



Enel Smart Info and Energy@home

Enel proposal to promote active customer participation to the energy market

Dubrovnik 7 October 2011

Federico Caleno (Enel)

Agenda

Background

Rationale for the Enel Smart Info

Previous experiences - Market Test

Definition of requirements

Ongoing activities

Energy@home project

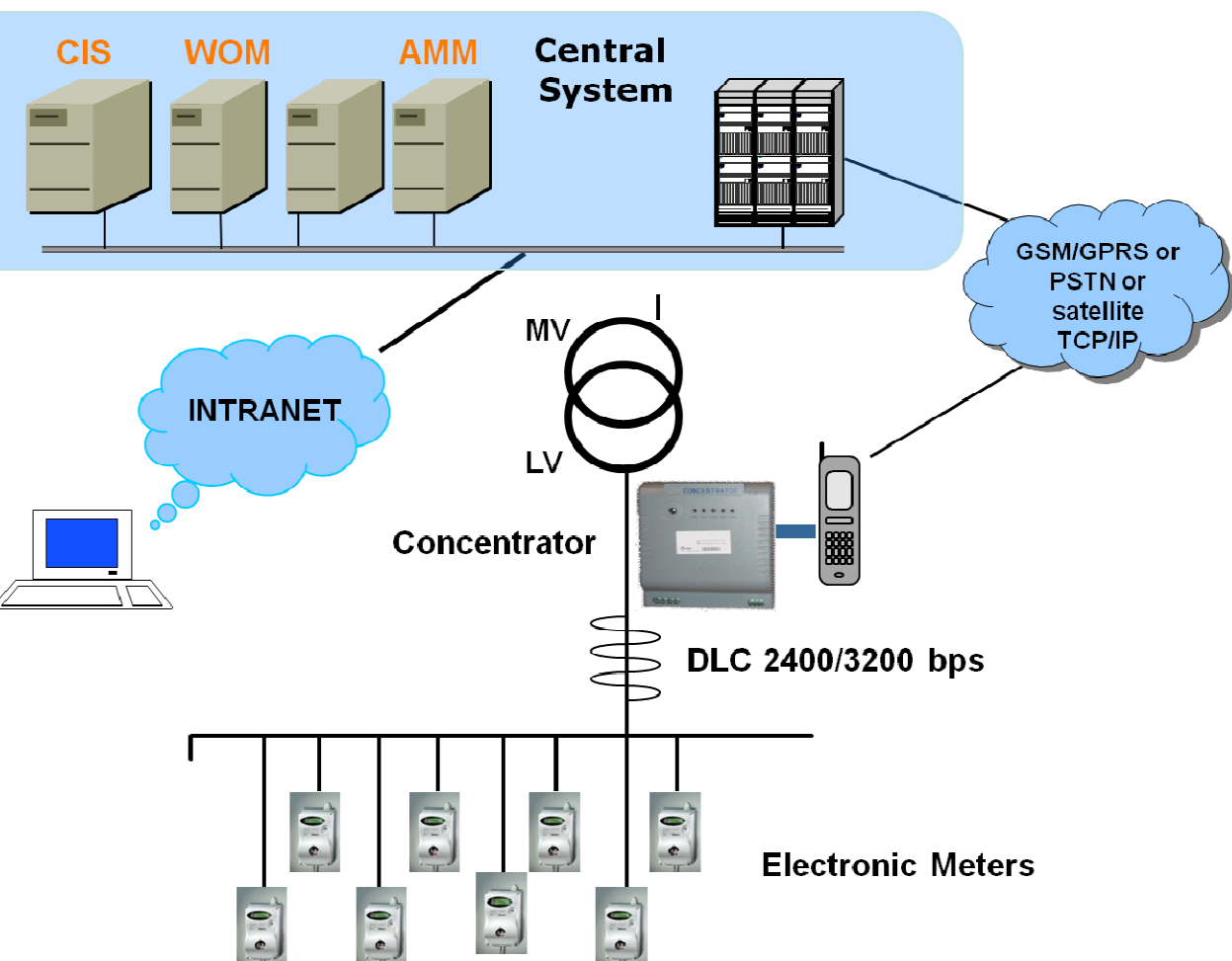
Enel Smart Info device



The Goals of Enel Smart Info Project

- ▶ The purpose of the project is providing clients with a tool to increase their awareness on energy consumptions
- ▶ Information will be provided through a wide range of standard media (such as personal computers, dedicated displays, white goods) that will be available in the market
- ▶ The Enel Smart Info will participate in a domestic framework to support new advanced services, such as:
 - ▶ Automatic control of loads
 - ▶ Integration of smart white goods
 - ▶ Enabling of real time tariffs
 - ▶ Active demand services

The state of the art: Enel Telegestore



Meters

32 M

Concentrators

360 k

Remote operations

20 M

Remote readings

>300

The European and Italian Regulatory framework

► Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services



The purpose of this Directive is to enhance the cost-effective improvement of energy end-use efficiency in the Member States

► D.P.R. n. 115 del 2008 art 17 comma 1 lettera c

DSOs shall provide clients with instruments to monitor their energy consumptions, such as ad-hoc displays or by using electronic devices already available in their homes.



► Delibera ARG/com 56/09

Already ongoing a procedure to issue a directive in response of D.P.R n. 115 del 2008 art 17



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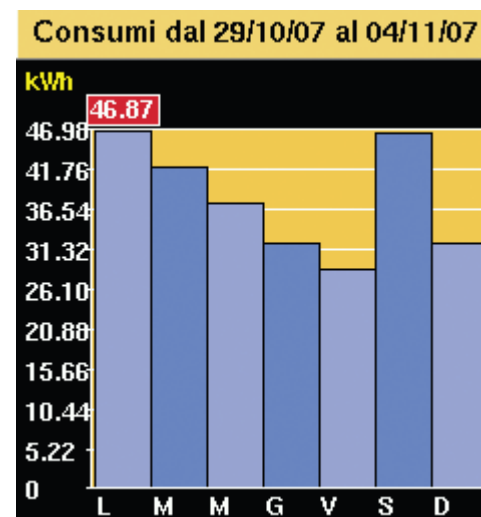
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Market test 2008 - description

- ▶ A pool of clients have been equipped with a display able to monitor their electric consumptions.
- ▶ Test objective was the qualitative evaluation of:
 - ▶ customer acceptance
 - ▶ potential impacts on customer energy consumption behaviors
- ▶ 1000 residential customers in 50 municipalities
- ▶ Test management and data collection performed by a third party (The Nielsen Company) to guarantee objective results
- ▶ 3 face2face interviews to collect feedbacks

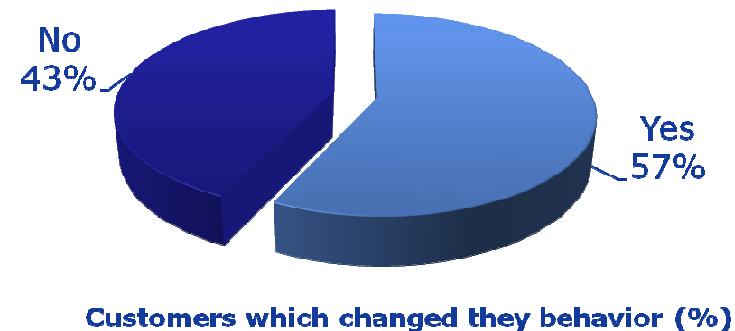
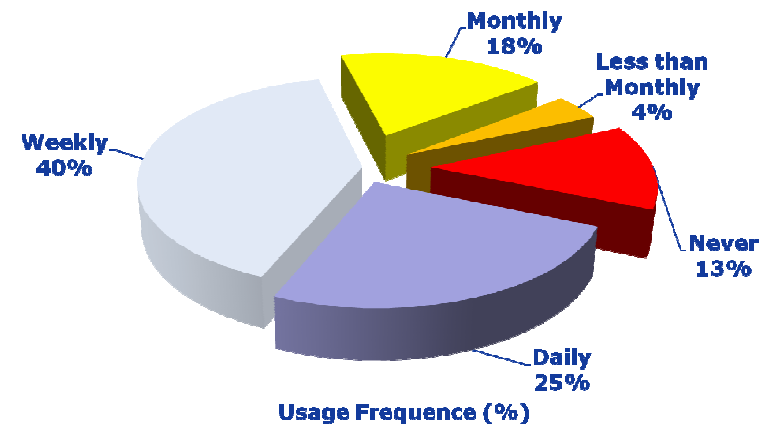


Consumi del 17/10/2007

Ora	Wh	Mono	Bioraria
00:00	1.36	0.22€	0.20€
01:00	1.92	0.32€	0.28€
02:00	0.96	0.16€	0.14€
03:00	1.20	0.20€	0.17€
04:00	1.68	0.28€	0.25€
05:00	1.20	0.20€	0.17€
06:00	1.52	0.25€	0.22€
07:00	1.36	0.22€	0.20€

2008 market test - main results

- ▶ 65% of involved customers looked at the display weekly
- ▶ Customers changed their energy consumption behaviors:
 - 29.3% delayed the white goods use to the night
 - 11.9% avoided the simultaneous use of different appliances
 - 7.5% switched off appliances instead to leave them in stand-by:
 - 6.6% used less the whitegoods
- ▶ Customers asked for more information (e.g. related to billing)



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Rationale for the Enel Smart Info

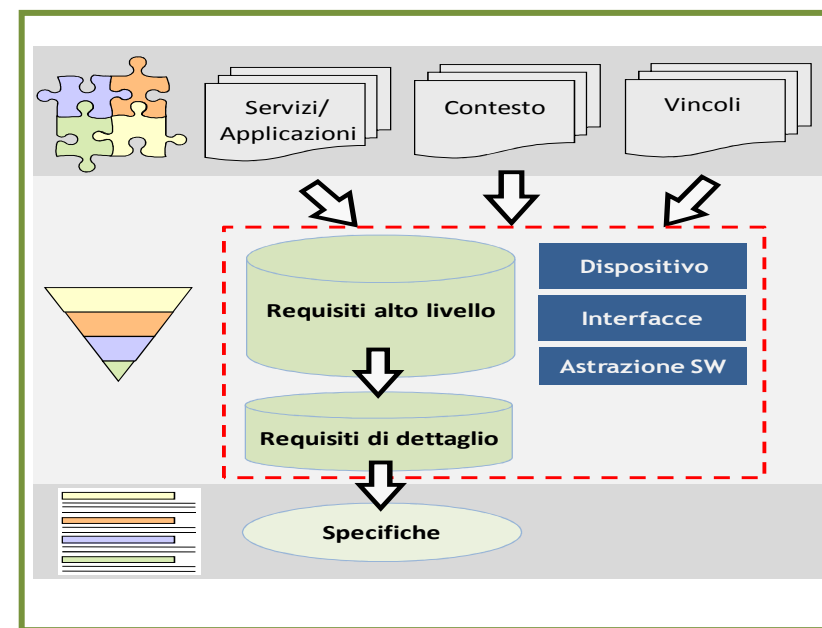
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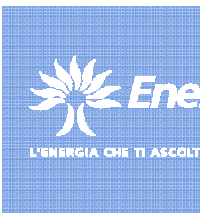
Guidelines for requirements definitions

- ▶ In 2009 Enel started the Smart Info project in order to define the requirements for the development of a product suitable for mass penetration.
- ▶ The requirements have been derived taking into account:
 - ▶ The potential services to be enabled by the SI
 - ▶ Possible alternative technical solutions
- ▶ Moreover, two additional projects contributed in the definition of requirements:
- ▶ **Energy@home** project in collaboration with Telecom Italia, Indesit and Electrolux: integration of the SI in a domotic network
- ▶ **Address (FP7)**: Synergies with the Energy Box development to enable services to the “Aggregator” in domestic environment



address

interactive
energy



Guidelines to the development of the project

Uniqueness of
Telegestore

**High production
volumes**

**Long term
perspective**

► **Modular Architecture:**

- **Base block (Enel Smart Info)** to interface with the existing grid and supporting minimal functionalities.
- **Additional Block (Additional Block - AB)** whose purpose is to enrich the base functionalities supporting both additional services and the management of more evolved interfaces

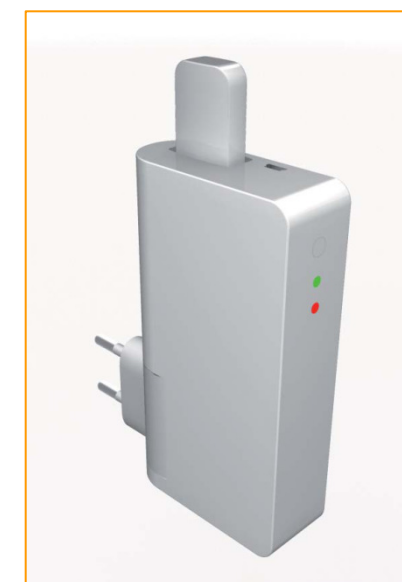
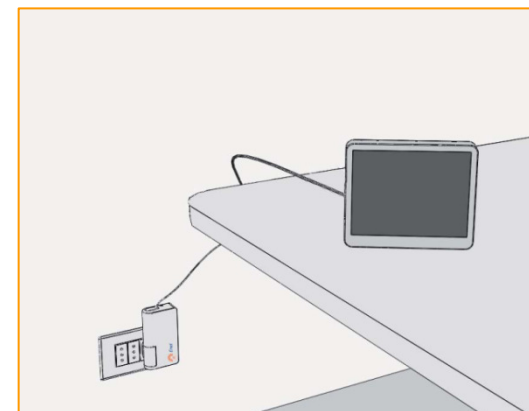
Enel Smart Info services

Base services

Base consumption data visualization	Services oriented to the final customer
Alarms (e.g. overload)	
Contractual information	
Visualization of service messages	

Additional services

Advanced Consumption data visualization	Services oriented to the final customer
Visualization of cost data	
Energy efficiency	
Cost reduction	
Monitoring of electric vehicle recharge	
Monitoring of self-production	Services DSO oriented
Additional Monitoring of energy demand	
Demand modulation request	
Metering data collection for third parties (not only electrical)	
Rational and efficient use of smart appliances	Services enabled for third parties



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Energy@Home: the Project



Energy@home is a collaborative and spontaneous project between Electrolux, Enel, Indesit and Telecom Italia



- **Goal:** to develop a **communication** infrastructure to provide **Value Added Services** based upon information exchange related to energy usage in the Home Area Network (**HAN**)
- **Result:** definition of ZigBee based communication **protocol**
- **Enel Smart Info's** role is enabling the communication between Enel's Telegestore and the devices in the HAN



Energy@Home: The Architecture



Energy@home

www.energy-home.it

Enel Smart Info:

Dispatches home energy into the HAN.

Interfaces the utility AMM system and the Smart Meter

Customer Interfaces:

Devices that provides an interface for the end user

Can be PCs, Smart Phones, ad hoc displays, entertainment systems, and similar

Smart Appliances:

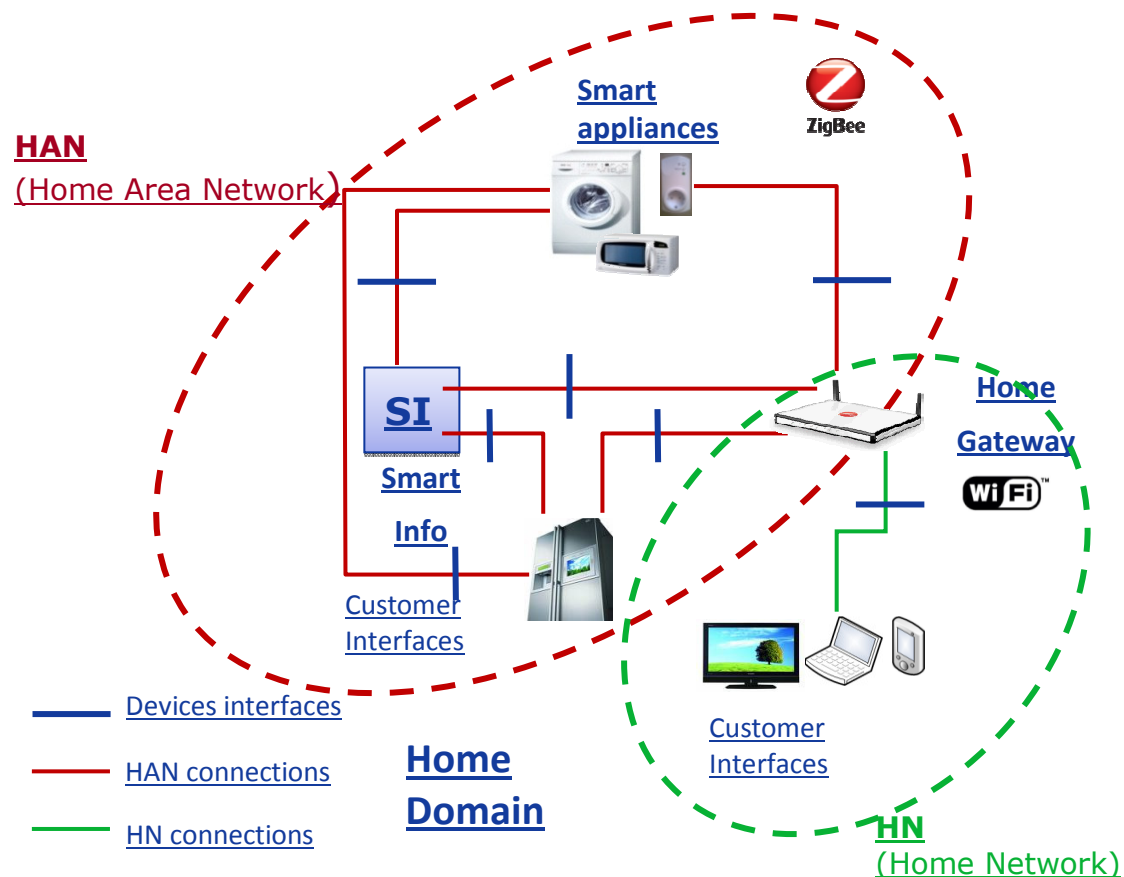
Cooperate in order to optimize the energy usage through load shifting and load shedding

Can offer customer interfaces functions

Home Gateway:

Coordinates the energy consumptions

Interfaces Smart Appliances and other devices (e.g. PC) through the communication protocol(s) used in the HAN and in the HN



The **Home Gateway** is the HAN coordinator and the bridge among domestic grids (HAN, HN and WAN)

Energy@Home: The Use Cases

CUSTOMER AWARENESS

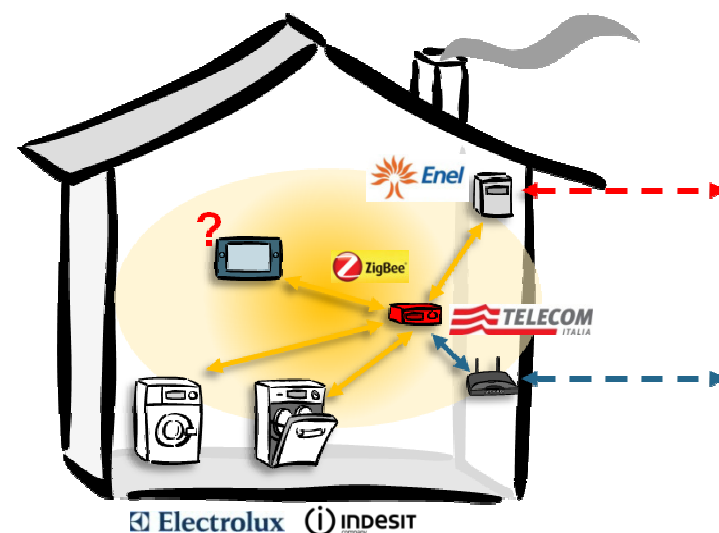
- **Scenario 1: Visualization of current energy and power data**
- **Scenario 2: Visualization of historical data**
- **Scenario 3: Alarm**
- **Scenario 4: Other energy information**

APPLIANCE REGULATION (Both Coordinated and self Management appliances regulation)

- **Scenario 5: Home Domain Overload management**
- **Scenario 6: Optimize energy cost in case of multi-tariff contract**
- **Scenario 7: Demand response**

ENERGY@HOME PROVISIONING AND MAINTENANCE

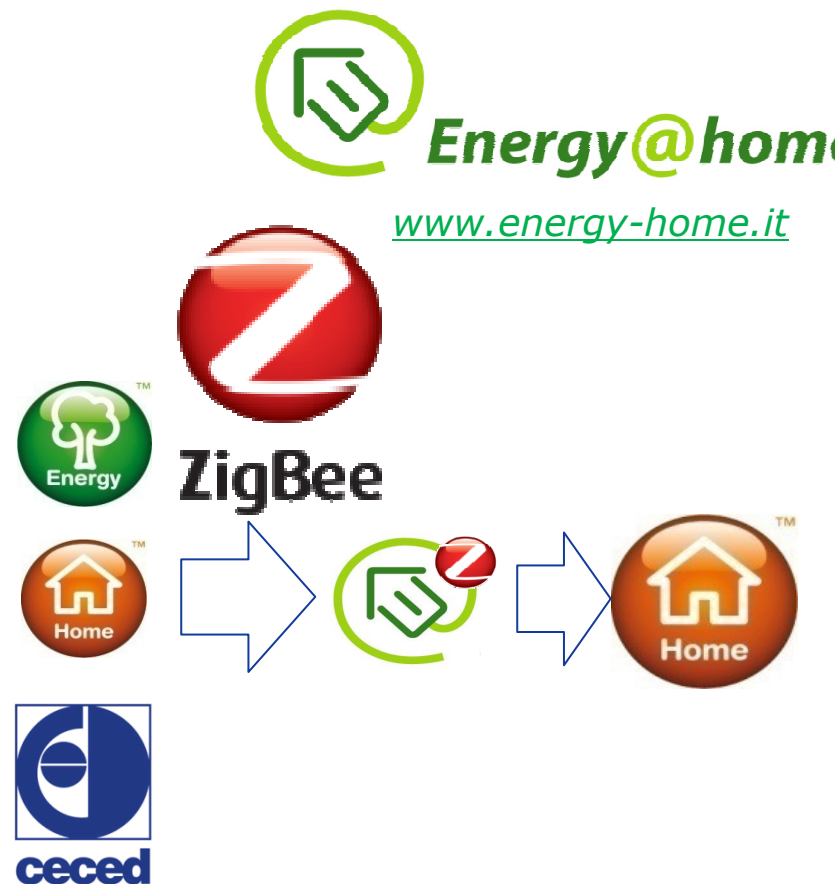
- **2.3.1: Add a new device**
- **2.3.2 : Remove a device**
- **2.3.3 : Maintenance**



From Energy@home Use Cases Document

Energy@Home: The Technology

- **Zigbee** is the chosen technology to enable communication inside the HAN
- Energy@home leverages on existing protocols:
 - ZigBee (*Smart Energy e Home Automation*)
 - CECED (EN50523-1)
- Energy@home has defined additional clusters in order to fulfill the defined use cases
- Released in 2010 a technical specification V0.9 (candidates to become V1.0)
- Under evaluation integration (by ZigBee Alliance) of Energy@home clusters in upcoming Home Automation v 1.2
- Possible adoption by CECED



ZIGBEE ALLIANCE AND ENERGY@HOME COLLABORATE ON EUROPEAN RESIDENTIAL ENERGY PLATFORM

Four ZigBee standards to play key role in new value added service platform

Milan, Italy and San Ramon, Calif. – Oct. 4, 2011 –
The ZigBee® Alliance and Energy@home will cooperate on the creation of an integrated residential energy value added services platform for Europe by leveraging four ZigBee standards.

**The protocol defined by Energy@home could become European
reference for HAN communication**

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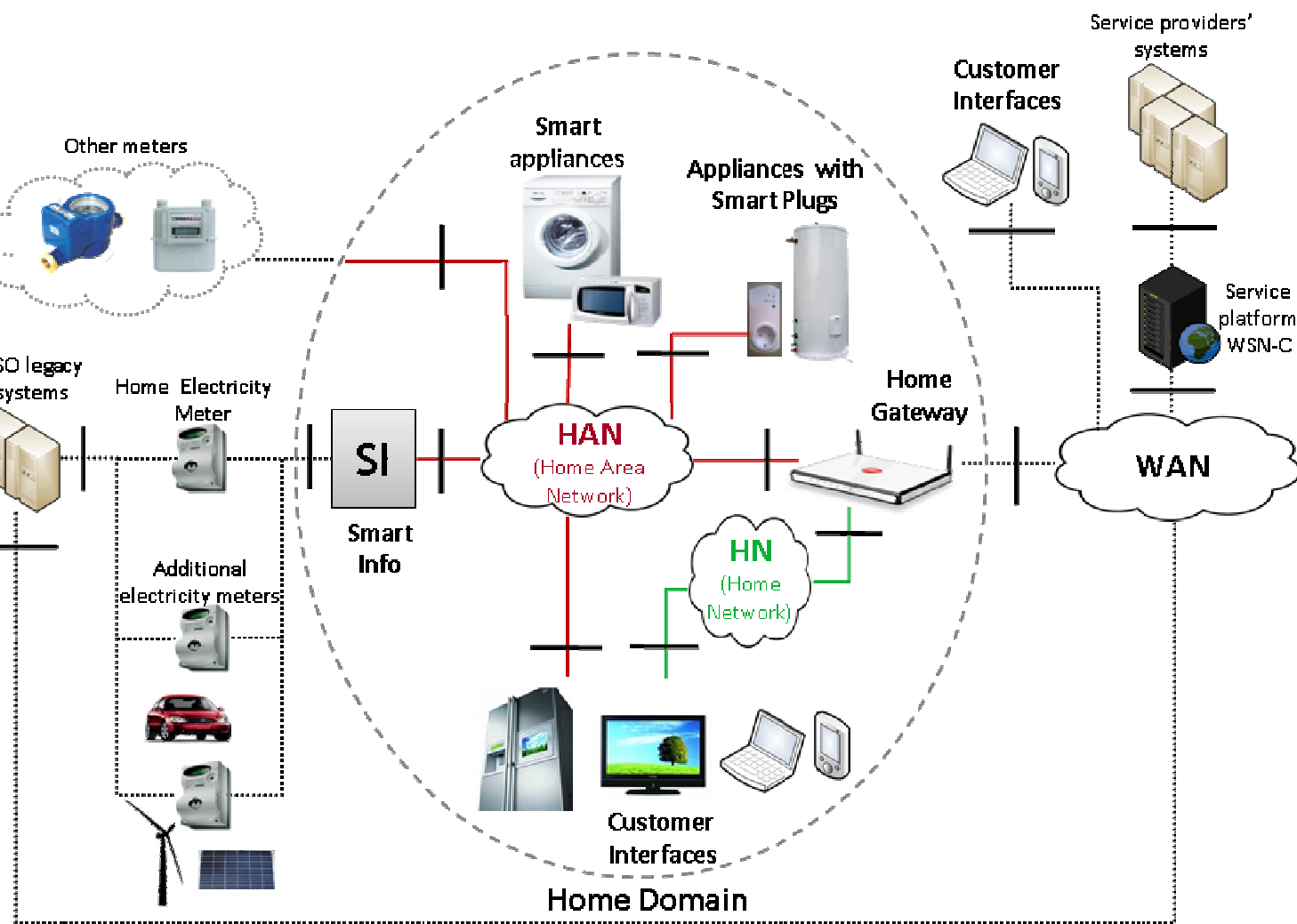
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Enel Smart Info: Reference Architecture



Enel Smart Info is fully integrated in the Enel AMM solution (Telegestore)

Every indoor socket will be an access point to the network

— HAN connections Other connections
— HN connections ——— Devices interfaces

Available metering data

Metering Data	
Metering data	Active and negative energy in <i>current</i> billing period and in different tariff intervals.
	Active and negative energy in <i>previous</i> billing period and in different tariff intervals.
	Maximum power of active and negative energy in <i>current</i> billing period and in different tariff intervals
	Maximum power of active and negative energy in <i>previous</i> billing period and in different tariff intervals
	Average positive and negative power (different integration periods)
	Reactive Energy in different billing periods and tariff intervals
	Active and reactive energy of current day and previous one.
Contractual and configuration information	Contractual power and power thresholds.
	Customer ID
	POD (Point of delivery) code
	Tariff intervals configuration
	Credit left (for pre-paid contracts)
	Date and time (from the Smart Meter)
	Last alarm with type and timestamp
	Meter device details
	Bidirectional transmission of custom data.

- ▶ The Enel Smart Meter collects a large set of metering data.
- ▶ Through the Enel Smart Info it is possible to collect a preconfigured subest of the availabe data

Thanks for your attention!



federico.caleno@enel.com