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.)

Implies

- 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

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

Validation

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

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)

References
