Smart Home Abstraction Layer

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Abstraction Layer? What's that?

Ecosystem of services from 3rd Parties to monitor and control real-world devices

Abstraction Layer = magic in the middle to interwork the services with all kinds of devices

Huge number of device types connected on diverse networks

Cloud-based Applications

Access Network

HOME GATEWAY

Proxy

Local Applications

Abstraction Layer

Network Driver A

Network Driver B

Sensors & Actuators

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Why do Smart Cities need to consider Abstraction Layers?
Smart Cities

Overcrowding detected in SuperStore venue. IF fire-alarm, then people directed to best exits.

Building Controller senses room occupancy and people flows and helps avoid panic.

Needed: Gateways and Abstraction Layers

V2X GW. of passing cars collect environmental data and sends later to M2M application.

Crop Alert from ice damage!

Pollution or Agriculture Sensors managed by dedicated M2M Gateways

HomeGateway interacts with Calendar + SmartGrid + Billing + Home Automation + Safety
HGI: Connecting Homes, Enabling Services
HGI’s Mandate

• To set requirements for the broadband-enabled home, the equipment and services deployed by the operators
  • Scope: Home Gateway, Home Network, End Devices
  • Including Smart Home services, software and hardware
• To offer a test program to check the vendor compatibility with operator requirements
  • Remote testing of software compatibility begins 12/2013!
• To build the ecosystem with all stakeholders (device vendors, services providers, application developers)
  • Dialogue with other SDO
  • Develop PLATFORM approach (Home Gateway + cloud)
HGI’s Working Groups & Liaisons

- **Business Group**: Business need and use cases
- **Smart Home Group**: Smart Home architecture & software
- **Technical Group**: Networking and hardware needs
- **Test Task Force**: Test plans and logo program

**Key Use Cases**
- Home Energy Management
- Alarms & Home Security
- Ambient Assisted Living
- Comfort & Home Automation
- NG Communications
- Media Re-Distribution

**Liaison Partners**

[Logos of various technology and standardization organizations]

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- RP1 – Abstraction Application Interface
- RP2 – Device Application Interface
- RP4 – Remote Representation (e.g. ETSI M2M)
- RPx – Cloud API

There are more reference points for LAN side access and inter-application communication, but HGI focuses on RP1, RP2, RP4 and probably RPx.

RPx is not defined yet, but considered to be a cloud side API (i.e. for M2M platforms)
Goals for HGI Abstraction Layer

1. Enable unified APIs for application developers
   1. command, control and query home appliances

2. Be independent of HAN (Home Area Network) technologies
   1. developer doesn’t need to know details about Zigbee, Z-Wave, wireless m-bus etc.
   2. developer can concentrate on modeled devices available

3. Make applications portable across various devices

4. Enable extensibility of the system to additional HANs

5. Allow a pass-through mechanism so Applications can use HAN-specific functions

This all assumes Developers know the devices!
Needed: a common Device Model Template

- A common template used to specify device capabilities
- When instantiated, enables a common API for all devices of the same class (e.g., “Doorbell”)
- Should be approved by all participating organizations (BBF, HGI, ETSI SmartM2M, OneM2M, OSGi-A, ...)
- Template has an informal (text) and a formal section (machine-readable, probably XML based)
Needed: a common Device Model Template

- **Device instances**
  - Friendly Name – user readable
  - Manufacturer – text or agreed id
  - Model Name – exact model name
  - Model Number – not unique
  - Serial Number – unique to manufacturer
  - Universal Product Code
  - Identifier –unique in customer area

- **Services** (aka “interfaces”)
  - (grouping of actions)

- **Actions** (aka “operations”)
  - e.g. on/off, “methods”, ...

- **Device classes** (aka “types”)

- **States** (aka “state variables”)

- **Events** (asynchronous info)
  - i.e. what info, when, what is trigger

  etc., etc., etc., ....
Potential Contributors

Examples only! Many others ...

SmartM2M

Smart Appliance Semantics

EC

EU/National Projects

System Architects

Automation Protocols

Device Manufacturers
A pseudo code XML example:
Concrete device using standardized modules

```xml
<Domain xmlns="http://hgi.org/xml/dal"
        name="com.smartdev.home"/>
<Device>
    <DeviceInfo>
        <Name>PowerSwitch</Name>
        <Vendor>Smart Device Inc.</Vendor>
        <ModelInfo>
            <Model>SD-PS-*</Model>
        </ModelInfo>
    </DeviceInfo>
    <Modules>
        <Module name="status" extends="org.hgi.core.BooleanState">
            <Events>
                <Event name="batteryLow"/>
                <Event name="alive"/>
            </Events>
        </Module>
    </Modules>
</Device>
</Domain>
```
(Our) Next Steps

- HGI invites your contact re:
  - Device template design
  - Instantiated device models for major smart home devices
  - Smart home interface requirements (applications & networks)
  - Evaluating how to enable Cloud-based applications
  - An open, reliable, low-barrier Device Model repository

- HGI invites your participation:
  - Guest at next meetings: California (December), Malta (March)
  - Remote SWEX Test Event for HGI members Nov/Dec 2013 (still time to get involved)

- HGI plans to input above work to OneM2M during 2014
Questions?