UPnP Framework
http://brisa.garage.maemo.org

Speaker:
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About me

- PhD candidate at Federal University of Campina Grande, Paraiba, Brazil

- Have been working for embedded systems:
  - Universal Plug and Play
  - Location Based System
  - VoIP, DCCP protocol and Linux Kernel
  - Maemo PC-Connectivity

- Took his master in Computer Science at Federal University of Campina Grande, Paraiba, Brazil

- Working in projects with Nokia Institute of Technology, Brazil
Summary

• What is UPnP?
• UPnP standard
• BRisa UPnP Framework
• Examples
• Conclusion
What is UPnP?

- Short for Universal Plug n' Play
- Set of protocols describing how devices interact and serve their purposes seamlessly
- Built upon well-known technologies: UDP/TCP/IP, HTTP, SOAP, SSDP, XML, GENA, SCPD
UPnP terms: home automation example

- **Device**: all devices that support UPnP
- **Control Point**: device capable of controlling other UPnP devices
- **UPnP DCP**: similar to IETF RFCs, they are documents for UPnP specifications
  - Audio/Video/Image
  - Lights
  - Printers
  - Internet gateways
  - Home automation etc.
UPnP network is invisible and ad-hoc

The earlier concept of **device drivers** and **system calls** is replaced by **Internet protocols** and **webservices invocation**.
UPnP Control Point

- Invokes actions on a service and receives a response

Control Point

UPnP Device

Service 1

Service 2

Invokes action on a service

Return value(s), if any
UPnP Protocol (steps)

- **Addressing**: IP assignment on any network
- **Discovery**: services and devices over SSDP
- **Description**: services and devices using SCPD
- **Control**: use of SOAP for accessing web services
- **Event Notification**: updates of variables through event messages (GENA)
- **Presentation**: access to device through a webpage
UPnP Protocol Stack

UPnP uses only standard and well-know protocols provided by IETF and W3C.
What is BRisa?

- A UPnP framework that implements the UPnP Architecture
- Written in Python programming language called `python-brisa`
- Initially focused on UPnP Audio/Video, but now it attains a general UPnP framework status
- Provides a high-level API to build UPnP devices and services through Object Oriented programming
What is BRisa?

- Implements facilities for logging, configuring, multi-threading, networking and so forth

- Provides a set of UPnP devices built on top of the framework, such as for **Media Server**, **Media Renderer** and **control points**

- Current version 0.9.1
  - *UNIX and maemo
  - Windows
  - MacOS
BRisa and maemo platform

- Development platform for Nokia Internet Tablets
- Based on Linux
- Embedded in 770, N800 and N810 devices
BRisa and maemo platform

- Embedded Systems and BRisa framework
  - Maemo platform (stable)
  - OpenMoko (work in progress)
  - SymbianOS (work in progress)
  - Android (plans)
  - IPhone (plans)
**BRIsa packages and modules**

- `brisa.config` - configurations facilities
- `brisa.control_point` - control point API
- `brisa.log` - logging facilities
- `brisa.threading` - thread management & main loop
- `brisa.services` - basic UPnP services implemented
- `brisa.upnp` - UPnP core implementation (SSDP, MSEARCH, SOAP, SCPD)
- `brisa.utils` - utility, networking, messaging, parsers
brisa.control_point

- Extensible UPnP Control Point capable of
  - discovering devices
  - executing actions against devices
  - receiving events notification from devices

- AV Control Point capable of
  - discovering UPnP A/V devices
  - browsing contents of UPnP media servers
  - playing contents in UPnP media renderers
Diving into UPnP and Brisa
Developing a simply UPnP control point (generic steps)

- **Use BRisa Control Point API:** to call find UPnP devices
- **BRisa Thread Manager:** to create a main loop
- **Three commands:** start search, stop search and list found devices
- **Define callbacks:** to be notified when a device enter in the network or go out
Diving into UPnP and Brisa
Developing a simply UPnP control point (generic steps)
Diving into UPnP and Brisa
Developing a simply control point

Enjoy the video...
BRisa Team

Team

- Manager and developer:
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Come to see BRisa in action...

- How to implement a UPnP Binary Light
- How to modify the UPnP control point that we have implement to support controlling BinaryLights

**BRisa** in action:
- media server
- media renderer
- control point
Thank you!

Question and discussions

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