

# A Multi-Protocol Service-Oriented Platform for Home Control Applications

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**Abstract**— The convergence of smart home appliances and business services stands to profoundly change the way we interact with our environment. However, implementing and maintaining home-control applications is still far from easy. This demonstration presents our service-oriented platform to facilitate the development of home-control applications. This prototype is used in the ANSO industrial European project.

**Keywords** : OSGi, iPOJO, Home appliances, Home control, UPnP, DPWS

## I. CONTEXT

The home automation is finally becoming a reality for the mass market. Until now, the market was scattered into a large number of appliance manufacturers promoting incompatible and proprietary control protocols, making it difficult for the market to progress. One of the main reasons was that until now, it was very difficult for the integrator (architect, installer...) to provide a completely integrated solution covering all the types of appliances (HVAC, shutters, burglar and fire alarm, patients' healthcare monitors, etc) to their customer. The beginning of more widespread opened norms and standards as X10 and the generalization of domestic IP wire and wireless connections has brought about a new era of home automation and building automation [1]. Indeed, some device interaction protocols such as UPnP [2], Bonjour [3], DPWS [4], IGRS [5], SLP [6] and Jini [7] allow the dynamic discovery of device in the home network without the necessity of user interaction. However, dealing with all heterogeneous device interaction protocols is confusing for the value-added application providers and for the GUI providers.

## II. DEMONSTRATION

This demonstration presents a platform to facilitate the development of home-control applications. The elements of this platform (figure 1) are fully described in 2 papers accepted at CCNC 2007 [8][9]. This platform is designed according to the Service Oriented Architecture paradigm (SOA) [10] to reify appliances as services [11].

The platform runs simultaneously multiple home control applications based on services controlling the home appliances. Each application coordinates actions on several appliances and services simplifying the inhabitant life. For instance, one application called "I Leave / I come back" turns off all lights, close all shutters, turn on the alarm center, and start a presence simulation service. When the user comes back in his home, the previous configuration is restored. Another application could be a "Follow me!" radio station which plays the user's favourite radio on the speakers located in the user's current room [12].

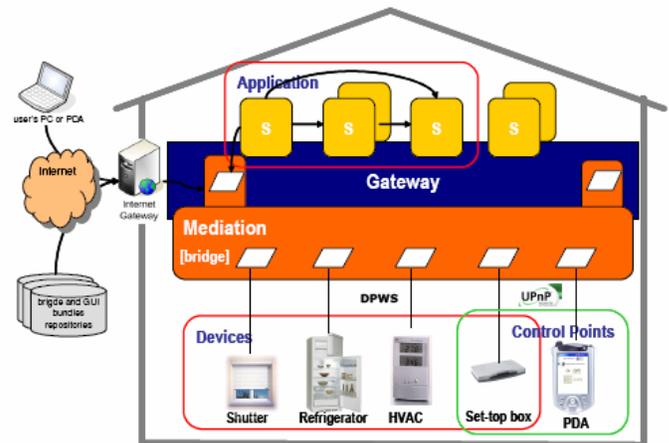


Figure 1. Platform Architecture.

The platform reifies appliances by using various protocols bridges (figure 2). These bridges act as technical mediators between different interaction protocols and service invocations and services event notifications. For instance, a DPWS-enabled appliance can be reified as a UPnP device and then controlled by a UPnP-aware control point (figure 3).

The platform [11] is developed with the OSGi technology [13] and a component model named iPOJO (for injected POJO). This component model alleviates the burden to deal with the dynamism of OSGi services. Three bridges are currently available: one for UPnP (Universal Plug and Play)

[2], one for DPWS (Device Profile for Web Service) [14] and one for Web Service.

The demonstration contains a UPnP generic control point for PDA [8]. This control point is also developed with the OSGi technology. The GUI components (figure 3) are deployed dynamically on device discovery and tracking.

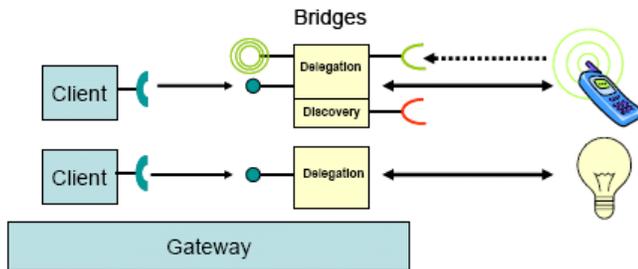


Figure 2. Bridges between heterogeneous protocols



Figure 3. Generic control point for various home appliance

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