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

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Context
Home automation new era

•Segmented appliances market (*HVAC, shutters, burglar and fire alarm, patients' healthcare monitors, etc.*)
• Various competing (*open or proprietary*) device discovery and interaction protocols (*UPnP, Bonjour, DPWS, IGRS, SLP, Jini, SIP, etc.*)
• Various control devices for the end-user (*remote command, touch panel, cell phone, PDA, etc*)

Imply

• Difficulties for the integrator (architect, installer, etc) to provide a completely integrated solution covering all the types of appliances to their customer.

SOA-based Home Control Platform

Objectives
- facilitate application development and deployment
- ease HMI development and deployment

Architecture main elements
- Home Gateway
- Devices
- Control Points

Design principles
- Service Oriented Architecture paradigm (SOA)
- Independence to discovery/interaction protocols
- Dynamic deployment
  detection, install, activation, deactivation, uninstall

Home Gateway

•Reifies devices as basic services using bridges specific to a protocol (UPnP and DPWS in the demo)

•Executes high-level applications as service compositions (device and external Web services)

•Provides an event system (so applications are designed as event-driven scenarios)

•Exposes high-level applications as devices for control points

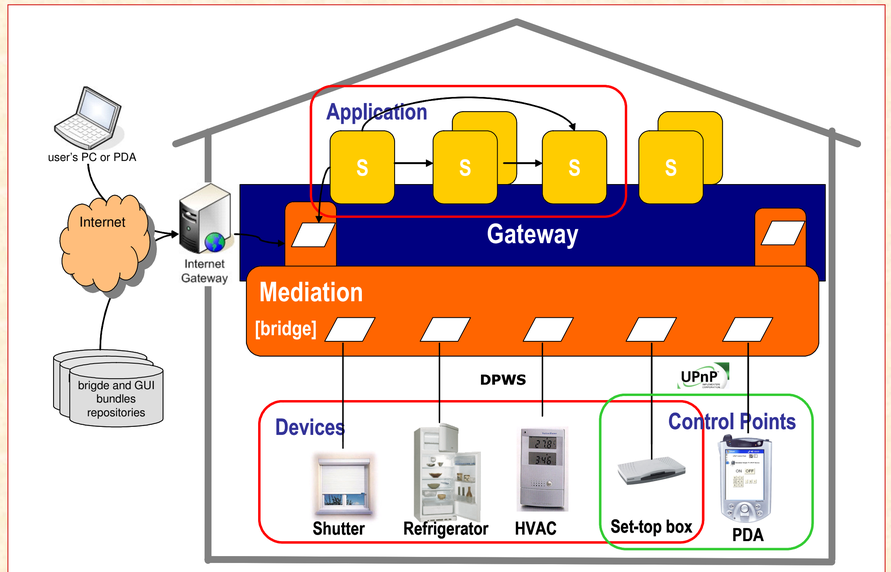

Figure 1. The Home Control Platform

Technologies

•Java programming language
•OSGi R4 platform (Apache Felix)
•Universal Plug And Play (UPnP)
• Devices Profile for Web Services (DPWS)
•iPOJO (Dynamic OSGi Component Framework)

Control Points

•Provides HMI for general-purpose control points (PDA, touch panel, …)

•Controlets are elements of a hierarchical HMIs can be generic or specific to a brand, model, type of a device

•Controlets are dynamically traded and deployed on device availability detection

Figure 2. Controlets for a PDA-based generic control point

Validation

•ANSO (Autonomic Network for SOHO users) funded by the European ITEA program

References

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