

# SMART HOMES

PHILIPPE LALANDA

KOBE UNIVERSITY – AUGUST 2017

# Structure of this lecture

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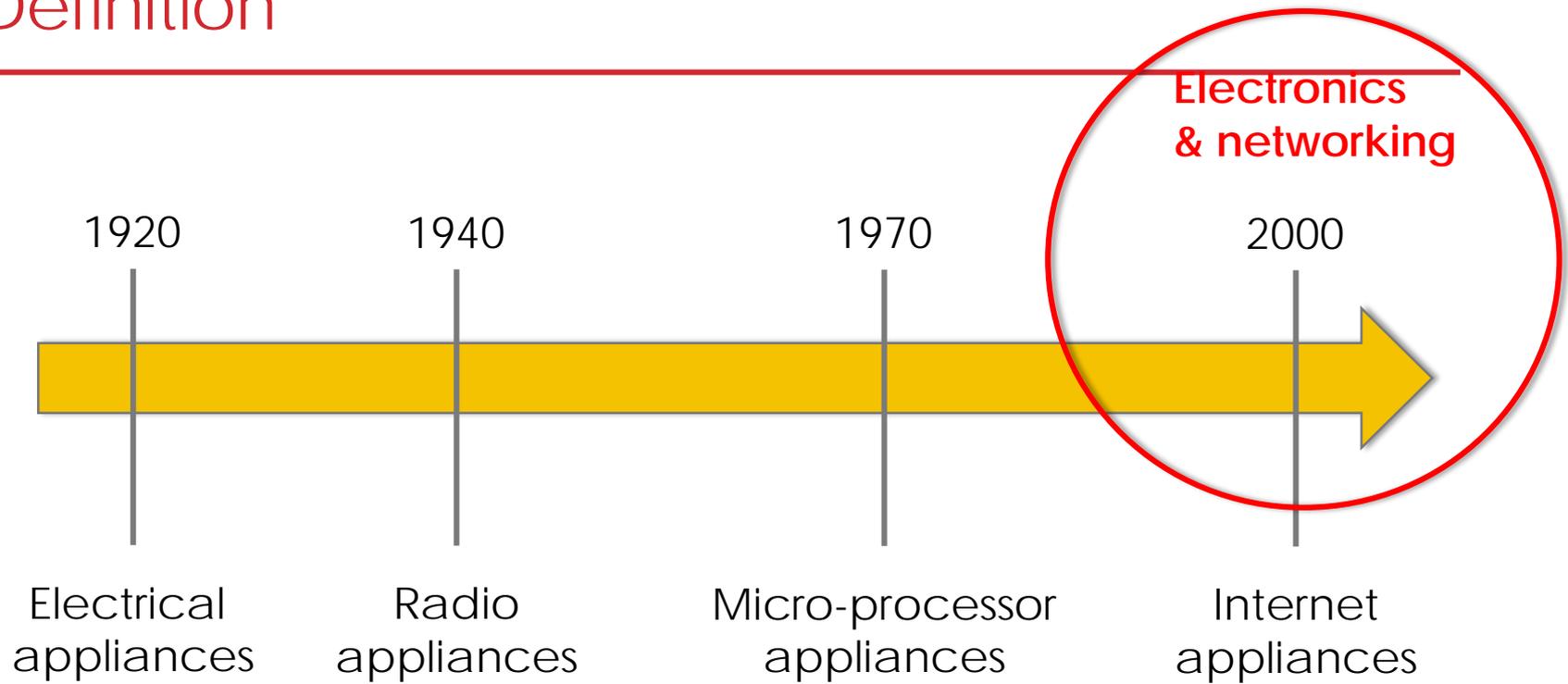
Smart home definition

Requirements

Current solutions

Challenges for tomorrow

# Definition



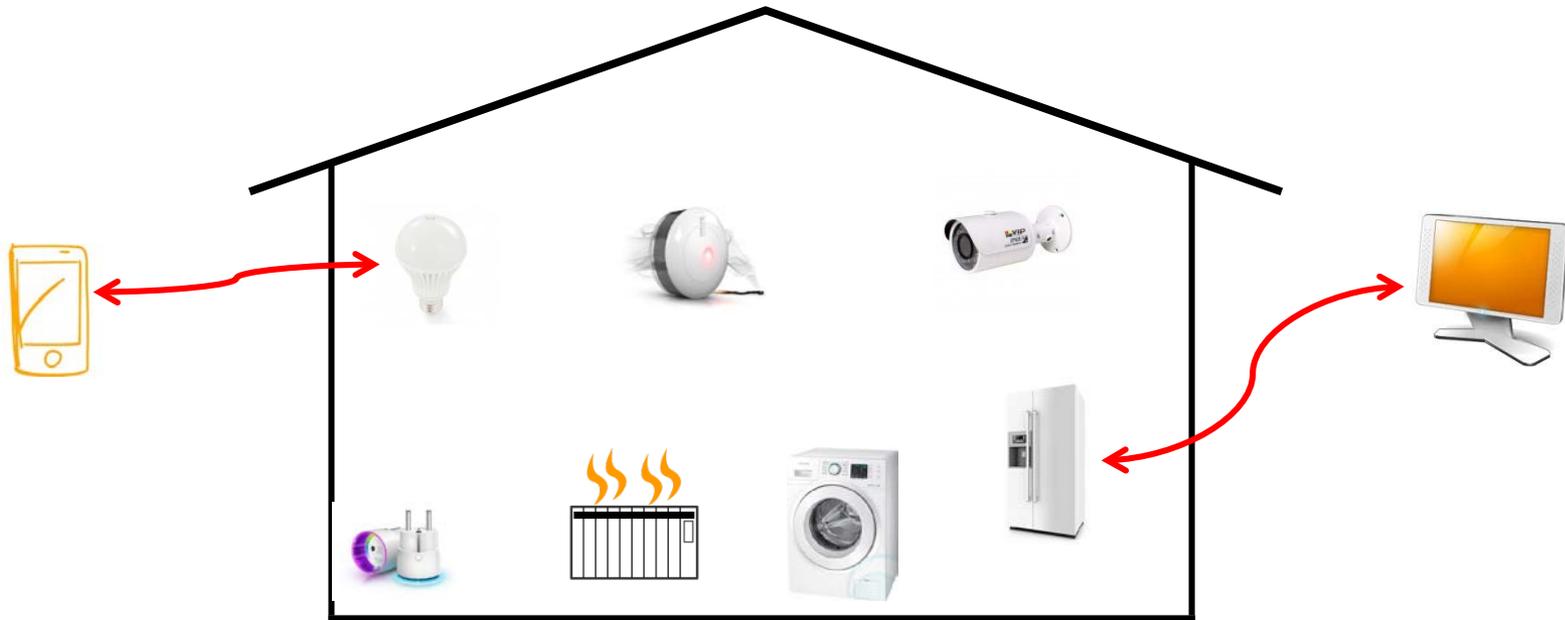
Philippe Lalanda - 2017



# Definition 1

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A home equipped with **electronic devices** that can be **controlled remotely** by smartphone or computer (Oxford dictionary).



Highly fragmented, not scalable, poor quality of service.

# Applications

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## **Example of applications**

Getting the temperature of the house

Turning heating on/off

Turning lights on/off

Turning electrical outlets on/off

Checking the doors

Checking what is in the fridge (exploratory)

## Definition 2

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A home with automation systems to provide the inhabitants with **monitoring and control** over the **building's functions** (whatis.com).



More coherence, still fragmented, closed world.

# Applications

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## **Example of applications**

Managing HVAC

Managing lights

Managing security

# Definition 3

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A home filled with **electronic devices** providing **services** in a way that is invisible to inhabitants (inspired from Weiser).



Coherent, not fragmented, open world assumption.

# Applications

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**More in line with Weiser's vision**

## **Example of applications**

Global security

Global Energy management

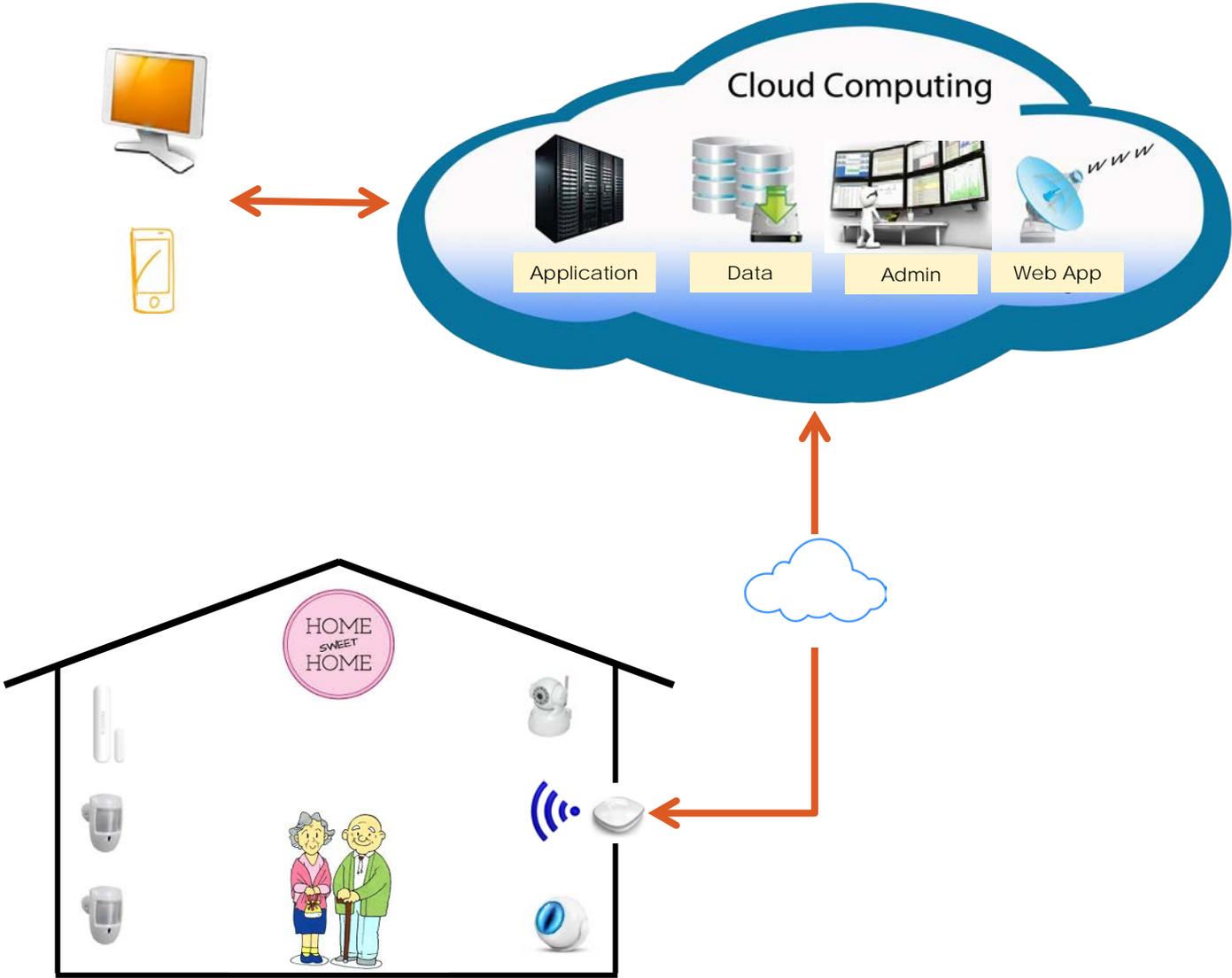
Health applications

Comfort applications

# Example – Activity tracker



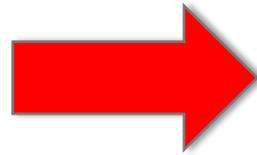
Activity tracker



# Conclusion: A major breakthrough

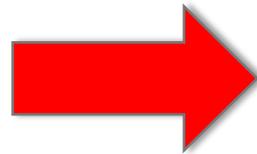
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Remote control  
and monitoring



Service

Devices & networks



Software

# Structure of this lecture

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Smart home definition

Requirements

Current solutions

Smart home tomorrow

Challenges and conclusion

# How to turn a house into a digital home

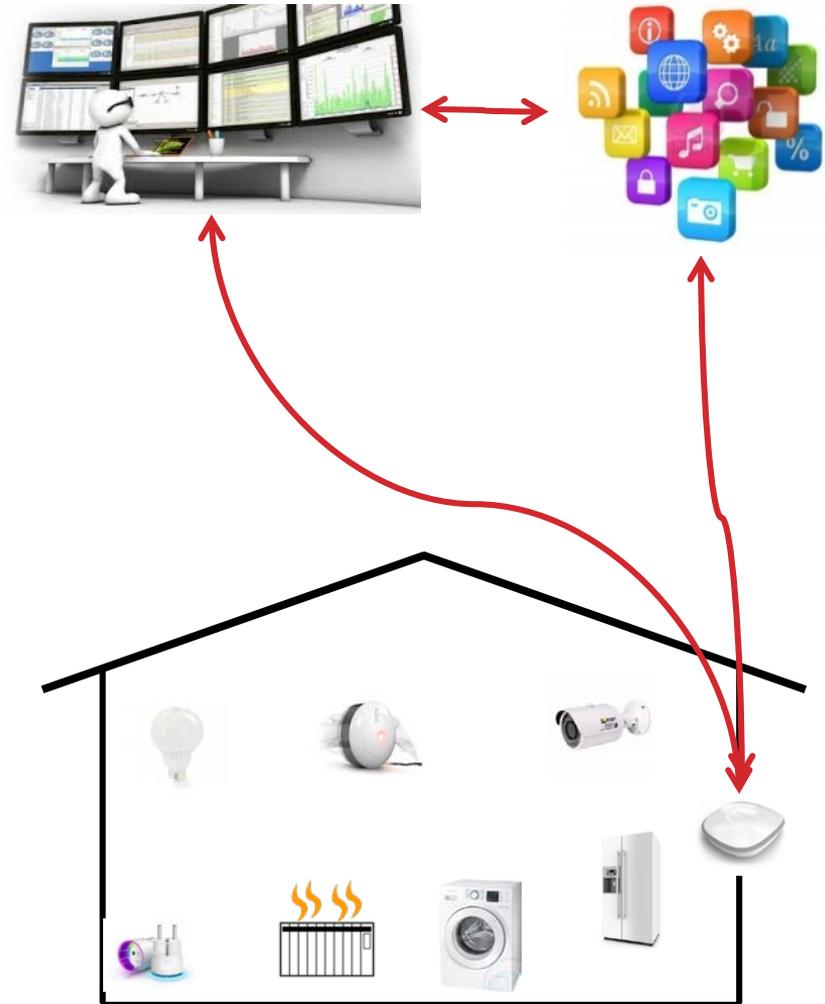
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## Needed artifacts

sensors and hub

applications

management infrastructure



# Requirements

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## **Sensors properties**

Reliable

Low energy

Configurable

## **Application properties**

Context-awareness

Distribution

Dynamicity

Heterogeneity

Security and privacy

Autonomic

## **Infrastructure properties**

Deployment  
(continuous)

Management

Autonomic features

Scalability/Elasticity

# Sensors: Energy consumption

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## Sensors rely on battery

wake up on events (motion sensor)

wake up on periods (thermometer)

configurable (periods, motion, etc.)



# Applications: Context awareness

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Applications use any information that is relevant to the interaction with users

users' location, activity, expectations, ...

physical quantities (temperature, light, ...)

available software resources

**A light management application behaves differently at night, or when the TV is on.**



# Applications: Distribution

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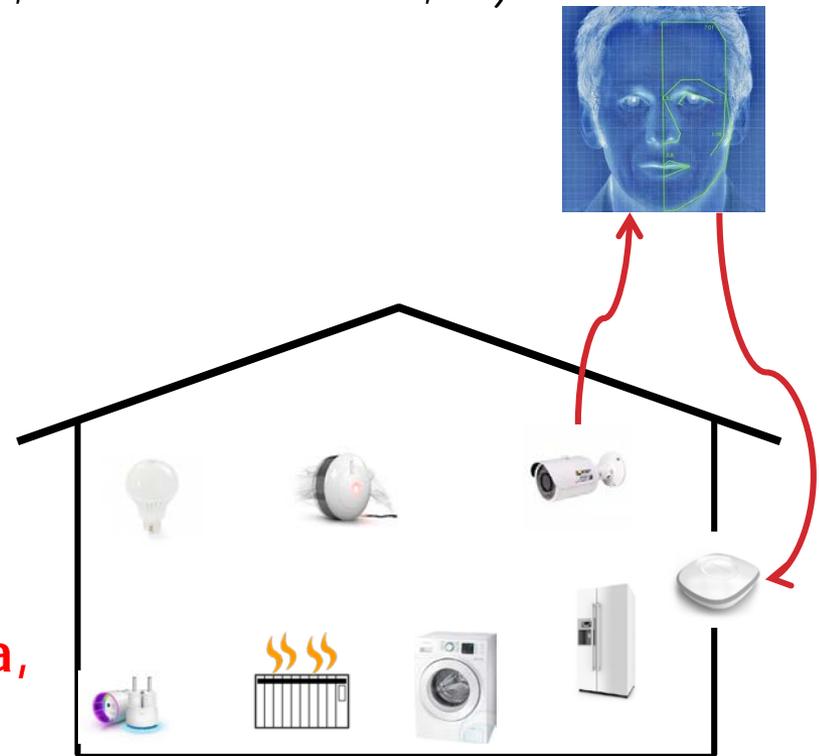
**Applications are inherently distributed among mobile and stationary devices (and web resources)**

devices integrated in the house

mobile devices (smartphones, smart watches, ...)

web resources

**A tracking application uses many devices and computing resources (presence device, GPS chip, camera, image recognition software).**



# Applications: Dynamicity

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Every device, every system that contributes to the open environment evolves and changes through time

hardware or software failures

energy shortage

maintenance operations (out of control)

**A light management application must use the lights that are working.**



# Applications: Heterogeneity

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Industrial device manufacturers use proprietary techniques to restrict openness and interoperability

communication protocols

data models

device management models

**A fire management application must access all entrances of a house.**



# Applications: Security and privacy

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Applications must not endanger users

Privacy must be guaranteed

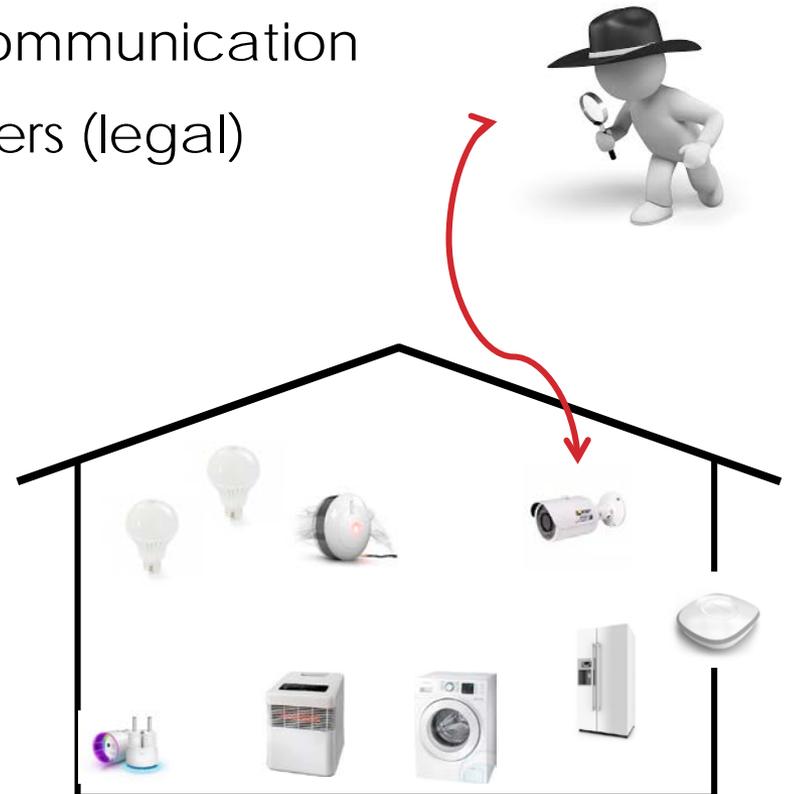
prefer local storage/avoid communication

guarantees signed by providers (legal)

kinect-like technology

...

**Health information must not be communicated to anyone but authorized doctors and relatives.**



# Infrastructure: Management

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## Application management

deployment

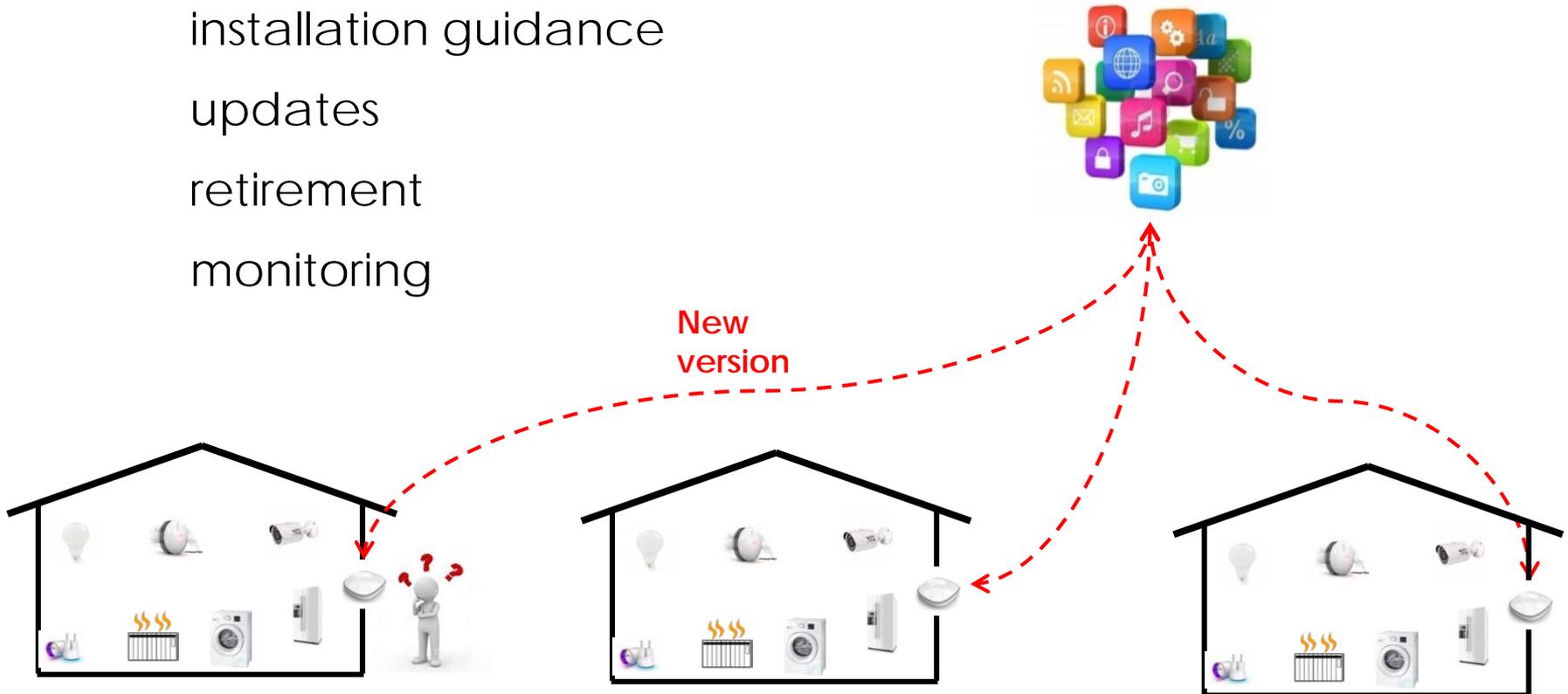
configuration

installation guidance

updates

retirement

monitoring



# Infrastructure: Management

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## Device management

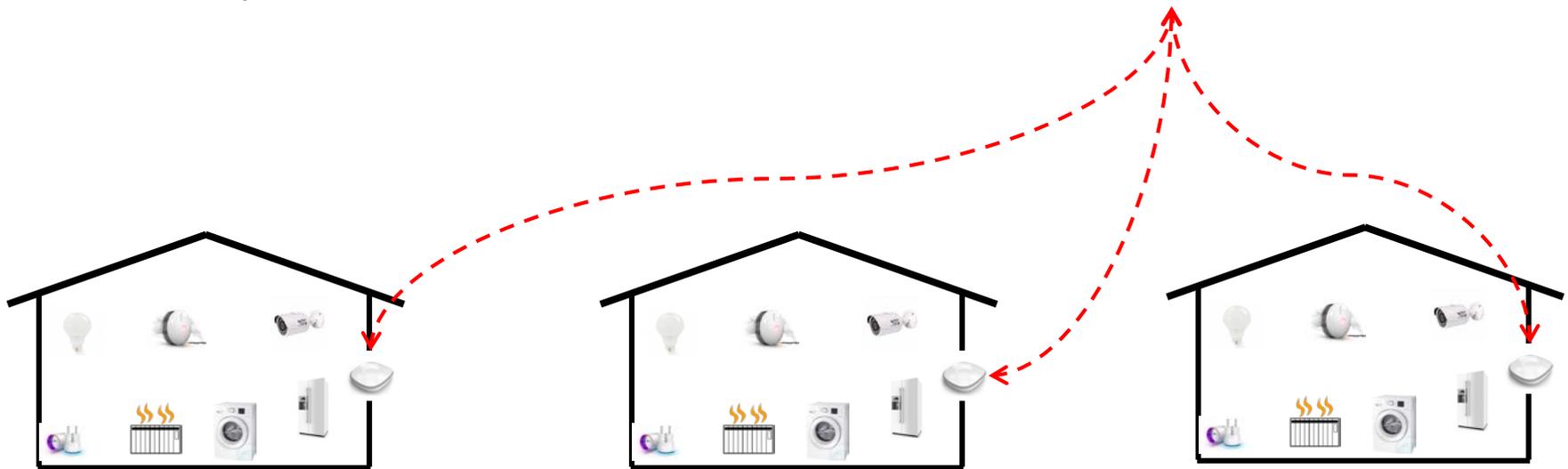
discovery

configuration

updates

monitoring

repair...



# Infrastructure: Management

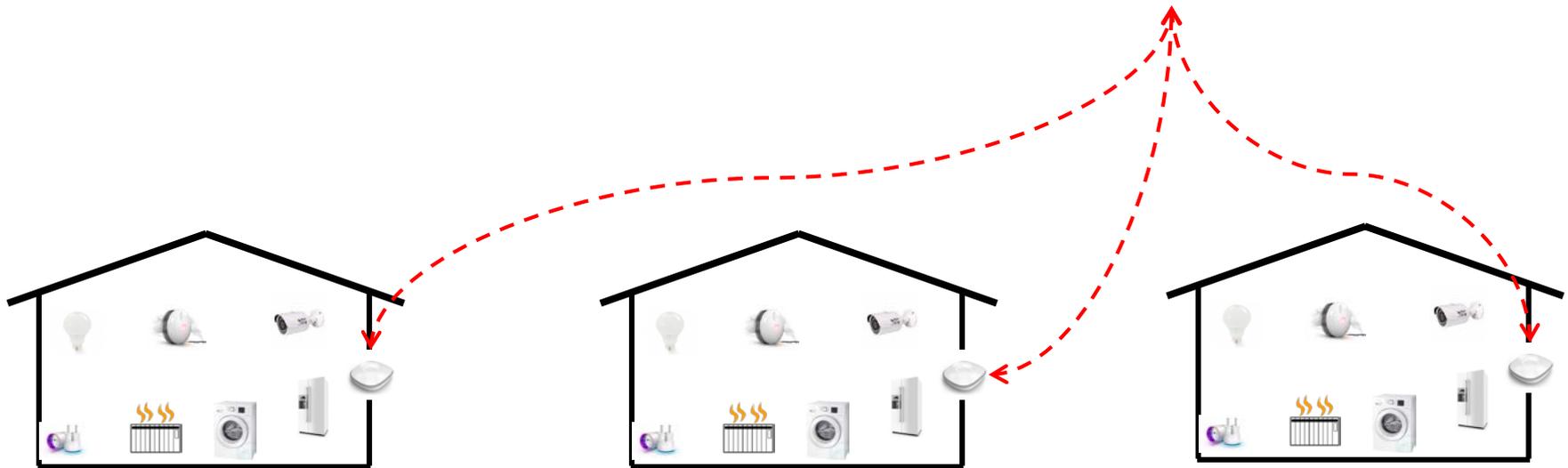
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## Network Management

configuration

monitoring

repair...



# Conclusion

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## **Application development is complex**

Context aware, flexible software

## **Infrastructure management is very challenging**

Requires different skills

Telecom companies? Manufacturers ?

# Structure of this lecture

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Smart home definition

Requirements

Current solutions

Challenges for tomorrow

# Industrial solutions

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Orange

Global telecom operator

Samsung

Electronics

Panasonic

Electronics

Google

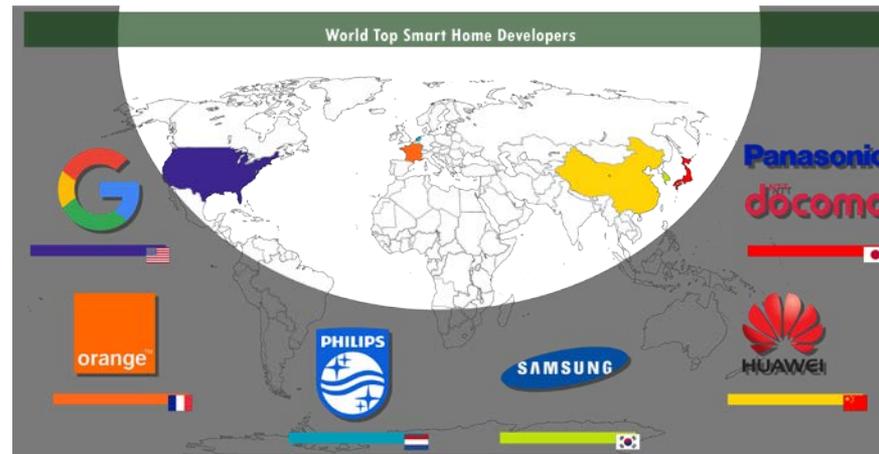
Software

Philips

Electronics

Huawei

Telecommunications



# Geographical distribution

## World Top Smart Home Developers



orange™



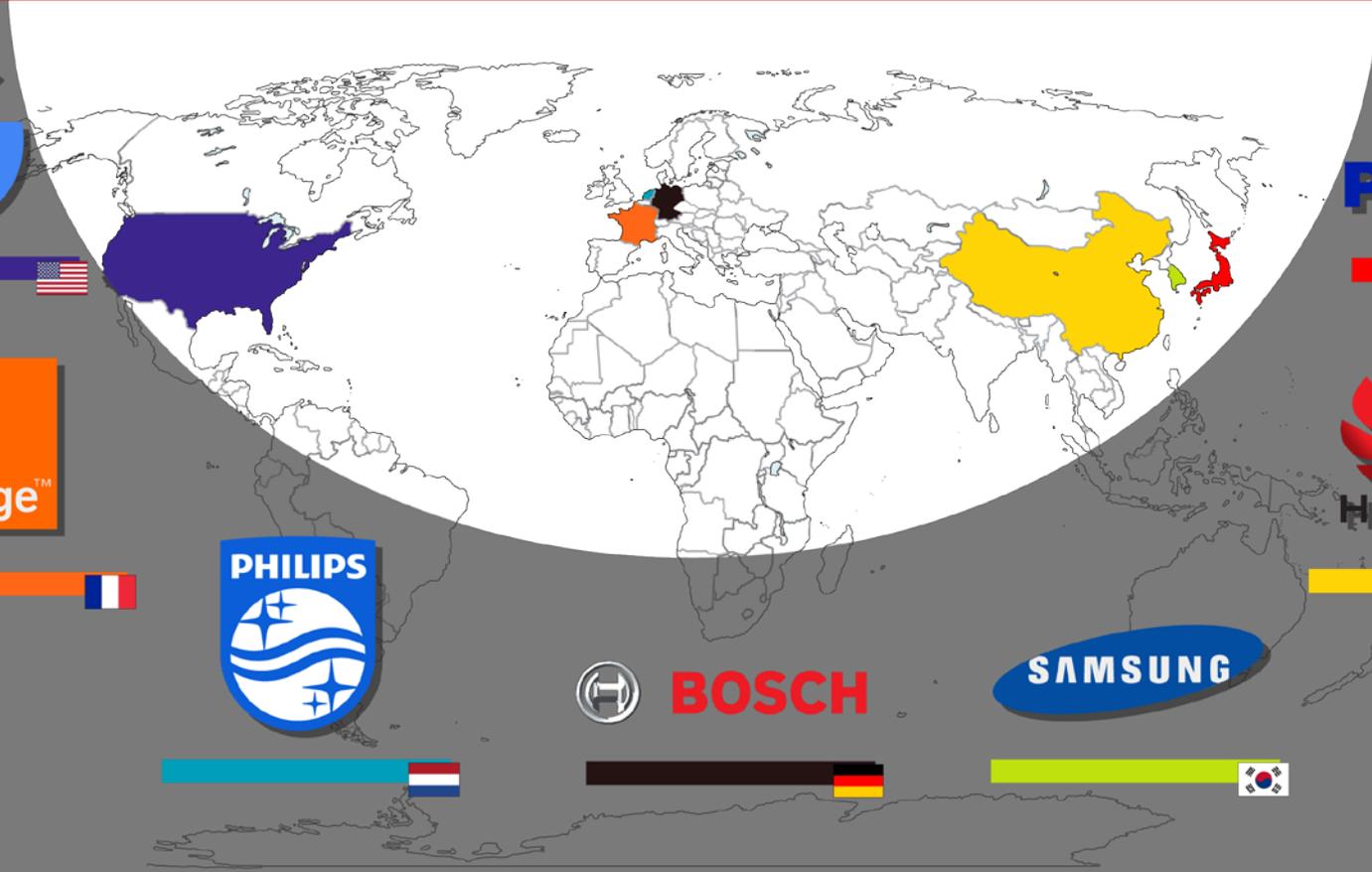
BOSCH



SAMSUNG



Panasonic



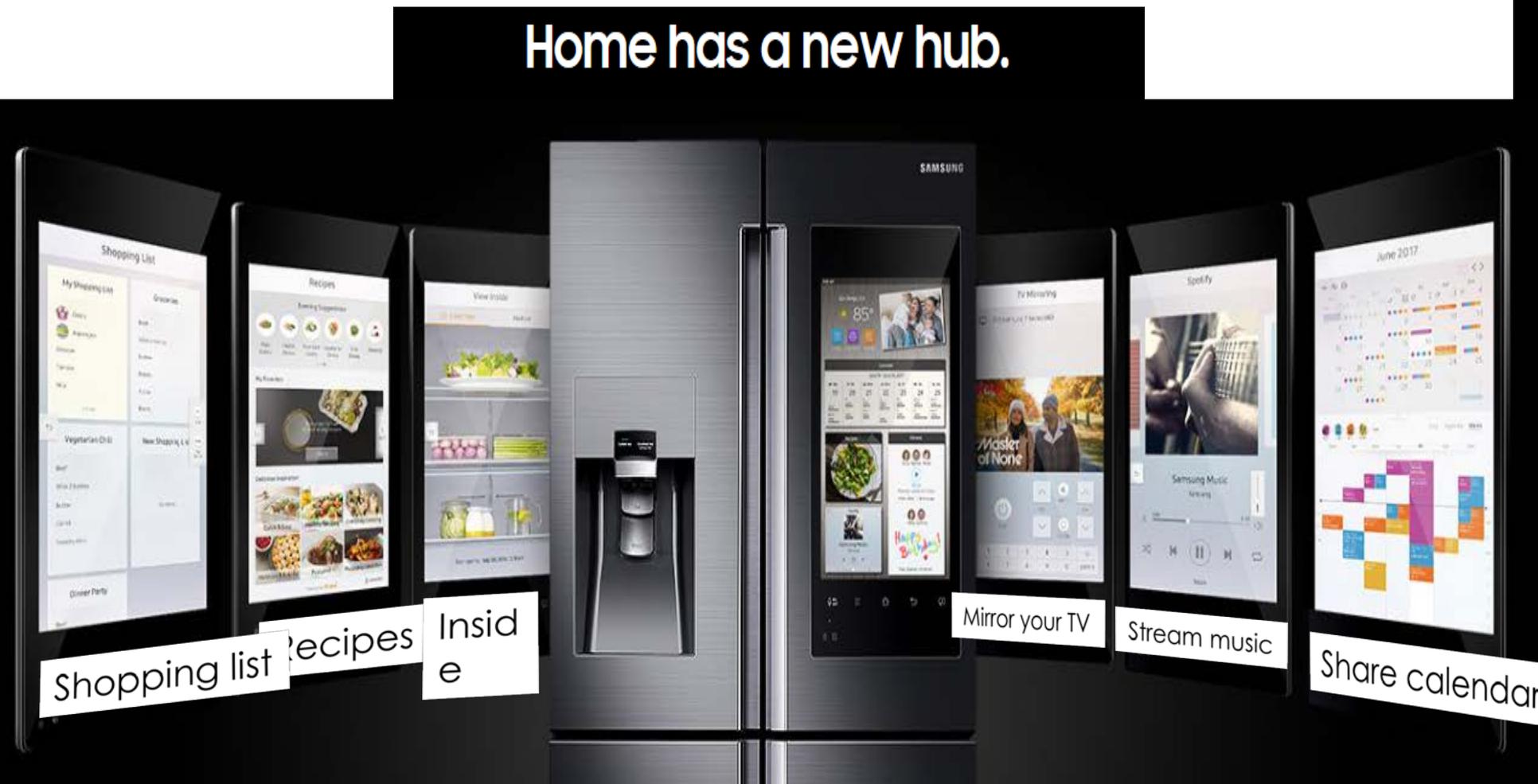
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**SMART HOME**

**SAMSUNG Family Hub**

# Samsung Hub Family: Smart Kitchen

Home has a new hub.



# Samsung Hub Family: Smart Kitchen

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**All your apps. All in one place.**

From keeping track of groceries to keeping in touch with family, these apps help you organize your home and life

# Samsung Hub Family: Apps



Recipes



View Inside



Calendar



To Do



Browser



TV Mirroring



Shopping List



Fridge Manager



Memos



Whiteboard



TuneIn



Pandora



Instacart



GrubHub



Photo



Glympse



Spotify



iHeartRadio

## Food management

Buy groceries with Instacart, browse recipes with the Recipes app and even order in with GrubHub

© 2017 Samsung Electronics Co., Ltd. All rights reserved.

## Family connection

Leave notes, share your location with Glympse and limit app access with parental controls

## Entertainment

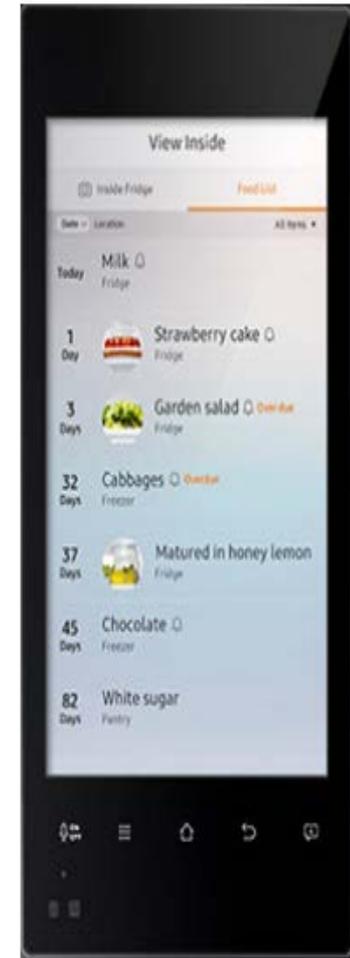
Find and stream music with Spotify, tune into iHeartRadio and seamlessly mirror what's playing on your Samsung TV

# Samsung Hub Family: Food management



Remotely monitor  
and control your fridge  
from anywhere

See inside from  
anywhere and get  
expiration notifications



# Samsung Hub Family: connected appliances

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## Smart appliances fully engineered by Samsung

- ✓ Samsung refrigerator, oven, laundry, TV,...
- ✓ The Hub Family is a smart refrigerator

## Family Hub update?

When will 1st gen family hub receive the software updates to support the new software features and apps found in the 2nd gen family hub fridge?

## Services and living places: smart associations

- ✓ The Samsung refrigerator provides Food management, Family Connection, Entertainment
- ✓ It can communicate with the Samsung TV

# Samsung devices



- Smartthings HUB

HUB/HUB equivalent



pasive security

- Motion sensor
- Presence sensor
- Opening detector



others

- Smart power Outlet



mobility

- Mobile app (3.3)
- Web interface



cameras

- Wide angle cam



sensors

- Multi sensor
- Opening detector



others

- Intelligent switch
- Alarm
- Z-wave repeater



connectivity



# Samsung: architecture



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# SMART HOME

## BOSCH Smart Home portfolio

# Announcement

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## Bosch Smart Home arrive en France

8 juin 2017

**Labofnac**  
Tests, actu et comparatifs high-tech

Bosch Smart Home est disponible en France depuis le 1er juin dernier, avec l'intégralité des appareils présentés ci-dessus. Les détecteurs de mouvements/fumée, le contact porte/fenêtre, le thermostat et la prise connectée sont vendus seuls ainsi qu'en kits : 399,95 euros pour le kit sécurité et 359,95 euros pour le kit régulation climatique. Les caméras 360° et EYES sont, elles, uniquement vendues seules. Comptez 250 euros pour la première et 350 euros pour la seconde.

28 juillet 2017

La caméra d'intérieur 360° de Bosch est disponible depuis peu dans le commerce, mais elle vient aussi de faire un passage dans notre rédaction. Nous avons donc pu nous faire un premier avis.

# Bosch Smart Home: Modular and extensible solutions

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**Indoor Climate Starter Pack**



**Heating Starter Pack**



**Security Starter Pack**



**3 Packs, 3 standalone solutions, 1 Smart Home app  
Compatible with the Bosch Smart Home system**

**Designed and build by Bosch**

**Promises: smart, reliable, robust, safe**

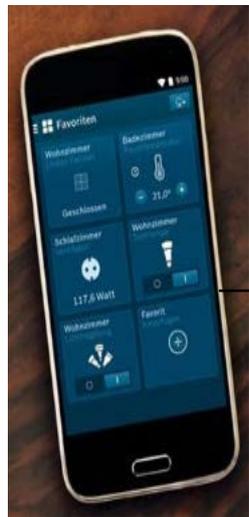


## Smart Home Motion Detector

- ✓ Notifies when necessary
- ✓ Identifies movement reliably and precisely
- ✓ Distinguishes between untoward and unremarkable events
- ✓ Small animal recognition – ignores pets to reduce false alarms
- ✓ Sounds the alarm in case of unauthorised access and permits fast reaction by notification via Smart Home App

# Example: Bosch Security starter pack

3 LED: power LED, LAN LED, Cloud LED



Smart Home app



Bosch controller

Internet box



Motion detector



Door / window contact



Smoke alarm

Cloud LED "on": remote control activated

Required to connect to the Bosch Smart Home update server

# Bosch Smart Home system

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## Scenario Manager, a software feature of the Smart Home app



### Leaving home

### Coming home

### Relax with Philips

Lower the room temperature and switch off appliances and lights, and activate the alarm system.

Heat the living areas as desired, switch on electrical appliances and lamps. The alarm system is deactivated.

Light on your Philips lamps in exactly your favorite shade and lighting mood, turn on your radiator thermostats for a cosy warmth.

## Scenario Manager:

Leave daily actions to a reliable system with the help of scenarios

- ✓ Pre-set scenarios avoid repetitive tasks
- ✓ All pre-settings can be customized
- ✓ Scenarios allows partner products to be used in one system
- ✓ Scenarios can be used intuitively

# Bosch Smart Home portfolio

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## **High-quality devices manufactured by Bosch**

- ✓ Target features: smart, reliable, robust and secure
- ✓ Significant investment in smart objects and, recently, in smart home appliances

## **Standalone added-value services fully engineered by Bosch**

- ✓ First services: ventilation, energy, security
- ✓ Extensible: with extra devices (camera, etc.) , with the scenario manager feature

## **Scenario Manager to automate simple and repetitive tasks**

- ✓ Scenarios are rules that avoid simple and repetitive tasks (turn on the light, etc.)
- ✓ End-users customize pre-set scenarios
- ✓ Scenarios allow third-party devices to be integrated

## **In option, Cloud compliant solution for remote controls and firmware update**

- ✓ Data can be stored locally or on remote servers



HUB/HUB equivalent

- Smarthome controller



mobility

- Smarthome app(4.4)



others

- Radiator thermostat



pasive security

- Opening detector



sensors

- Smoke detector
- Motion detector



cameras

- 360 indoor cam
- Eyes-outdoor cam



others

- Smart plug



connectivity



# Bosch: architecture



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# SMART HOME

## Orange Smart Home

# Homelive announcement

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## Orange France Launches Homelive, a Home Automation Solution Powered by Sigma Designs' Z-Wave Technology

Nov 19, 2014

Homelive is a smart-home convenience system that puts their home at the customer's fingertips when away. Using a single application accessed by a smartphone tablet or computer, Orange Homelive allows consumers to adjust settings and to control remotely all connected home appliances from any place in order to enhance home security, improve home comfort, and manage energy consumption in the home. Homelive includes support for a broad range of devices,



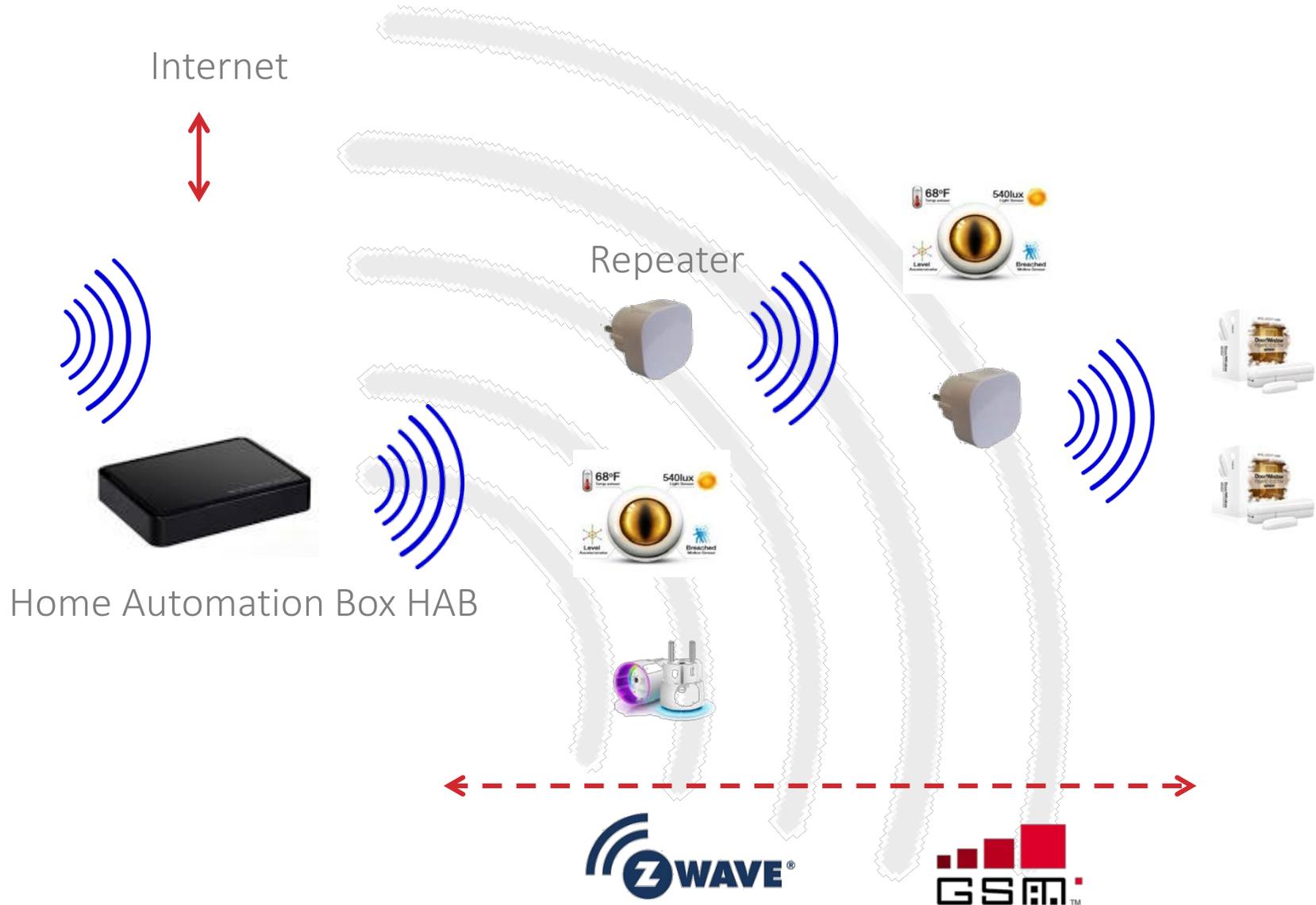
# Homelive Pack: Comfort & security

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1 Smart Home app, one controller and 3 objects to play with

# Orange: architecture



# Homelive, comfort & security Pack



Homelive app

End-users install devices and monitor their home using the Homelive app



Fibaro Wall plug



Fibaro Motion detector



Fibaro Door / window contact

End-user scenarios interacts with surrounding devices to provide comfort (lighting,...) and security

# Homelive product: first version

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## **Third-party devices**

- ✓ Devices are made Homelive-compliant and are qualified by Orange
- ✓ Some devices are not reliable enough and difficult to install

## **No embedded services dedicated to comfort and security**

Scenarios for simple and repetitive tasks... and more

- ✓ End-users create scenarios for simple and repetitive tasks (turn on the light, etc.)
- ✓ End-users also create their own security and comfort applications using scenarios
- ✓ A set of scenarios can be globally activated or deactivated (scenes of daily life)

## **Cloud compliant solution for remote controls and firmware update**

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GOOGLE

Google Home

# Google: offer



- Google Home

HUB/HUB equivalent




- Indoor/outdoor

cameras




- Smoke/CO2 detector

sensors




- Learning thermostat

others




- Mobile app (4.2)

mobility



connectivity

nest	PHILIPS hue	tp-link	iRobot	legrand	LEVITON
wemo	SmartThings	IFTTT	LG	LIFX	LightWye
ALARM.COM	ANOVA	Eugust	logitech	iris	OLUFTON
decko	emberlight	D-Link	nuByte	nanoleaf	NavoStorage
OneLink	FRIGIDAIRE	geeni	ACH	rachio	ring
hve	HomeSeer	Honeywell	scout24	SENSIBO	Smartika
iforce	HomeConnect	INSIGNIA	zringify	SPONSOR	U-C
Wink SmartHome	VOLCUP	wink			
Wiz	ZOMA	ARTIK Cloud			





# Google: architecture





# Google: applications

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Voice based (depends on the connected devices)



# Philips: offer

-   
HUB/HUB equivalent
  - Base HUB
-   
pasive security
  - Motion detector
  - Opening detector
-   
sensors
  - Temperature and humidity detector
-   
others
  - Intelligent switch
-   
mobility
  - Mobile app (2.9)



-   
cameras
  - Wide angle cam
-   
sensors
  - Multi sensor
  - Opening detector

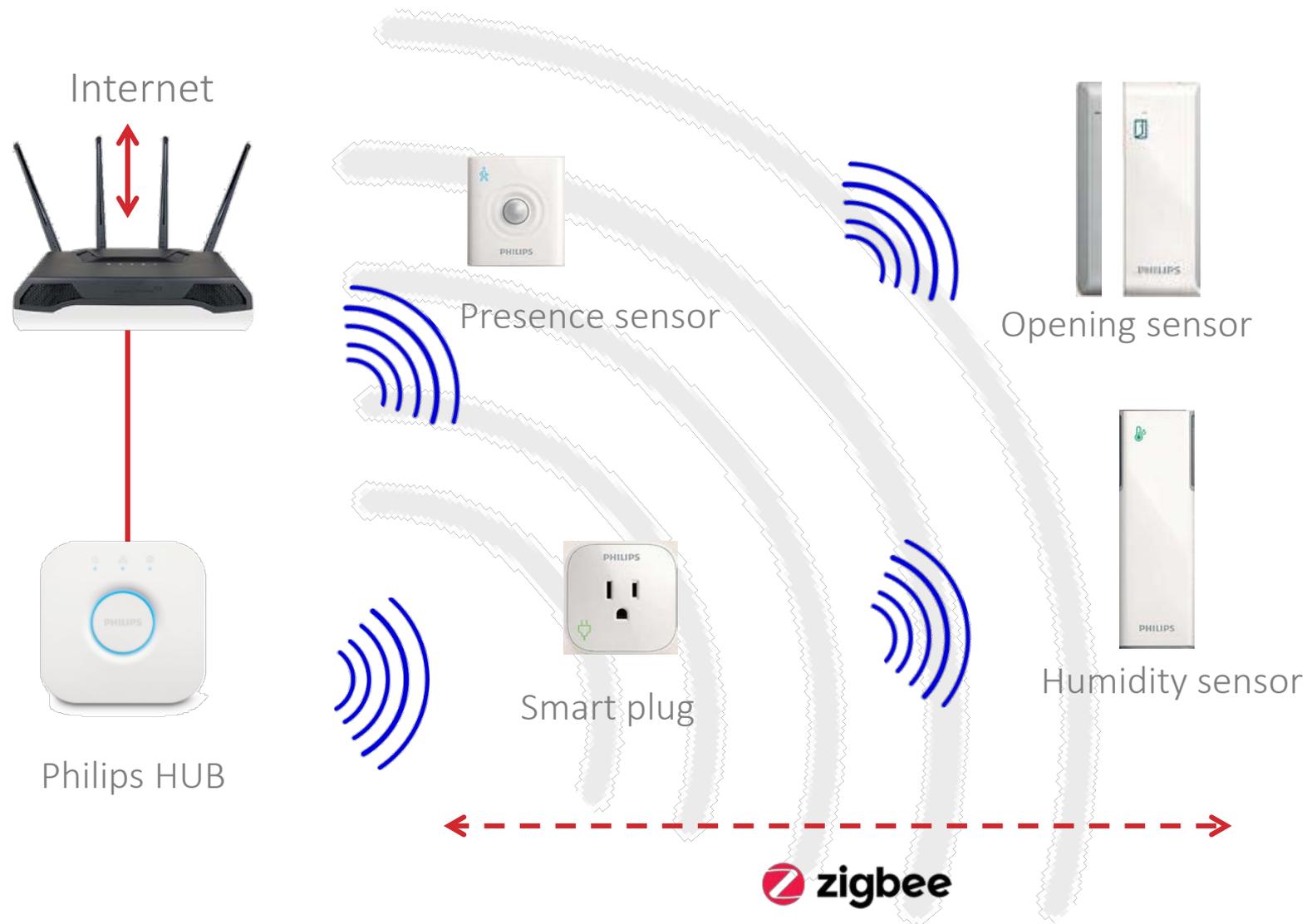
  
connectivity







# Philips: architecture





HUB/HUB equivalent

- Openlife HUB



pasive security

- Motion sensor
- Presence sensor
- Opening detector



others

- Smart lock



sensors

- Flood sensor
- Smoke sensor



mobility

- Mobile app ()
- Web interface
- Wearable app



cameras

- IP cam



others

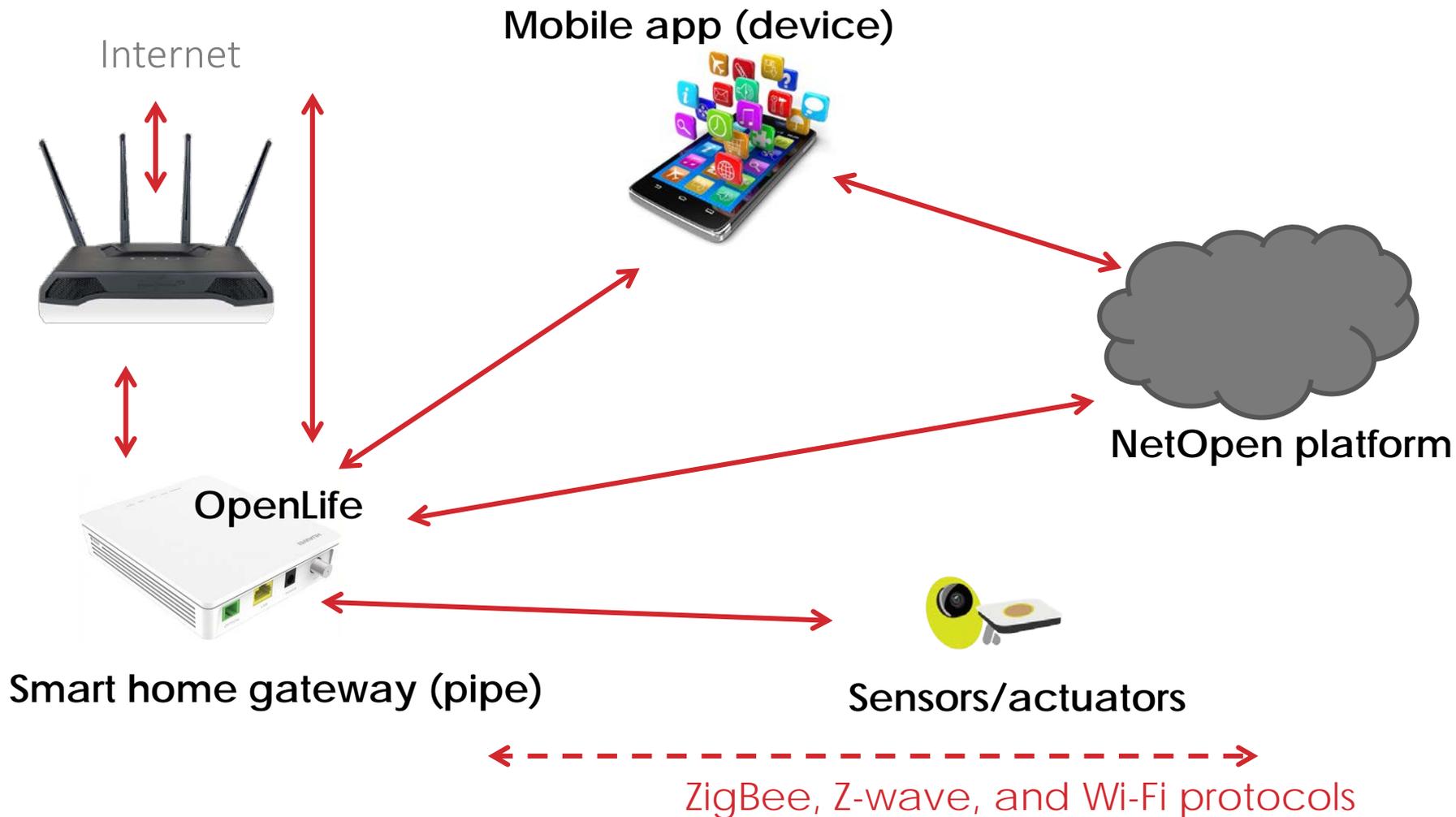
- Sound and light alarm
- Tv



connectivity

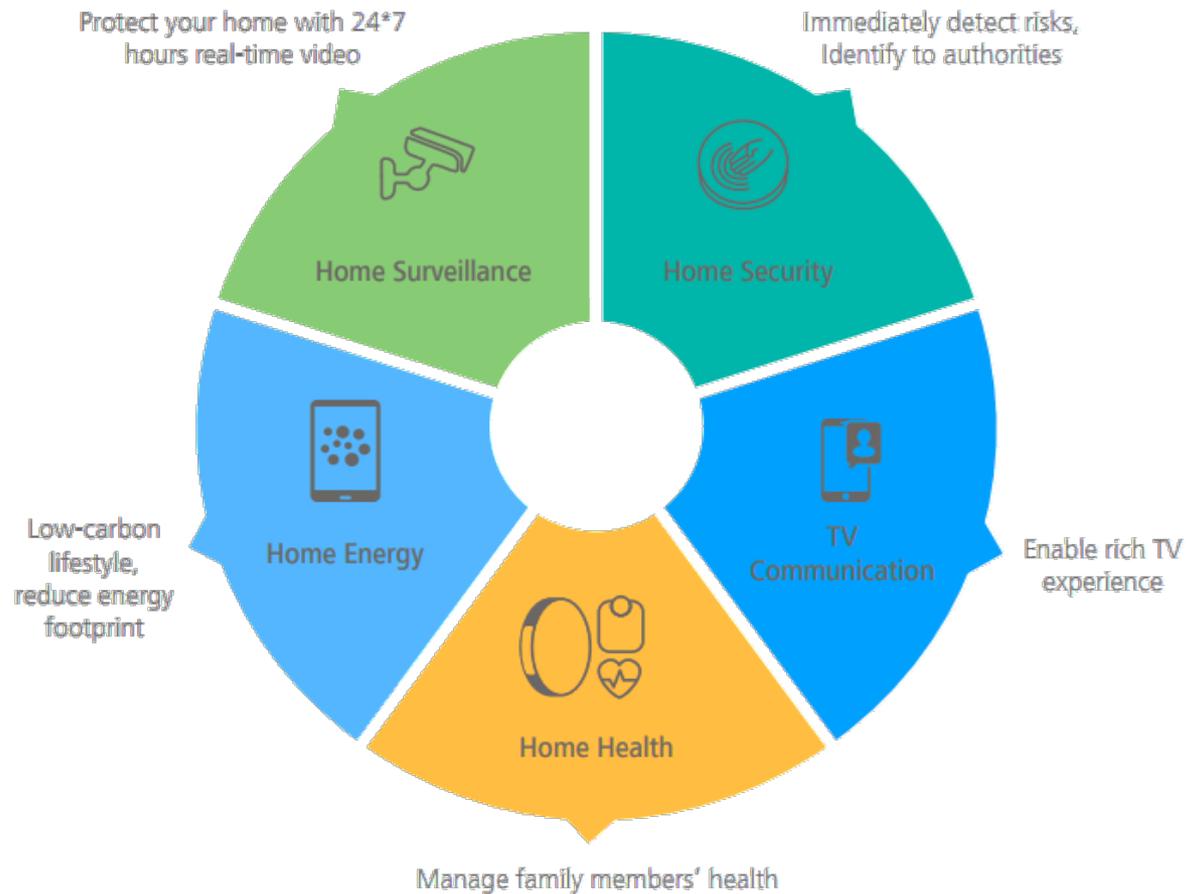


# Huawei: architecture



# Huawei: applications

## Service based





- Smart HUB

HUB/HUB equivalent



- Opening detector

pasive security



- In/out door cams

cameras



- Motion sensor

sensors



- Smart plug

others



- Mobile app (3.3)

mobility



- Keychain remote
- Access keyboard

Interactive security



- Water leak sensor
- Indoor siren

sensors



- Intelligent switch
- Alarm
- Z-wave repeater

others



connectivity





# Panasonic: architecture



## scenario based



# Structure of this lecture

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Smart home definition

Requirements

Current solutions

Challenges for tomorrow

# Challenges

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**More applications, less scenarios**

**Application and devices lifecycle**

**Better integration with the cloud**