Controlling the Smart Home from the VSDL Home Gateway: opportunities and lack of standards

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W3Ctrack @www2016
Smart objects and Smart Home: application domains

- SECURITY
- ENERGY
- HOME AUTOMATION & CONFORT
- ASSISTED LIVING
- ENTERTAINMENT
Smart Objects communication patterns and market strategies

- Commercial Smart objects mainly follow communication patterns which happen to help creating and protecting walled gardens.

- This is leading to an ecosystem of non-interoperable vertical silos which constrains the ability to create new composite services and to get closer to users’ real needs.

- What happens to personal data? Does it make sense that a service provider gets to know each time I switch on and off a light bulb at home?
Smart Objects communication patterns

- Device-to-Gateway: vendors provide «smart objects» normally to be linked to proprietary gateways, often non IP based devices with pros and cons

- Device-to-Cloud: vendors provide «smart objects» that need to connect to a service provider cloud, often with Back End data sharing pattern

- Device-to-Device: vendors provide devices which are capable to talk to without proxying features
Why using a Telco Home gateway to control the smart home could be a good idea?

- It is already there and can rely on an established customer caring network
- It can let users decide whether or not sharing their personal data with cloud service providers without affecting their QoE
- Users are not obliged to introduce more gateways/hardware in their houses besides the smart objects
- Maybe integrating with telephony is not a bad idea and increases confidence
- Telcos have no interest in creating more fragmentation, but rather offer this as a commodity for customer retention.
A Smart Home enabled VSDL router prototype

- PSTN
- Internet
- 3G
- 4G
- 5G

TIM Smart Home Gateway

OpenWrt

Asterisk

IP PBX

trunking
Controlling the Smart Home from a VSDL Router
Let’s try to put some order: a losing game
TIM Smart Home Gateway signaling module

- Signaling and its scalability and reliability is mandatory in order to connect and orchestrate an increasing number of smart objects.

- Deployed VSDL modems are already voice over IP (SIP) enabled.

- SIP Trunking resolves NAT transversal issues.
TIM Smart Home Gateway Modules

**RESTful API**: PHP module responsible of offering an homogeneous interface to the mobile client. Device of the same type can be controlled with the same command set, regardless of vendor, subgateway etc. looking forward to [W3C](https://www.w3.org) recommendations here.

**TIMgateway**: PHP module responsible of «translating» the homogenous commands interface from the client into the proper commands for the target device.

**Status Listener**: Python Module responsible of monitoring events sent by Gateways via subscriptions technologies such as SSE or Websocket.

**Status Socket**: Python Module responsible of exposing events to clients via WebSocket in a uniform format, regardless of subgateway and device.
Gateways Layer and dialects’ translation

A set of Sub-Gateways (aka ALG), providing access primitives and radio interfaces, has already been integrated and is supported by the platform:

- **QIVICON**: Platform powered by DT, Device Interfaces available: Zigbee, Homematic, Ip

- **FlexGateway**: Hardware by Flex, Jemma Software onboard (OSGI based), Zigbee Radio Interface

plus

- **Openhab2**: openHAB is a Java based software which provides an extensible sw abstraction layer for Smart home service developers to manage heterogeneous smart objects without having to speak their numerous specific dialects
Simplified starting point

TIM Smart Home Gateway

TIM modem router

TI Gateway Plane

Proprietary Gateway Plane

Device Plane

TIM modem router

GW1

GWn

Philips

Samsung SMART TV
Simplified target Architecture

TIM Smart Home Gateway

TIM modem router

TI Gateway Plane

Device Plane

Philips

Samsung SMART TV

Hue
Thanks
# Devices Integration Status

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Vendor</th>
<th>Protocol</th>
<th>Radio GW</th>
<th>Integrated</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>eQ3 PowerMeter Sw/Act</td>
<td>Smart Plug</td>
<td>eQ3</td>
<td>HomeMatic</td>
<td>Qivicon</td>
<td>CIl -&gt; TIGW -&gt; Qivicon</td>
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<tr>
<td>eQ3 Dimming Actuator</td>
<td>Smart Plug</td>
<td>eQ3</td>
<td>HomeMatic</td>
<td>Qivicon</td>
<td>CIl -&gt; TIGW -&gt; Qivicon</td>
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<tr>
<td>eQ3 Door Sensor</td>
<td>Door Sensor</td>
<td>eQ3</td>
<td>HomeMatic</td>
<td>Qivicon</td>
<td>CIl -&gt; TIGW -&gt; Qivicon</td>
<td></td>
</tr>
<tr>
<td>eQ3 Motion Sensor</td>
<td>Motion Sensor</td>
<td>eQ3</td>
<td>HomeMatic</td>
<td>Qivicon</td>
<td>CIl -&gt; TIGW -&gt; Qivicon</td>
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<tr>
<td>eQ3 Magnetic Contact</td>
<td>Door Sensor</td>
<td>eQ3</td>
<td>HomeMatic</td>
<td>Qivicon</td>
<td>CIl -&gt; TIGW -&gt; Qivicon</td>
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</tr>
<tr>
<td>Philips Hue</td>
<td>Hue/Color</td>
<td>Philips</td>
<td>Zigbee Light Link</td>
<td>Philips</td>
<td>CIl -&gt; TIGW -&gt; QIVICON</td>
<td>CIl -&gt; TIGW -&gt; Philips</td>
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<tr>
<td>Samsung Smart TV</td>
<td>SmartTV</td>
<td>Samsung</td>
<td>TCP/IP</td>
<td></td>
<td>CIl -&gt; TIGW -&gt; Device</td>
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<tr>
<td>Osram Lightify Bulb</td>
<td>Smart Light</td>
<td>Osram</td>
<td>Zigbee</td>
<td>Qivicon</td>
<td>CIl -&gt; TIGW -&gt; Qivicon</td>
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<tr>
<td>Osram Led Strip</td>
<td>Smart Light</td>
<td>Osram</td>
<td>Zigbee</td>
<td>Qivicon</td>
<td>CIl -&gt; TIGW -&gt; Qivicon</td>
<td></td>
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<tr>
<td>Osram Gardenspot</td>
<td>Dimming Light</td>
<td>Osram</td>
<td>Zigbee</td>
<td>Qivicon</td>
<td>CIl -&gt; TIGW -&gt; Qivicon</td>
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<tr>
<td>CleoBee Zmove</td>
<td>Motion Sensor</td>
<td>Cleode</td>
<td>Zigbee</td>
<td>CIl- &gt;TIGW-&gt; FlexGw</td>
<td>CleoBee Zmove</td>
<td>Motion Sensor</td>
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<tr>
<td>FlexPlug(2X)</td>
<td>SmartPlug</td>
<td>Flexplug</td>
<td>FlexPlug</td>
<td>FlexGate way</td>
<td>CIl-&gt;TIGW-&gt;FlexGw</td>
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<tr>
<td>4Noks Zr-Plug-EU-Eh</td>
<td>SmartPlug with metering</td>
<td>4-noks</td>
<td>Zigbee</td>
<td>FlexGate way</td>
<td>CIl-&gt;TIGW-&gt;FlexGw</td>
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<tr>
<td>Bitron Home Plug (2x)</td>
<td>SmartPlug</td>
<td>Bitron Home</td>
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</tr>
<tr>
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<tr>
<td>CleoBee Zmove</td>
<td>Motion Sensor</td>
<td>Cleode</td>
<td>Zigbee</td>
<td>Clei-&gt;TIGW-&gt;FlexGw</td>
<td></td>
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<tr>
<td>CleoBee Zlight (2x)</td>
<td>Two Light Controller</td>
<td>Cleode</td>
<td>Zigbee</td>
<td></td>
<td>Power Supply?</td>
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<tr>
<td>CleoBee Zdoor</td>
<td>Door Sensor</td>
<td>Cleode</td>
<td>Zigbee</td>
<td></td>
<td>Does not pair with Zload / Qivicon</td>
<td></td>
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<tr>
<td>CleoBee ZRC</td>
<td>CleoBeeMotion Sensor</td>
<td>Cleode</td>
<td>Zigbee</td>
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<td>Power Supply</td>
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<tr>
<td>CleoBee Zload</td>
<td>Gateway</td>
<td>Cleode</td>
<td>Zigbee/Usb</td>
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<td>Successfully installed on windows, does not pair with Door Sensor (could not try other)</td>
<td></td>
</tr>
<tr>
<td>FlexPlug(2x)</td>
<td>SmartPlug</td>
<td>Flexplug</td>
<td>FlexPlug</td>
<td></td>
<td>Clei-&gt;TIGW-&gt;FlexGw</td>
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<td>Clei-&gt;TIGW-&gt;FlexGw Cli-&gt;QIVICON</td>
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<tr>
<td>WinkHub</td>
<td>Gateway</td>
<td>WinkHub</td>
<td>???</td>
<td></td>
<td>Does not work without -LINKHUB- providing Wifi connection.</td>
<td></td>
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</tbody>
</table>