Coherence

UPnP/DLNA framework

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November 3rd, 2007 – Frank Scholz
a framework to simplify the interaction with UPnP/DLNA devices

be aware that UPnP is not only about punching holes into firewalls
- one division of UPnP is UPnP A/V
- it is about storing media on one device and playback on some other device
- control who is playing what with a third device
- without configuration by the user!
who wants to store media in directory trees?
- **Universal Plug and Play**
- some say it is a developers nightmare
- a weird mixture of bent specs and protocols
specs and protocols

SSDP
ARP
DHCP
GENA
XML
HTML
HTTP
SOAP
HTTPU
HTTPMU
BUT…
it is **THE** standard for CE devices to communicate on a network

- it is all about interoperability

- between devices of different vendors!
UPnP – history

- created by Microsoft
- adopted end of the '90s by the **BIG** players in CE
- and immediately a big success
  - on the paper
Digital Living Network Alliance

- another specification
- on top of UPnP
- refines the UPnP ones
- defines a minimal subset
- introduces detailed media format description and content transcoding
UPnP – a quick overview (1/2)

- composed of six parts
  - Addressing
  - Discovery
  - Description
  - Control
  - Eventing
  - Presentation
actually a set of specifications

- Networking
  - Internet Gateway Device
  - WLAN Access Point

- Audio/Video
  - MediaServer and MediaRenderer
  - ControlPoint

- Home Automation

- Printer and Scanner
UPnP A/V - devices

- MediaServer
  - stores and organizes media
  - does recording

- MediaRenderer
  - displays images
  - plays back audio and video

- ControlPoint
  - interconnects MediaServer and -Renderer
  - provides information about content
  - controls and provides status
UPnP A/V - capabilities

- media sharing
- recording
- playback and controlling
- organizing
- media exchange
- a framework to hide the UPnP/DLNA related tasks from the application
- written in Python
- acts as a daemon or can be embedded
- allows server and client creation
- exposes local and discovered devices/services via D-Bus (maybe Avahi too)
- provides a D-Bus interface to create UPnP devices (WiP)
- core is pure Python
- port by copy
- works on „normal hw“, STBs, Nokia Tablets, AVR32,...
- anything that provides a recent Python (>2.4)
- licenced under MIT
- UPnP v1 and v2
- DLNA 1.5
- works with „old“ UPnP devices, with special ones like the X-Box and with DLNA devices, e.g. PS3
has its „own“ device backends:
- filesystem MediaServer
- db MediaServer
- Flickr MediaServer
- GStreamer MediaRenderer
- Axis Cam Proxy
- ...

Coherence (4/6)
and plugins for:
- Elisa
- Rhythmbox
- Dreambox STB (Enigma)
- Buzztard
- ...
side projects:
- Compère
- TestSuite
- DeviceSpy
- presentation controller
- FritzBox phonebook
DBus MediaServer client in ~ 30 lines

```python
BUS_NAME = 'org.Coherence'
OBJECT_PATH = '/org/Coherence'

class CoherenceDBusClient(object):
    def __init__(self):
        self.bus = dbus.SessionBus()
        self.coherence = self.bus.get_object(BUS_NAME, OBJECT_PATH)

        self.coherence.get_devices(dbus_interface=BUS_NAME,
                                   reply_handler = self.handle_devices_reply, error_handler = handle_error)

        self.coherence.connect_to_signal('UPnP_ControlPoint_MediaServer_detected',
                                         ms_detected, dbus_interface=BUS_NAME)
        self.coherence.connect_to_signal('UPnP_ControlPoint_MediaServer_removed',
                                         ms_removed, dbus_interface=BUS_NAME)

    def handle_devices_reply(self, devices):
        def reply(r):
            if r[1] == 'Coherence Test Content':
                for service in r[3]:
                    if service.split('/')[1] == 'ContentDirectory':
                        s = self.bus.get_object(BUS_NAME+'.'+service,service)
                        s.browse({'object_id':'0'}, reply_handler = browse_reply,
                                  error_handler = handle_error)

            for device in devices:
                d = self.bus.get_object(BUS_NAME+'.'+device,device)
                d.get_info(reply_handler = reply, error_handler = handle_error)
```

DBus MediaServer client in ~ 30 lines
building UPnP enabled devices seems to be a hard job

tools to test and to validate UPnP methods are available as part of the Intel UPnP kit, but only for Windows

some issues only show up during interaction with another device

created by Michael Weinrich as part of his Master Thesis
- Coherence can simulate any devices, even broken ones
- creates complex scenarios
- scripting on board
Outlook

- core code base is feature complete
- documentation and cleanup phase
- better DLNA compliance
- version 1.0 planned 31.12.2007
- WAN tunneling and security addons
- media transcoding with Gstreamer pipelines Q1/08
- more UPnP devices
- Thank **YOU**!

- https://coherence.beebits.net
- irc://irc.freenode.net/#coherence

- Questions?