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

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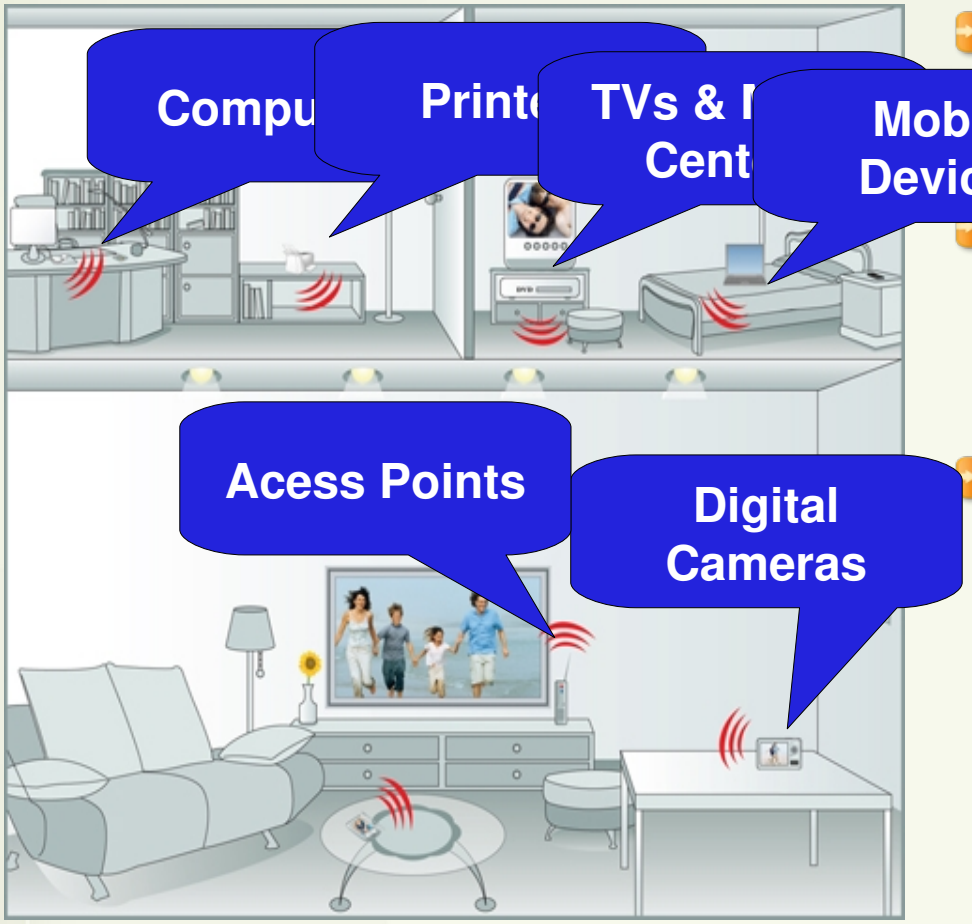
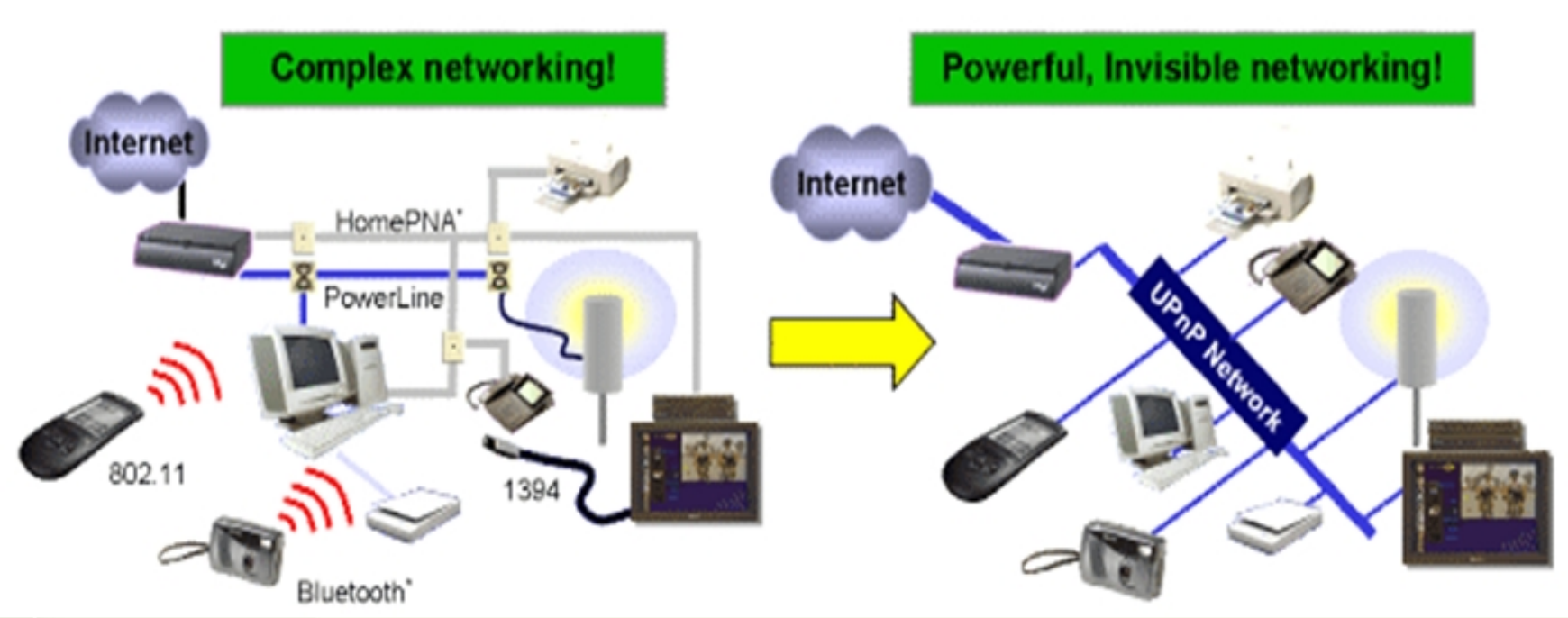
UPnP terms: home automation example



- **Device**: all devices that ort 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.

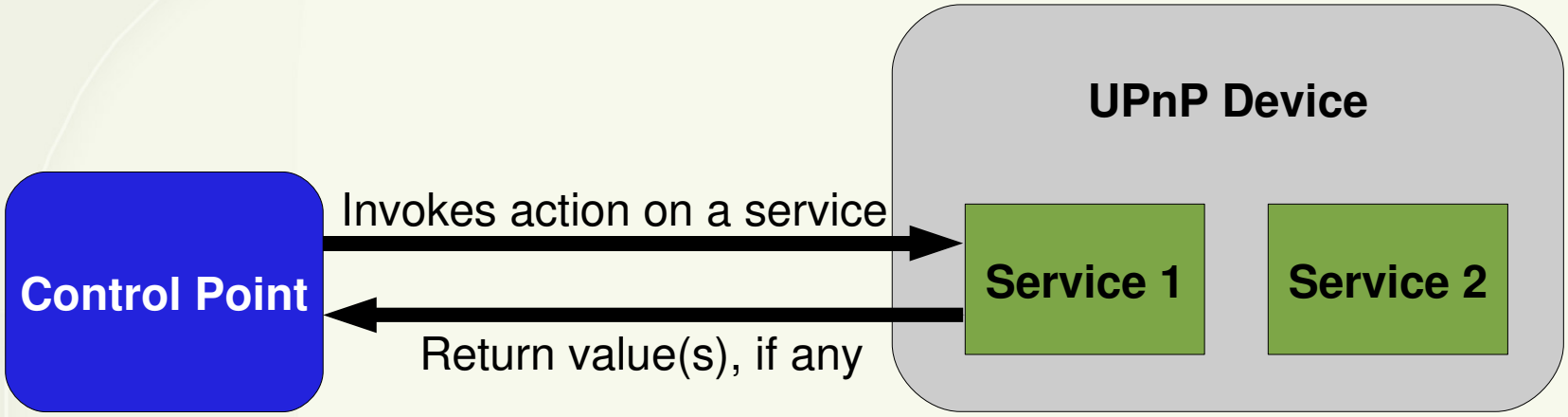
- UPnP network is invisible and ad-hoc



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

UPnP Control Point

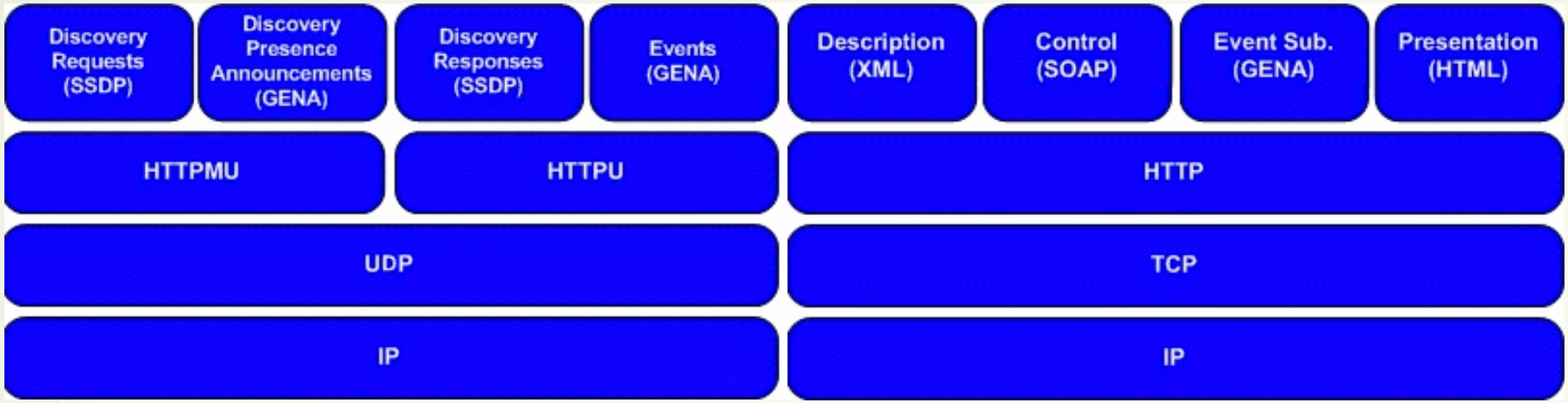
- Invokes actions on a service and receives a response



UPnP Protocol (steps)

- **Addressing**: IP assignment on any network
- **Discovery:** services an 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**

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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

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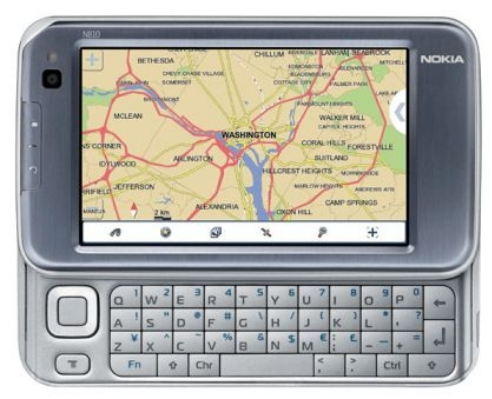
What is BRisa?

- 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



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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

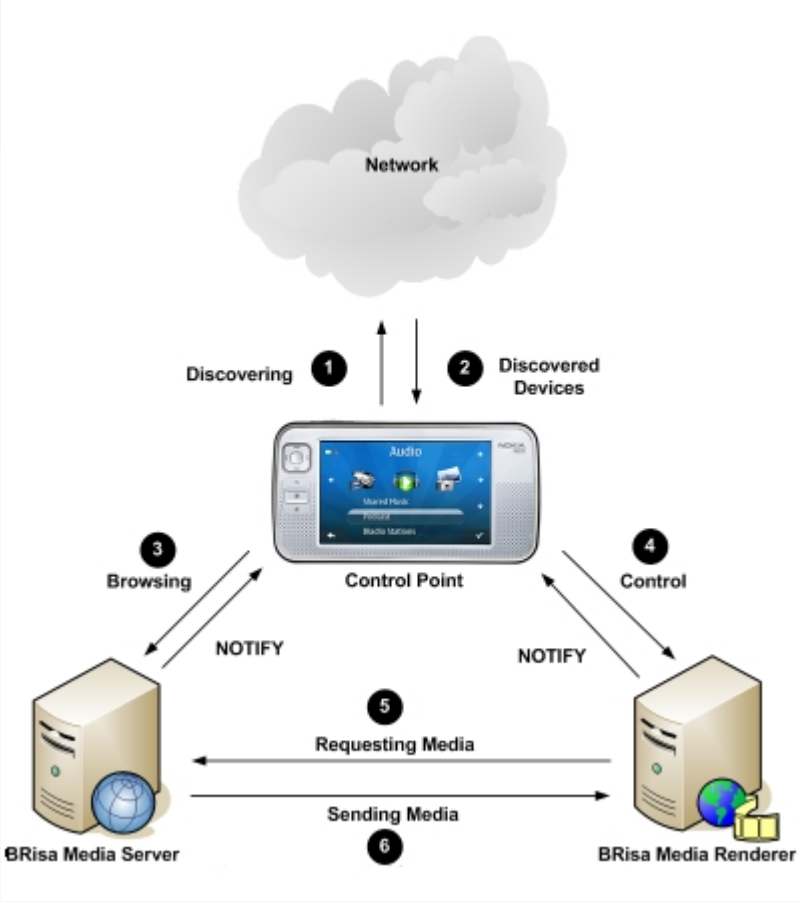
Diving into UPnP and Brisa

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)



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Diving into UPnP and Brisa

Developing a simply control point

Enjoy the video...

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BRisa Team

Team

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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

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Thank you!

Question and discussions

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