



# An Introduction, installation requirements and Smart Grid relationship

R&D Collaboration for DG-Ready Grid Architecture  
Workshop- 6th of December 2010- Albuquerque.

21/12/2010

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# The concept....



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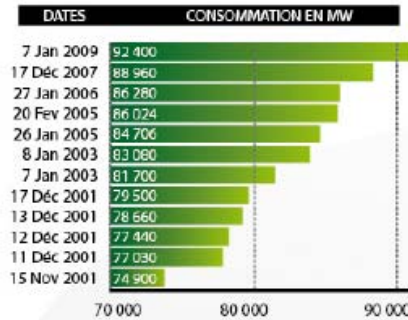
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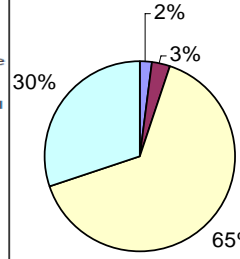
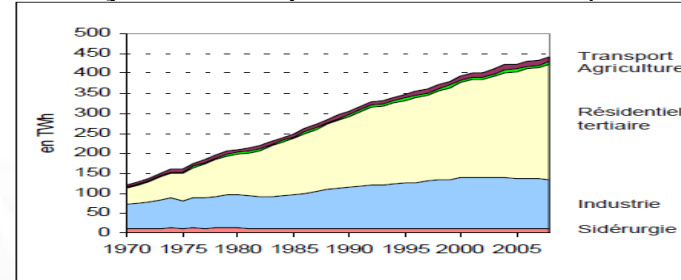
# Energy context : The example of France



## Peaks history in France



## Electricity consumption in France (source SOeS)



### L'expérimentation PREMIO



## The « new » electrical system



Electric Vehicle

### Renewables



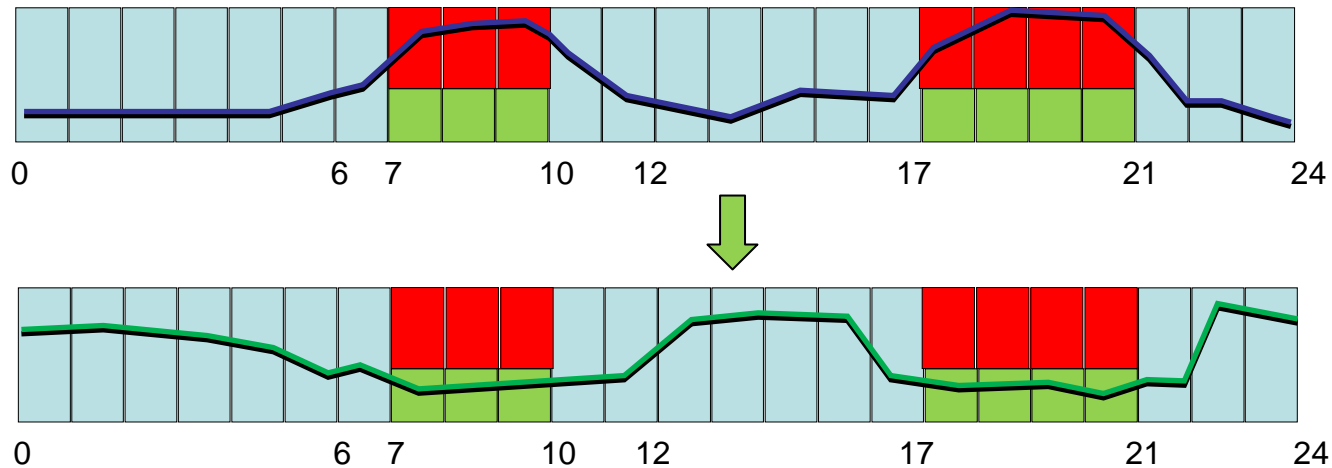
Smart meters

[www.beywatch.eu](http://www.beywatch.eu)



# Amortization of Loads

- The global electricity load that is most influenced by residential/professional consumption can be “streamlined”, if some of the customers accept to reduce their consumption during the “peak hours”
- Some customers would accept to reduce their consumption during the “peak hours”, if they had significant reduction at their bills.



# Goals of the project



- Give to users tools and information about their energy use
- Reduce Energy consumption
- Help the utilities to shape a sustainable energy utilization



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# In a few words...



- 1 Intelligent energy-aware white goods
- 2 Ultra low-cost in-home communications
- 3 Devices' monitoring & personalized control
- 4 Hybrid Photovoltaic/solar home system
- 5 Modelling & control of power distribution in local areas
- 6 Business Support Systems and new business models



- Reduced energy Consumption
- Power demand balancing
- Mutual beneficial contracts
- Contribution to standards
- Contribution to Energy & environmental Sustainability EU vision
- Reduced pollution & CO2 emission



Università degli Studi di Palermo

SYNELIXIS



FAGOR



gorenje

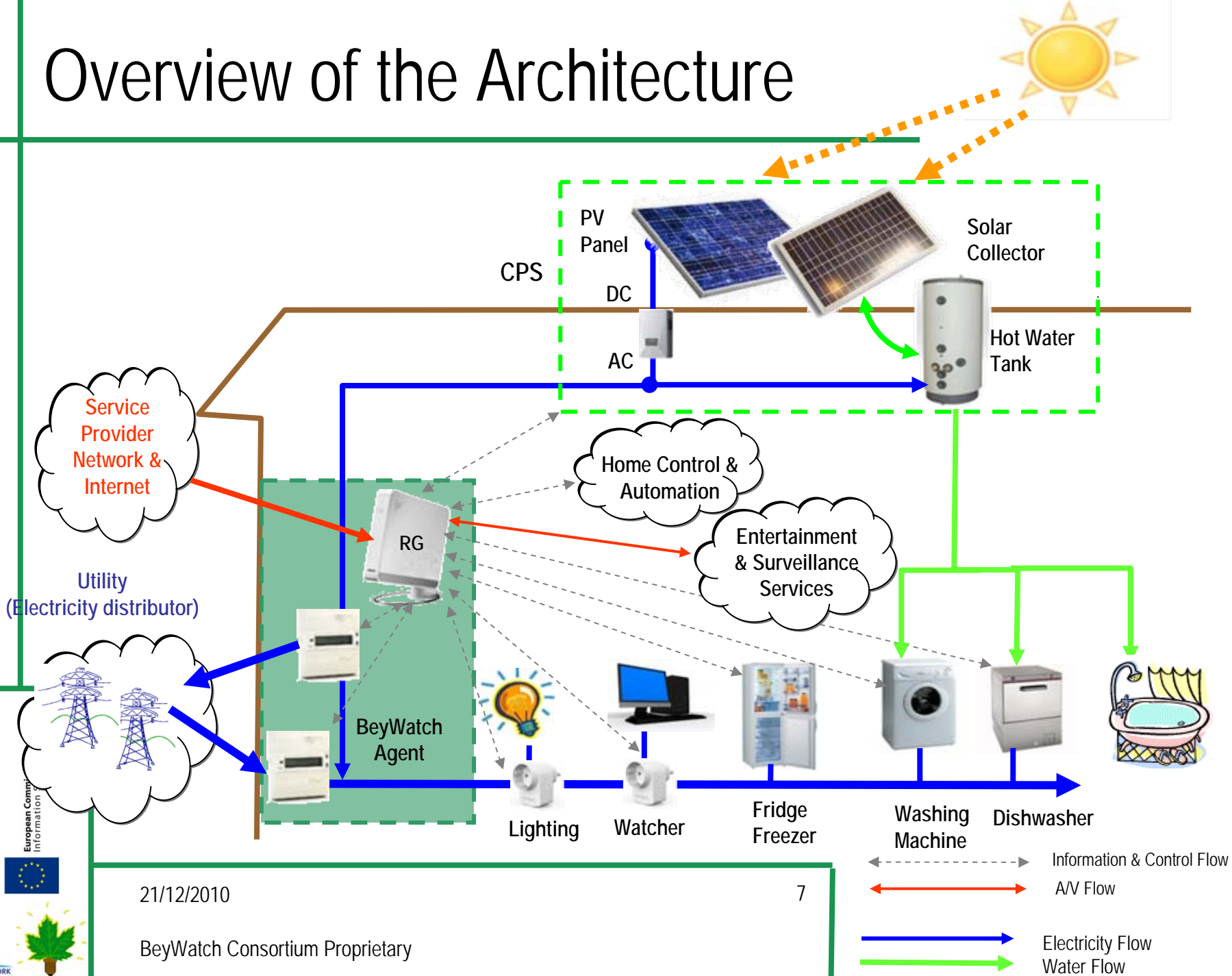
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# Overview of the Architecture



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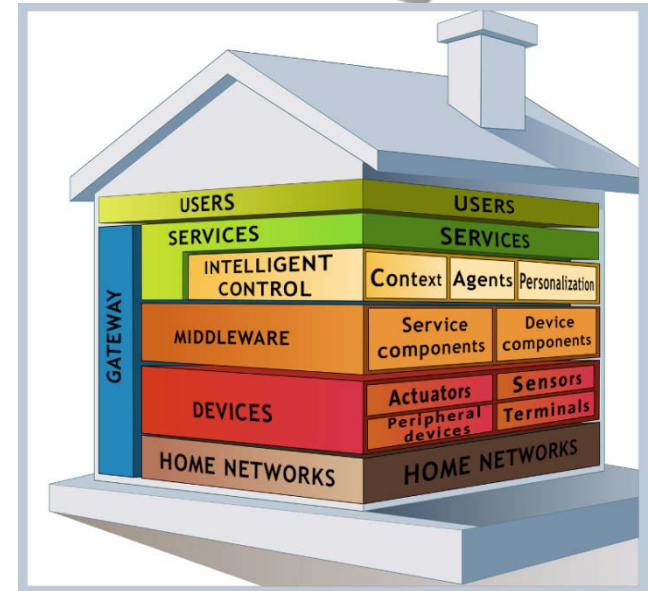
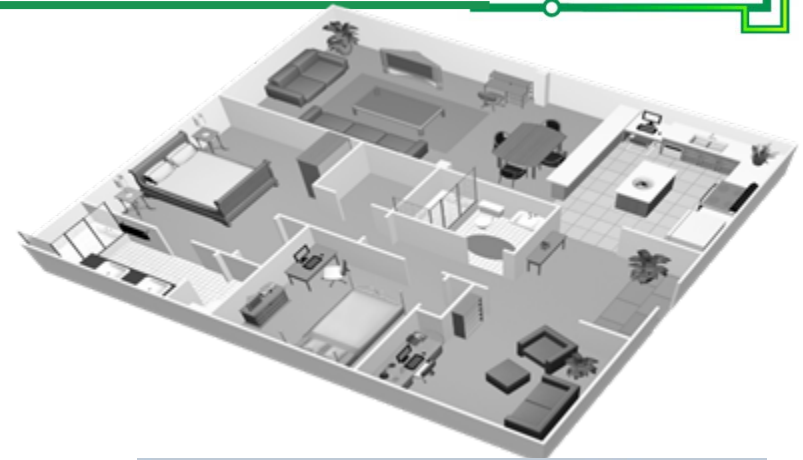
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# In the Home



- EASY: RG needed but may be off the shelf
- OPEN: Compatible with any Home automation solution
- Zero Touch: OSGI based solution
- Wireless?: Zigbee and WiFi but wired is possible
- Smart Plugs are needed for energy monitoring and control



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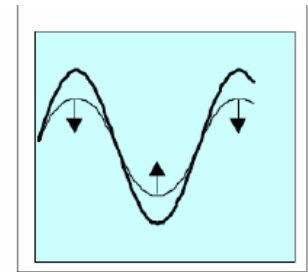
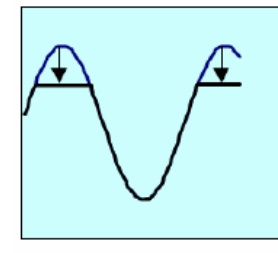
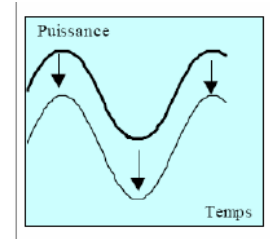
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# Types of services to the user

## Primary services : Energy and Load Management

- **Energy Management** : better manage and lower their energy consumption (kWh) and related bill (€) and greenhouse gas emissions (g.eqCO2)
  - More efficient technologies
    - Efficient Washing Machine, Dishwasher, Fridge/Freezer (→ WP3)
  - Services related to customer information and appliance control
- **Load Management / Demand Response** : To propose to customers, systems allowing them to act on the electrical system, through their white goods / Solar & PV
  - Emergency Programs
  - Direct Load Control, with incentive
  - Dynamic tariffs of electricity



## Complementary services :

- **Monitoring and control**
- **Failure detection services,**
- **Backup mode**
  - In case of failure of parts of the Beywatch System (Agent, communications Link, CPS), the user should have at least the functions of a non Beywatch Home and appliances :
    - standard appliance functions, hot water and electricity.
    - but potentially no energy or load Management 9

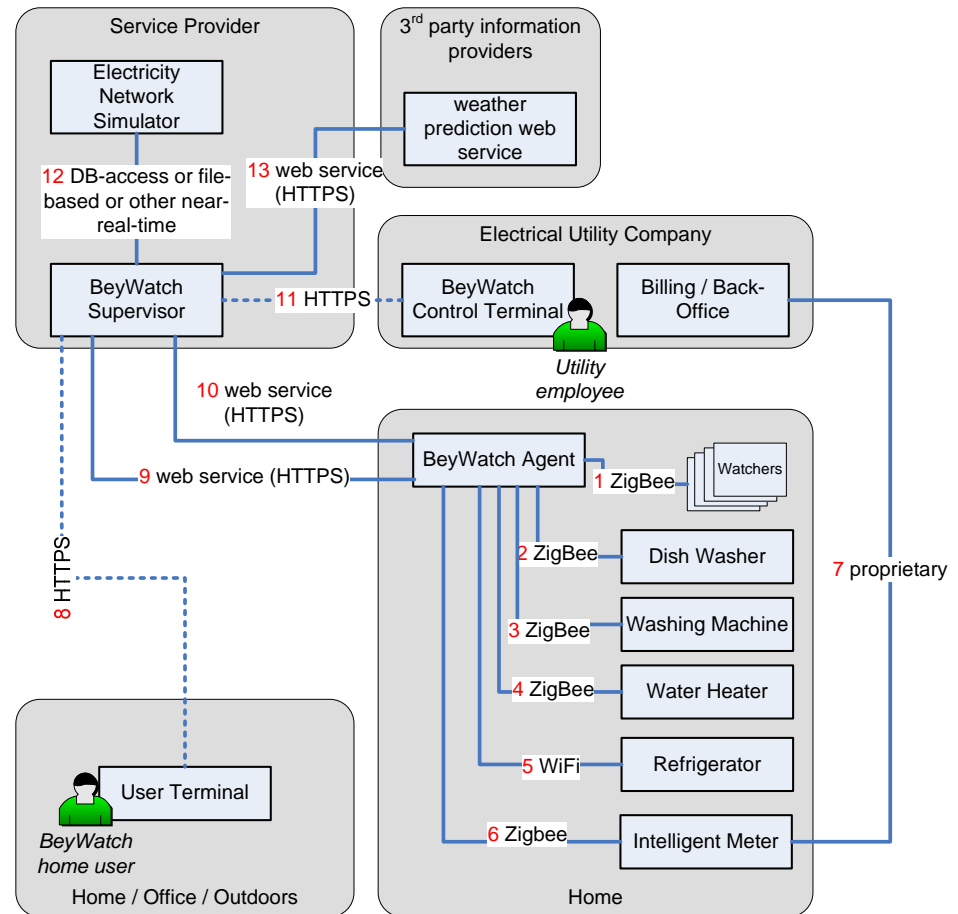
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# Energy Efficiency at home?

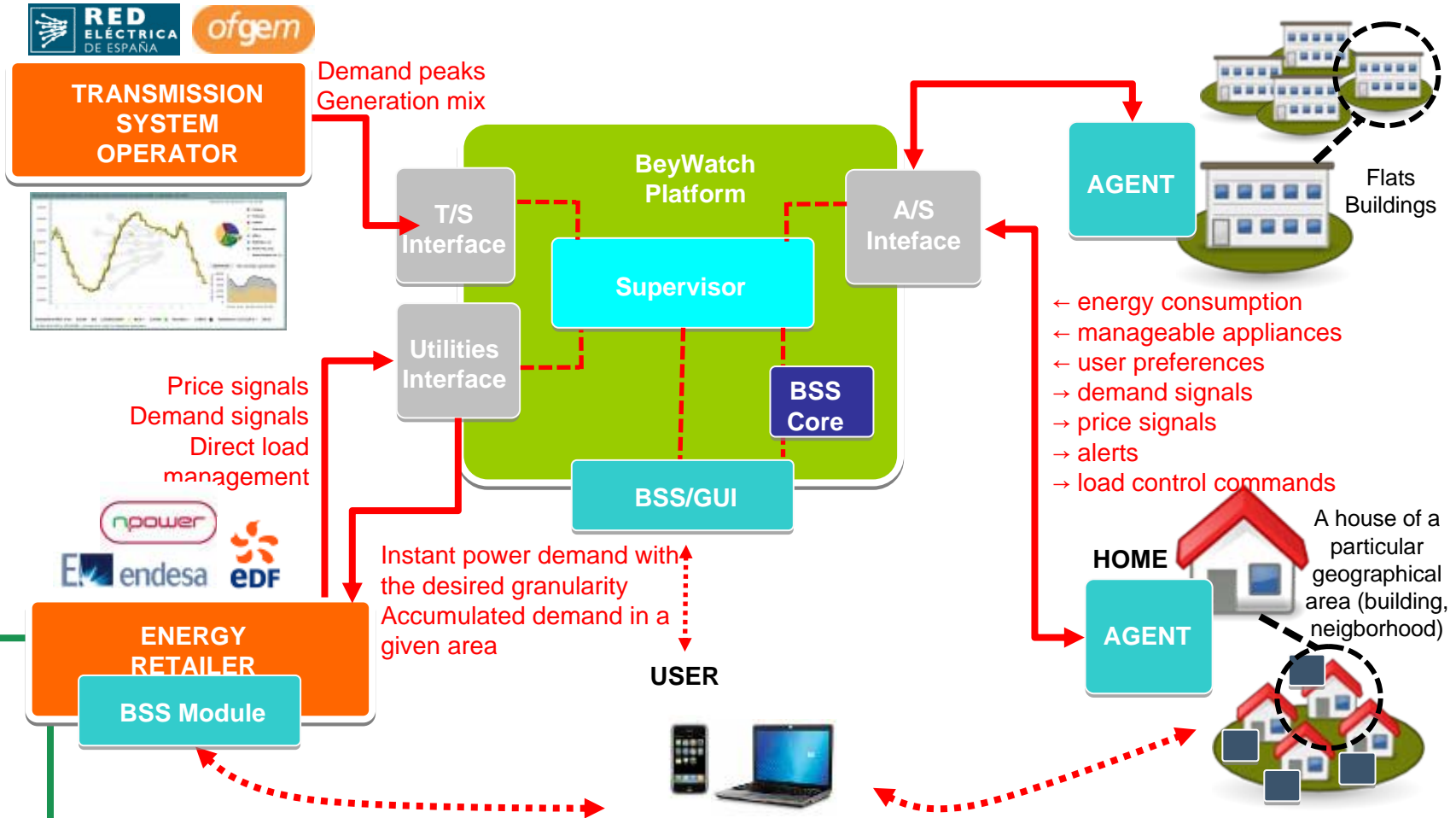


- The Agent:

Monitors and control the energy consumption at home based on the user preferences, the profiles of the appliances and the tariff schemes



# Overall picture



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# Customer communication!



- Easy and automatic (The BeyWatch button).
- In many types of display to suite all types of users.
- The amount of information and the way it is presented is key!
  - Parameters to use: money, CO2 emmisions, type of energy consumed, amount of energy sold, energy saved by the system, other users data, market place info to get new offers...



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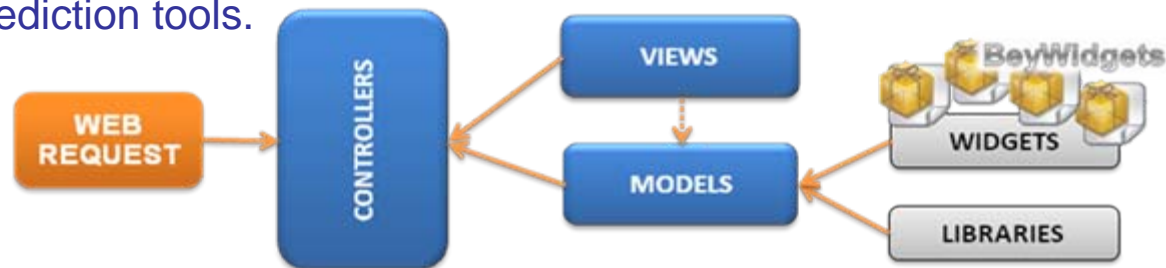
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## ■ Home User BeyWidgets:

- Tariffs optimizer
- Share your tariff or profile
- Current and aggregated consumption
- Green appliances market
- Top 10 BeyNet saver users
- Limit costs

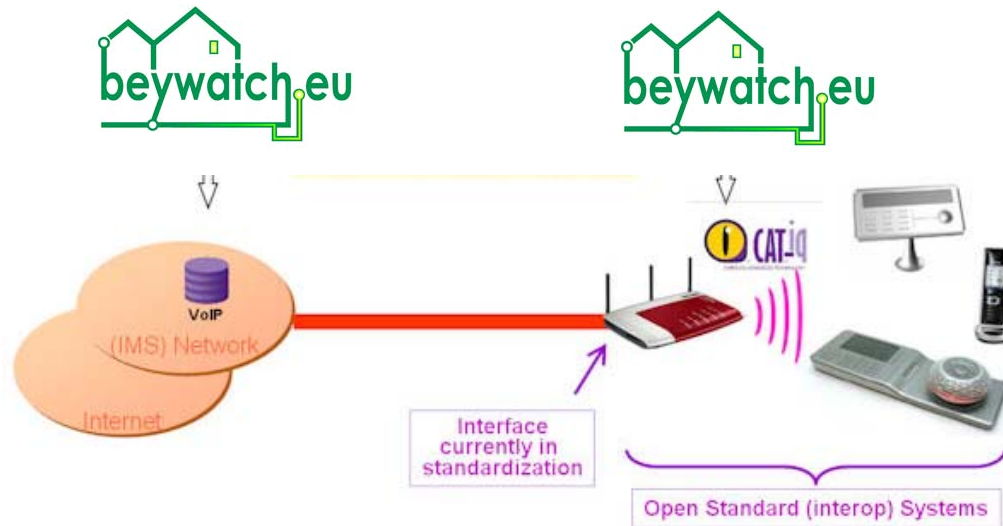
## ■ Utility Operator BeyWidgets

- Supervisor GUI.
- Tariff manager.
- Simulation and prediction tools.
- Marketing tools.



- The user will be able to change the behavior of an appliance referring to the associated BeyWidget, or even turn it off directly.





# BUT NOW... the services?

# User acceptance

- Easy to use interface at Home: Cat\_Iq phones- Intel's Dashboard- Ipad- ???
- Easy Middleware Integration
- Open Platform-> "Appstore"
- Easy Access and "right to the point" Information!



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# Ideal Digital Home



*Holds Super Broad Band connectivity*

*Global Digital Home services portfolio with services from Telefónica...*

*... and third-party strategic partners, service providers, and home technologies providers*

*Has an ADVANCED SERVICES GATEWAY FAMILY supporting these services and enabling different business models*

*Customer network management guaranteeing QoS from own and third party services.*

*Dynamic Service management: Remote access to services/devices*

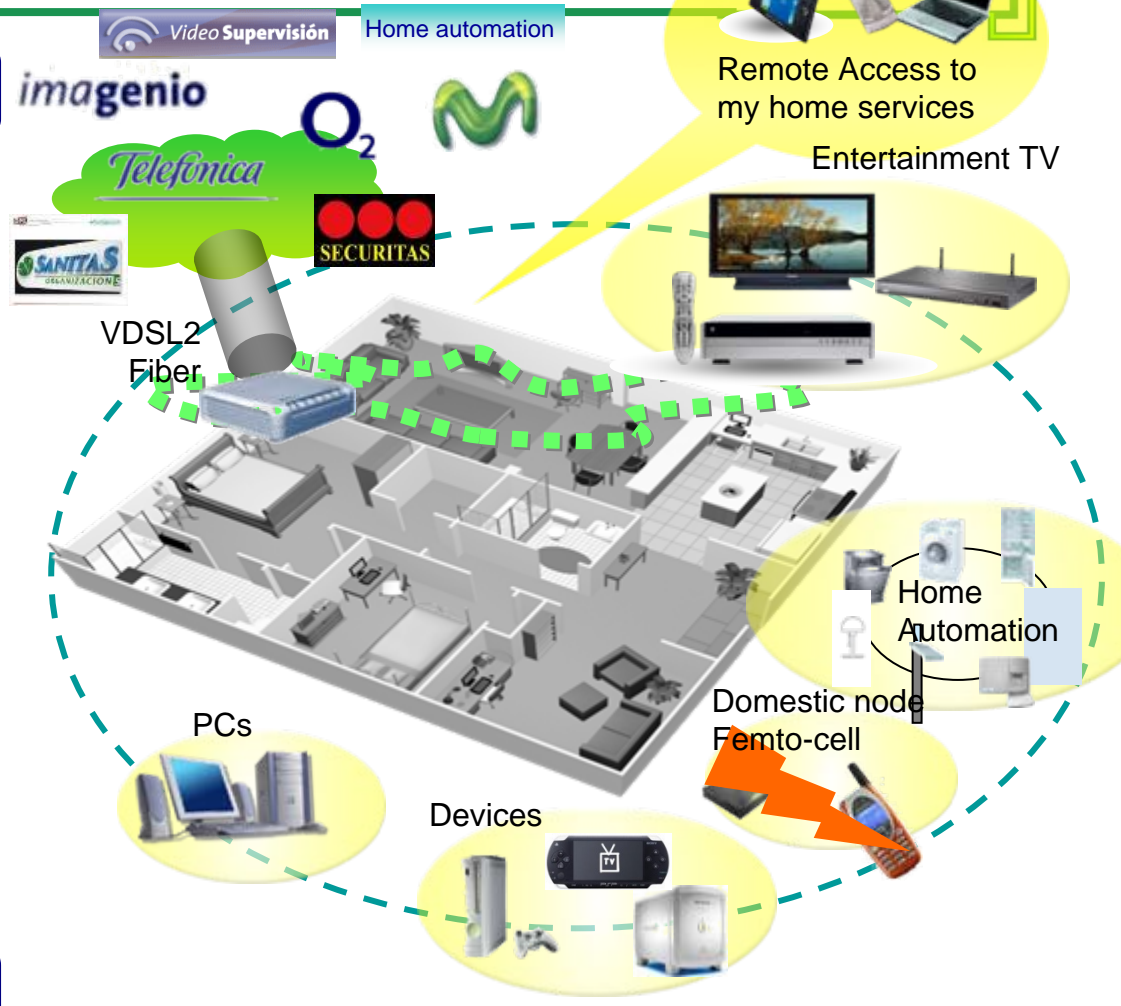
*Provision and self-configuration  
SW update  
Monitorization, Diagnostics*

*Self-discovering and local interoperability  
Among devices.  
Identification and local distribution of contents.*

*Home services travel with user*

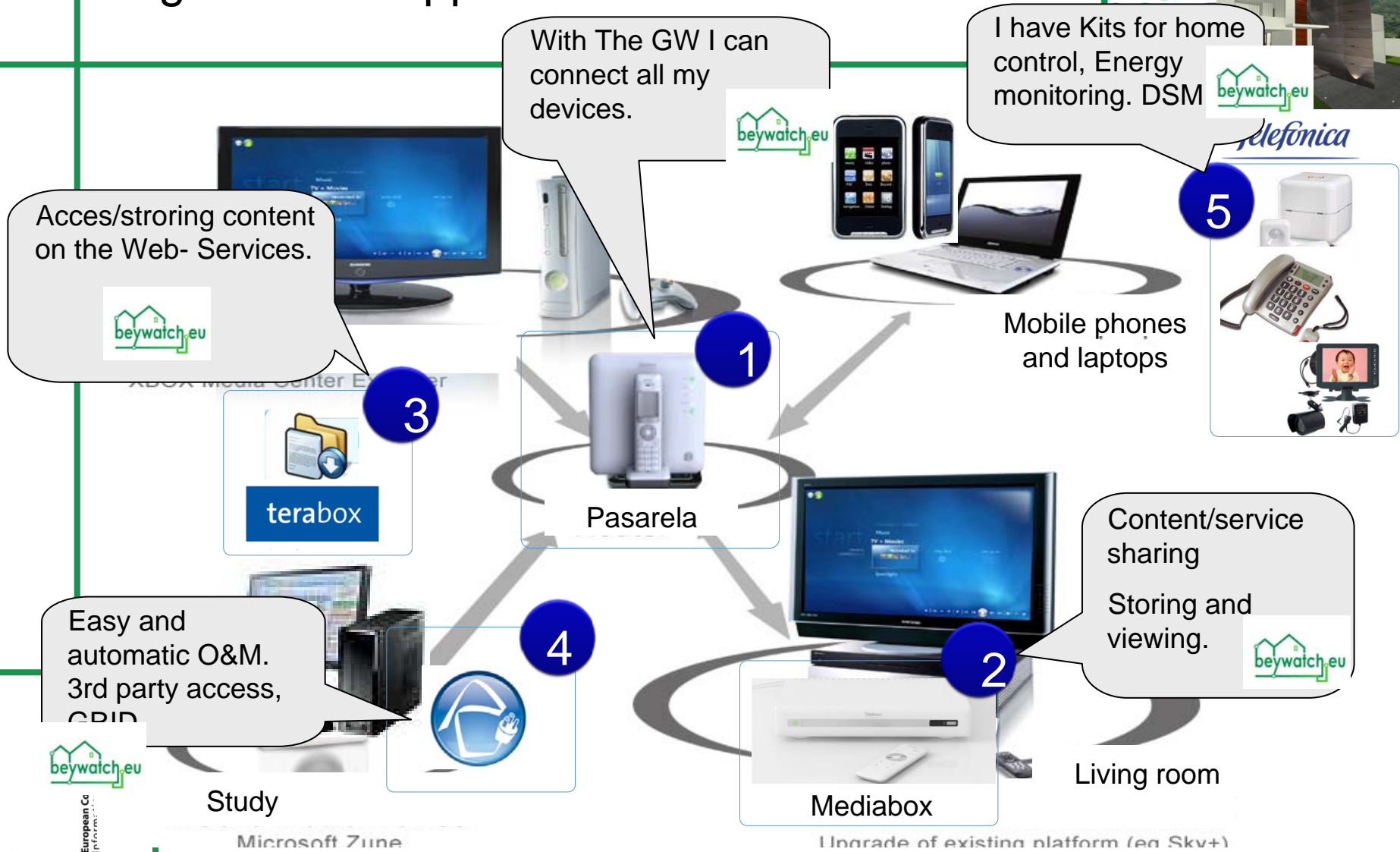


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**GOOD BRAND IMAGE,  
QUALITY AND CUSTOMER  
CARE**

# Digital home opportunities



# Gateway hard & soft model

## Easy Middleware Integration



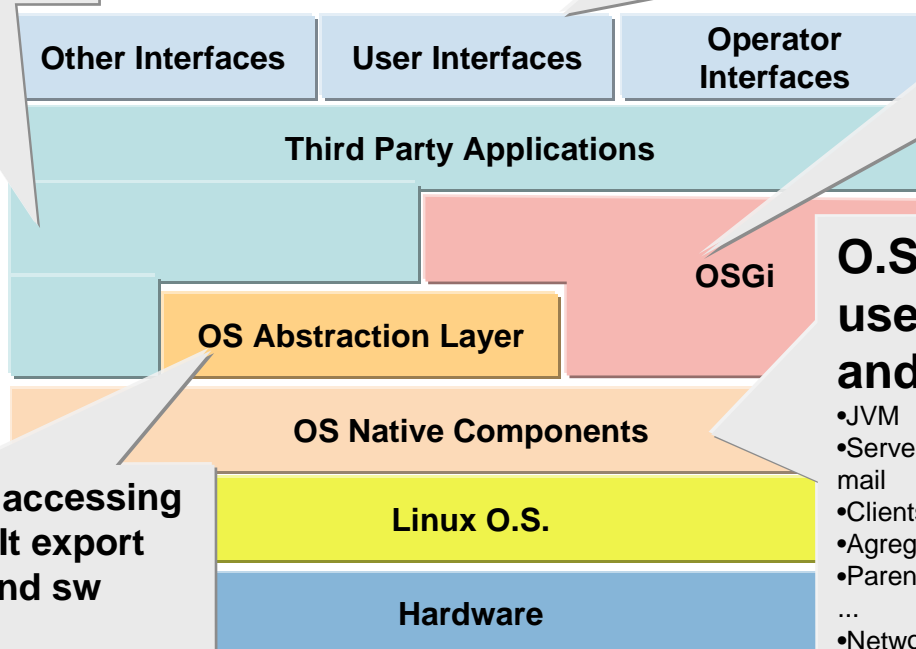
### Residential gateway software applications:

developed using APIs and OS Native components when necessary

Residential gateway configuration interfaces (operator and user), services portal and Cat-Iq handset interfaces

OSGi for basic bundles for the development of services and bundles APIs

to access the OS abstraction layer and OS native components



UI APIs & Utilities

OSGi APIs

O.S. Components & tools

### O.S. basic components used by applications and other components:

- JVM
- Servers: DNS, File, NTP, Printer, FTP, HTTP, mail
- Clients: NTP, DYNDNS, P2P, FTP
- Agregadores RSS
- Parental control, web filters, browsing control, ...
- Networking capabilities: QoS, HGI
- Multimedia: UPnP/DLNA
- Voice: Cat-Iq capabilities, VoIP, SIP, PBX
- Home networks: Lonworks, Zigbee, PLC, ...
- IMS
- Remote management: TR069

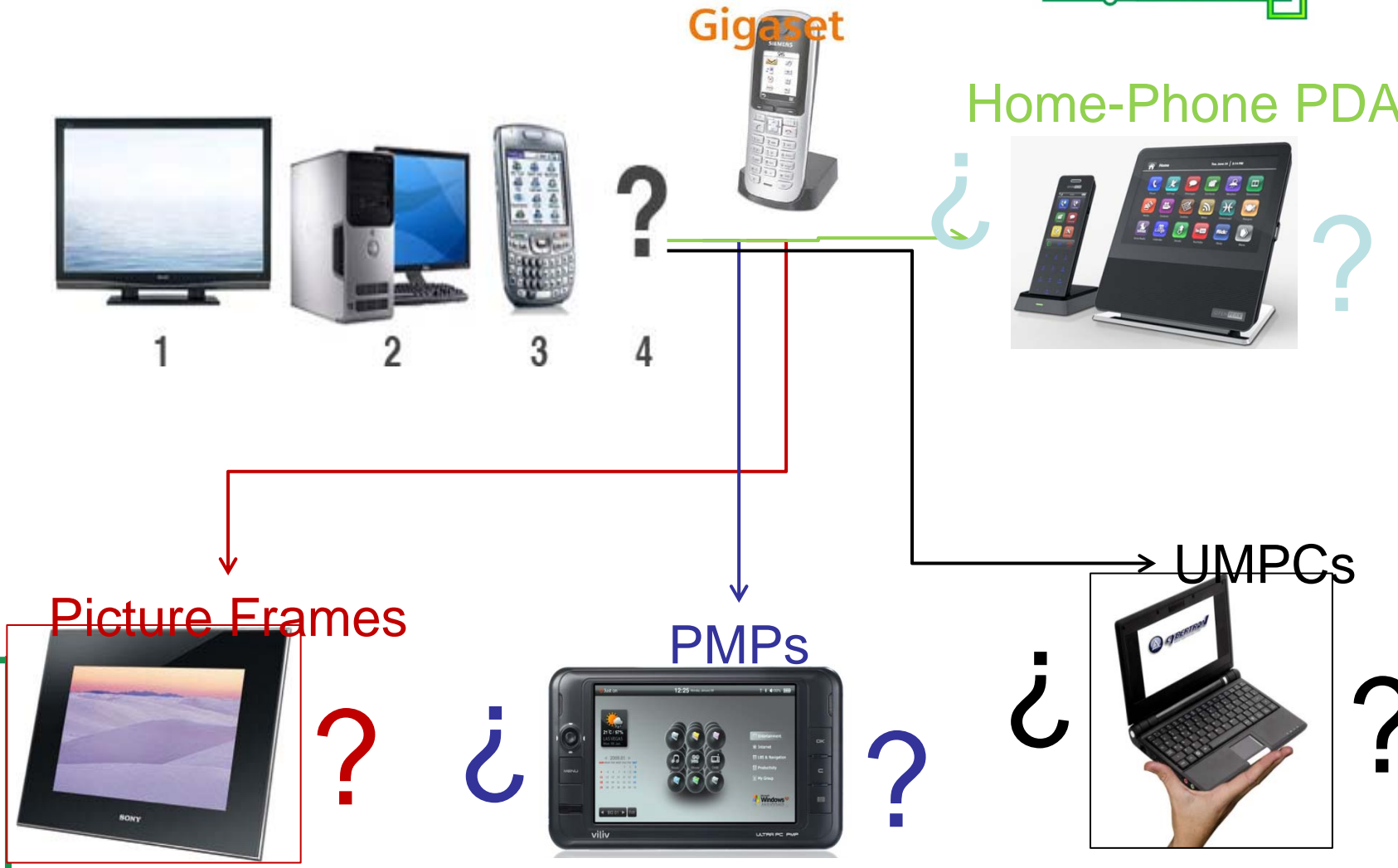
O.S. Abstraction APIs

### SW components for accessing platform resources. It export APIs to access hw and sw resources:

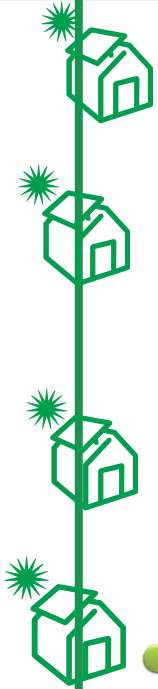
- Migration to other hw platforms
- O.S. Independence
- Development and testing environments in other platforms to reduce develop & debug time



# 01 Better Home interface!



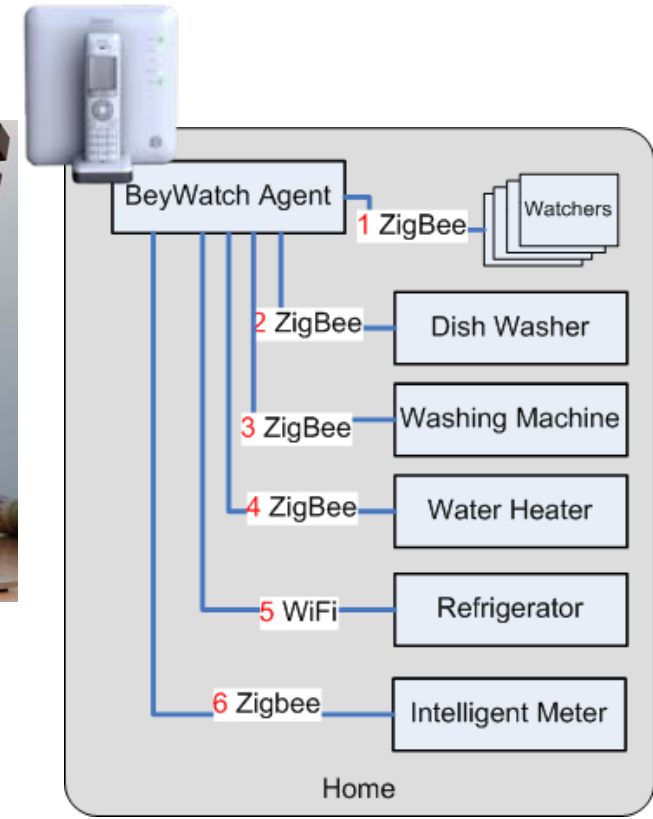
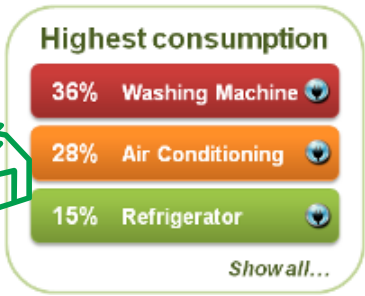
# Little but clear information is needed...



**YOUR TARIFF** 10 points  
**Iberdrola** (37,45€/month)  
 Type friend name...

**YOUR PROFILE** 20 points  
 54,30€ → 49,35€ → 37,45€  
 Type friend name...

**Instant Power**  
 ● 20% ● 60% ● 90%



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# Conclusions



- Energy Efficiency at Home :
  - Must cope with the market fragmentation!
  - But represents a big opportunity-> Killer application of the Smart Home?
  - Not many services to reduce expenses
  - Green and eco-friendly is now a social trend
- Interconnection with the Grid
  - Demand side management
  - RES usage
  - IP service integration
  - Well Adapted to Midw RG model.
- The market
  - Energy market is being tranformed and ICT is a must for the upcoming energy challenges.
  - Services offered by Beywatch are really needed!
  - Cat-Iq and BeyWatch can integrate easely

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