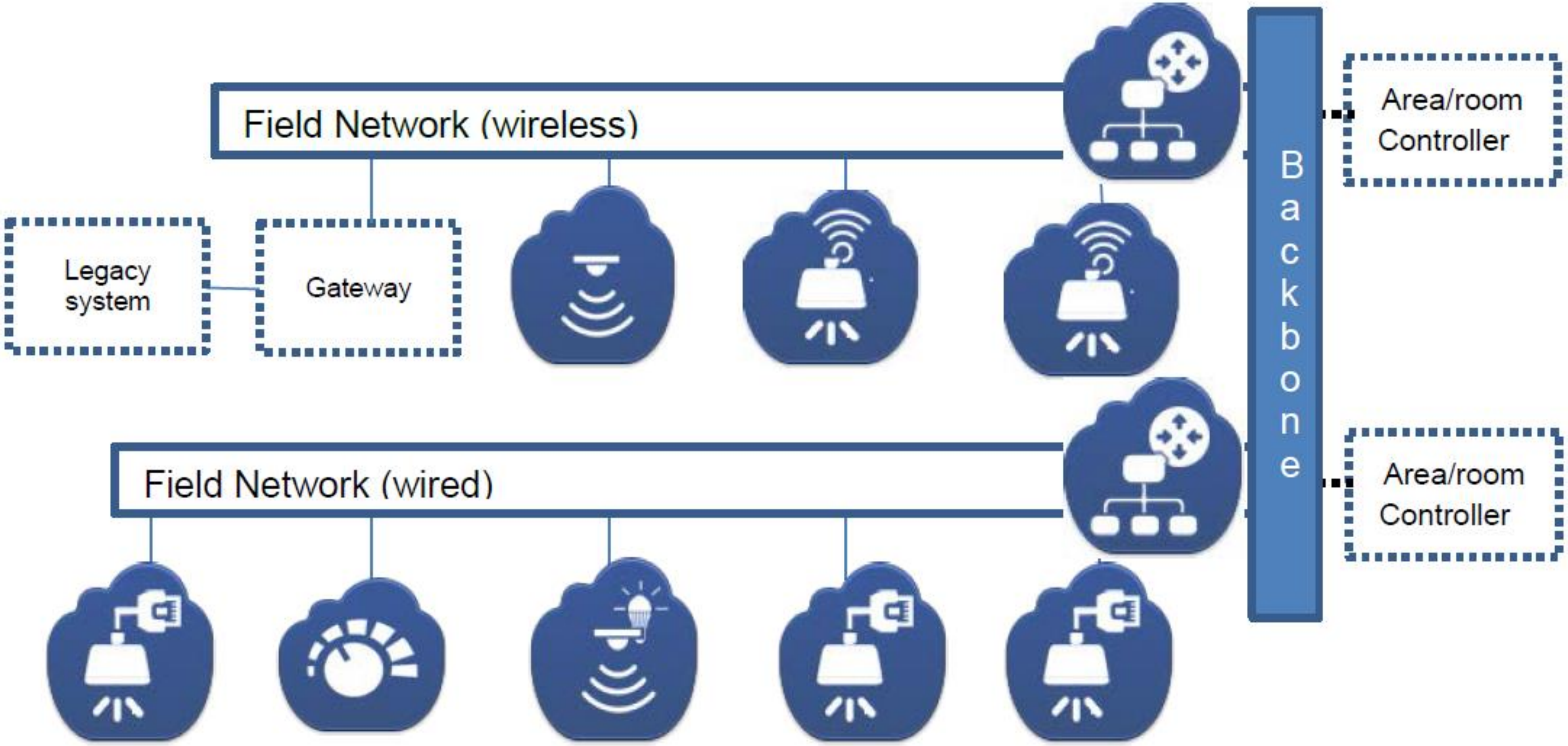
THREAD | OpenAIS Architecture and System Overview



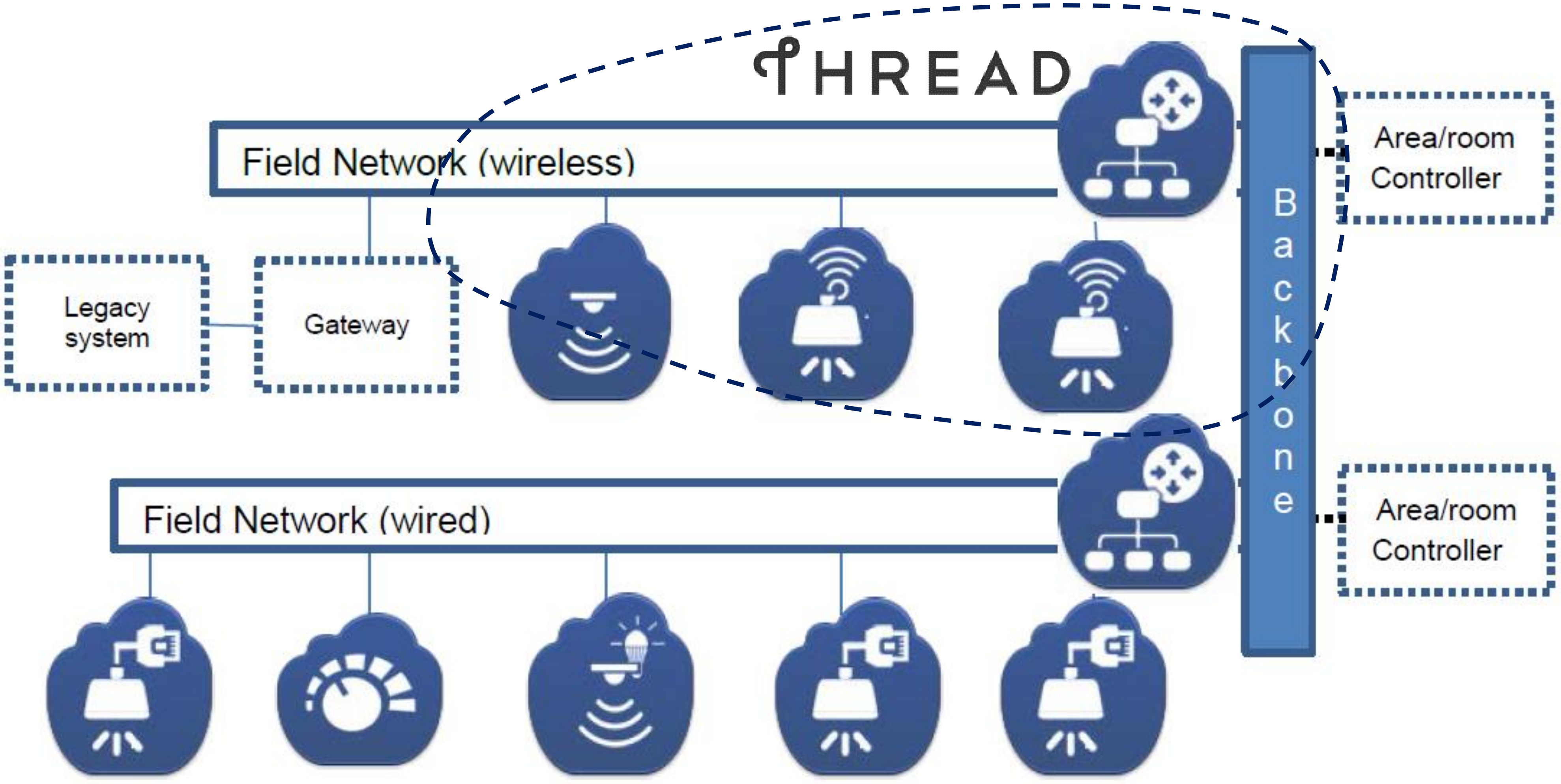
Reference Architecture for:

- ***Control and communication*** architecture for indoor managed building lighting and sensing
- A ***multi-vendor*** and open IT connected systems
- Need for ***differentiation***, openness and future developments.

THREAD | OpenAIS IPv6 Network

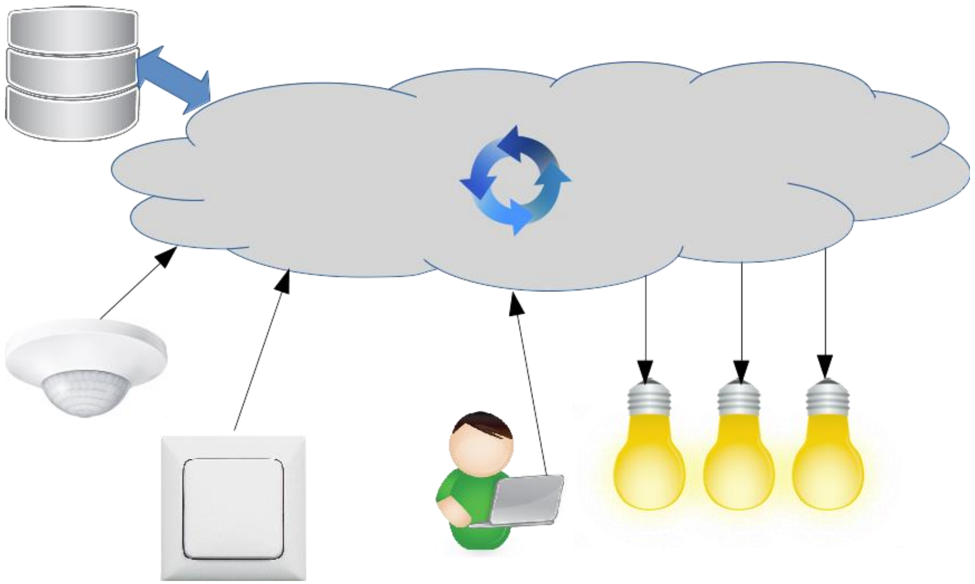


THREAD | OpenAIS IPv6 Network

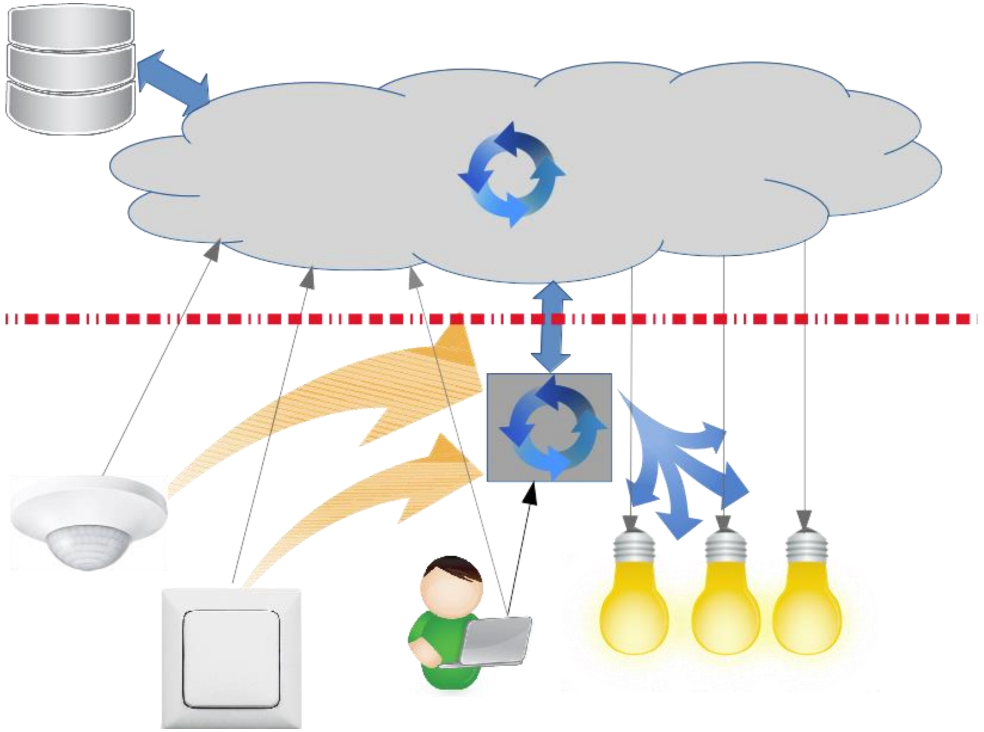


THREAD | OpenAIS Local Controls

IoT with Cloud-Based Control:
Perfect services environment, but poor scalability, insufficient timing and massive online dependency for „switching lights“



OpenAIS:
Adding the „local controls“ layer allows to adapt IoT technology to cover the user needs regarding group control and latency



THREAD | OpenAIS Group Communication (OGC)

Application group for a set of related entities like:

- All luminaires controlled by a control object
- A set of objects listening to one (or more) sensors

Features of Group Communication:

- OpenAIS Group Communication (OGC) uses IPv6 Multicast to address many nodes at once
- OGC applies sophisticated bandwidth optimization to avoid the temporary overload of the wireless spectrum
- OGC applies group communication security that is fast enough for lighting controls
- OGC caters for complex device and controls structures.
- OGC can be applied across diverse IoT frameworks, enabling interoperability for lighting controls

THREAD | OpenAIS Group Communication Summary

OGC is NOT a replacement for the IoT framework or application layer

It is adding a supplemental layer, that is optimized for low latency lighting controls

All other communications, including setup and commissioning remain as specified by the IoT framework

OpenAIS Pilot Installation: De Witte Dame Building in Center Eindhoven

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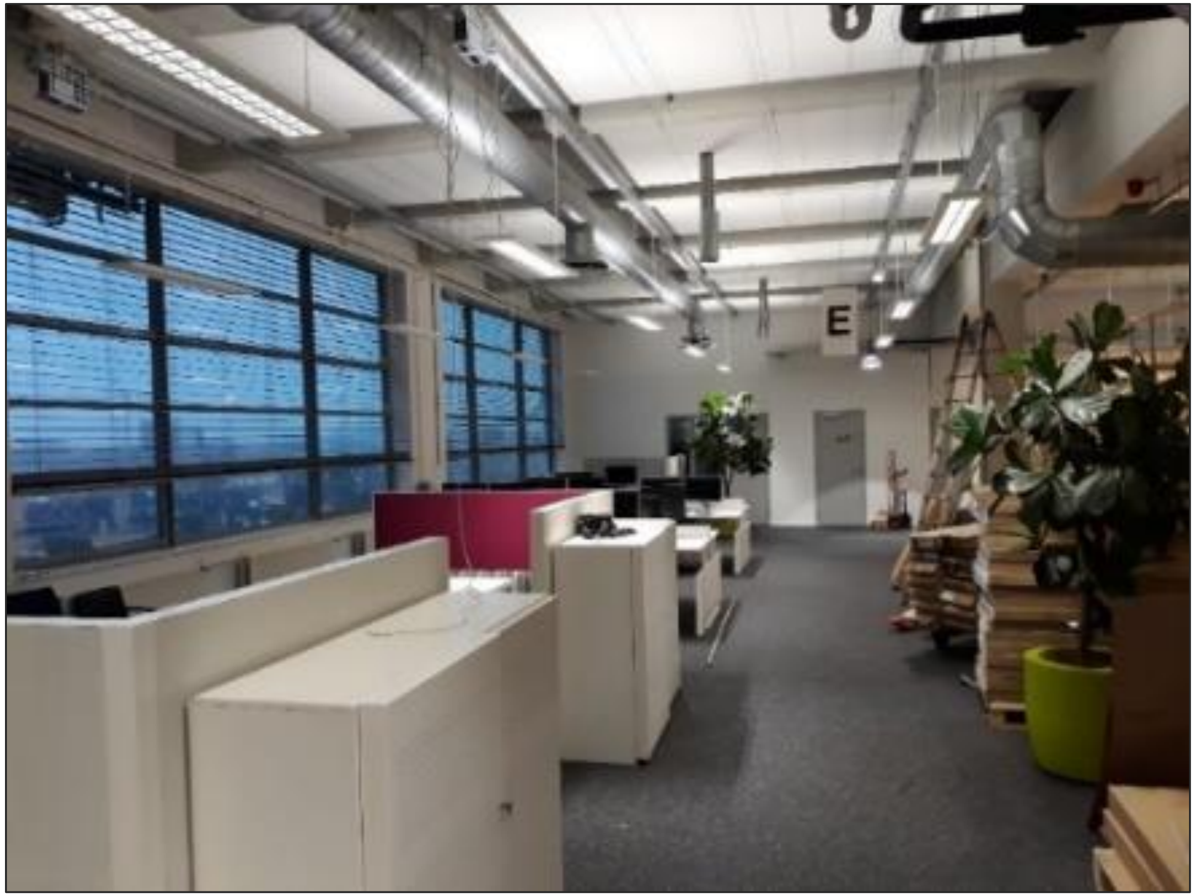
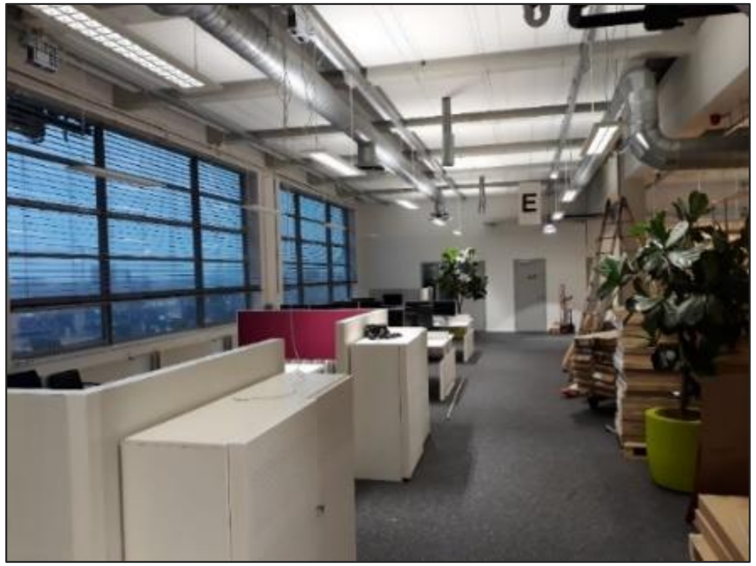


THREAD

OpenAIS Pilot Installation:
De Witte Dame Building in Center Eindhoven



Interoperable: mixed vendors in single system

400 nodes: Philips and Zumtobel luminaires
Commissioning Tool (Dynniq), BMS (JCI), Apps (TU/e)

Hybrid wired and wireless networks

Ethernet and Thread with commercial features (via ARM and NXP)
Power over Ethernet and mains powered

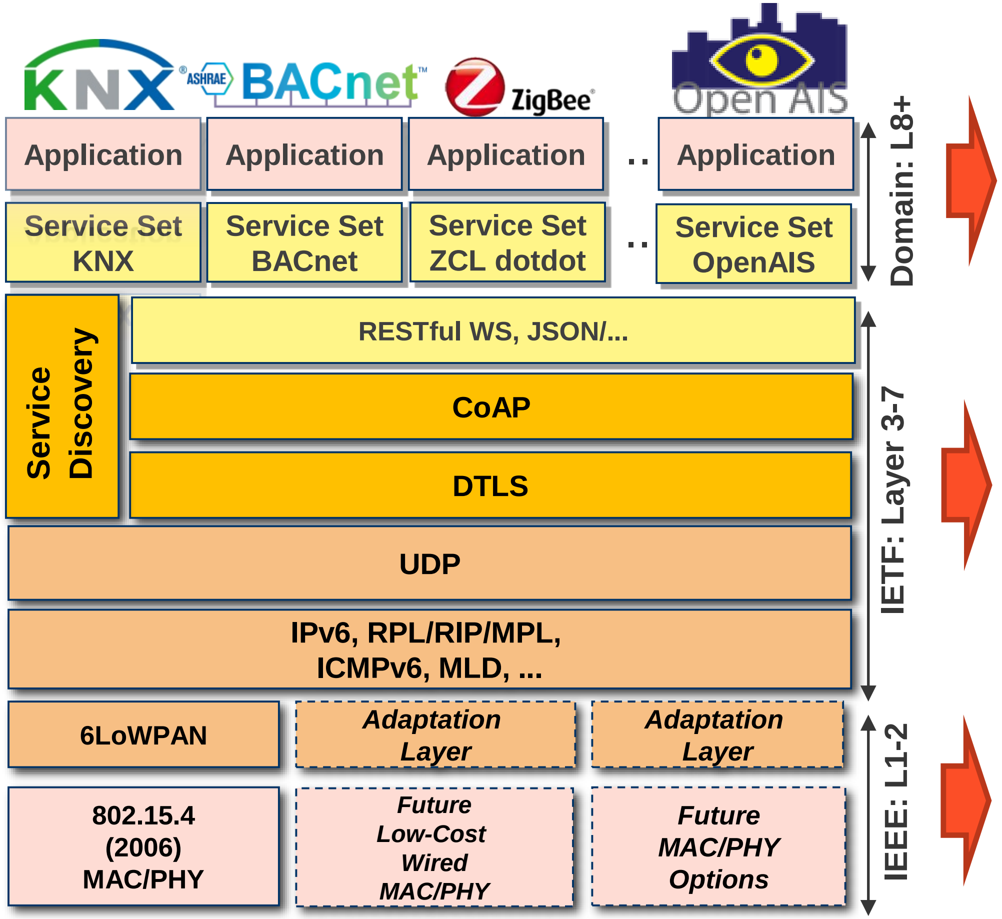
Advanced lighting control strategies

Local occupancy and light level sensing per luminaire
Granular sensing and control strategies (local dimming)
Personal control via Office App

Building Management System Integration

(Direct) access to data collected by lighting system: occupancy & energy data

THREAD | OpenAIS Standardization Contributions



Application layer: IPSO/OMA registration done and publication ongoing.

Middleware layer: liaison with Fairhair to align OpenAIS Reference Architecture to create a common layer 3-7 IT solution for Lighting and Building Automation.

Network layer: For wireless aligned with Thread, For wired use Ethernet (UPoE/PoE+)

Multiple scientific, academia and dissemination publications at:
http://openais.eu

THREAD | OpenAIS Video

http://www.openais.eu/en/news-events/demonstration-video-published/

https://youtu.be/kaWEh1jAqLA

THREAD | Conclusions and suggested follow-up
(both OpenAIS & Thread Group hats on)

Take a look at the OpenAIS project results:
http://openais.eu/en/results

Thread BH draft features used in OpenAIS Pilot components:
Multicast across Backbone router
ND Proxy feature of Backbone router (as in DUA)
Commercial Installation Mode

Enhancements for OGC over Thread:
After OpenAIS completion, follow up via Fairhair liasion