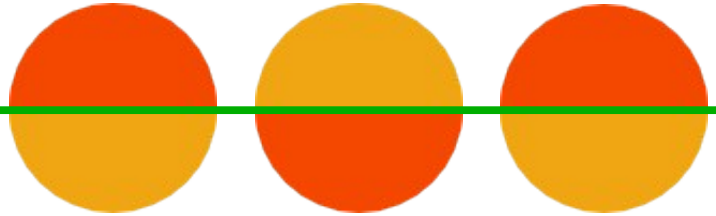
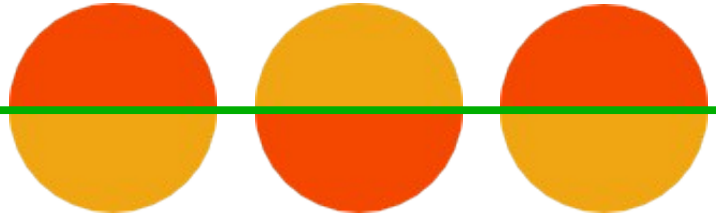


Coherence

UPnP/DLNA
framework

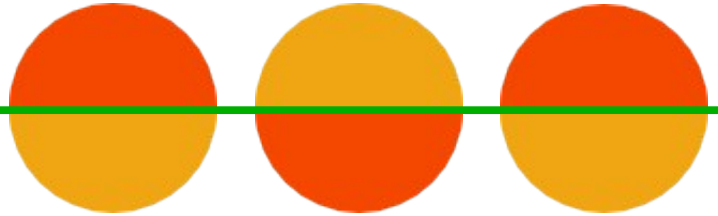
CELF Europe 2007

November 3rd, 2007 – Frank Scholz



Intro (1)

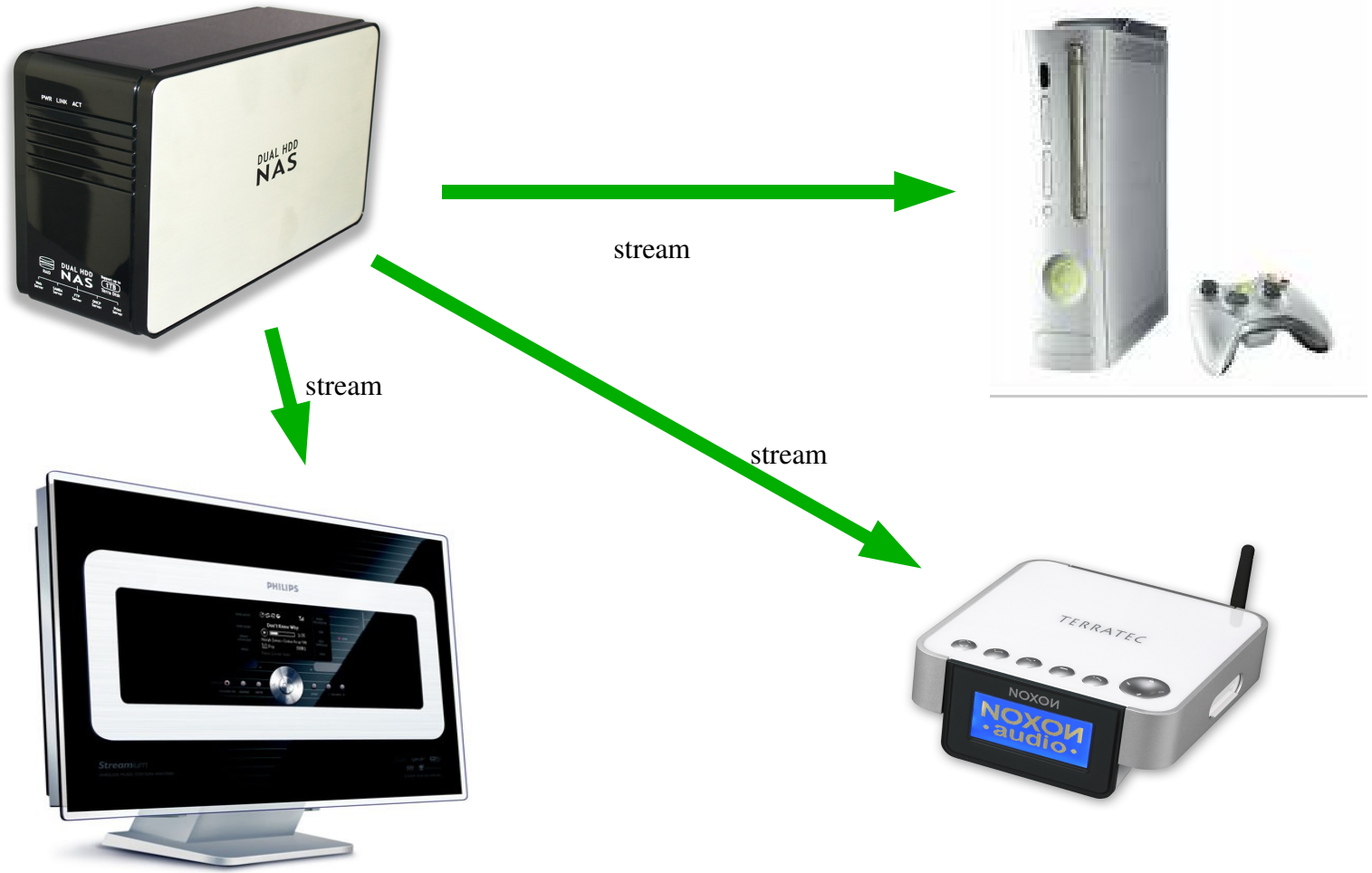
- a framework to simplify the interaction with UPnP/DLNA devices
- be aware that UPnP is not only about punching holes into firewalls



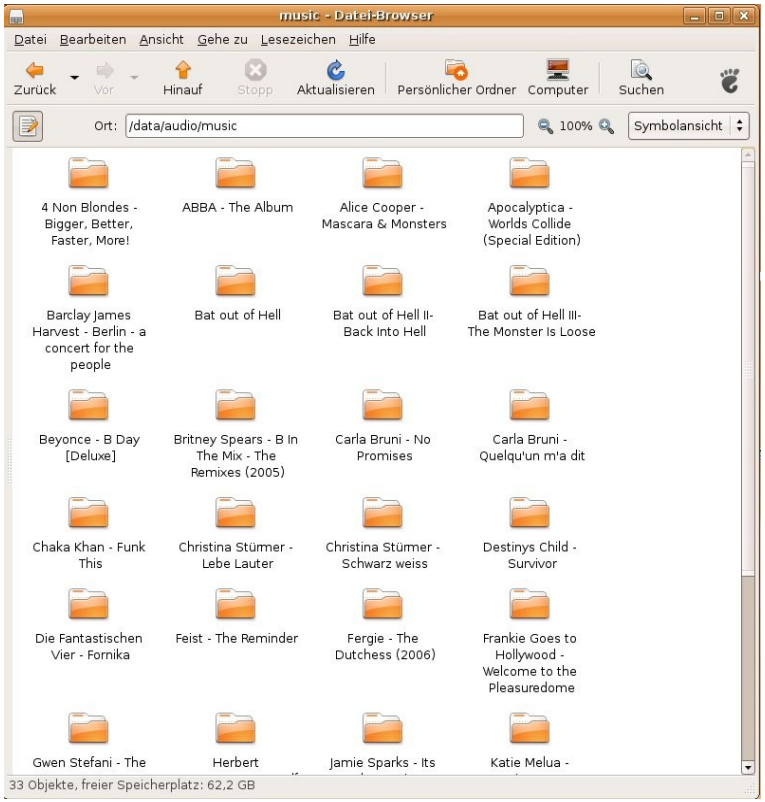
Intro (2)

- 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!

Intro (3)

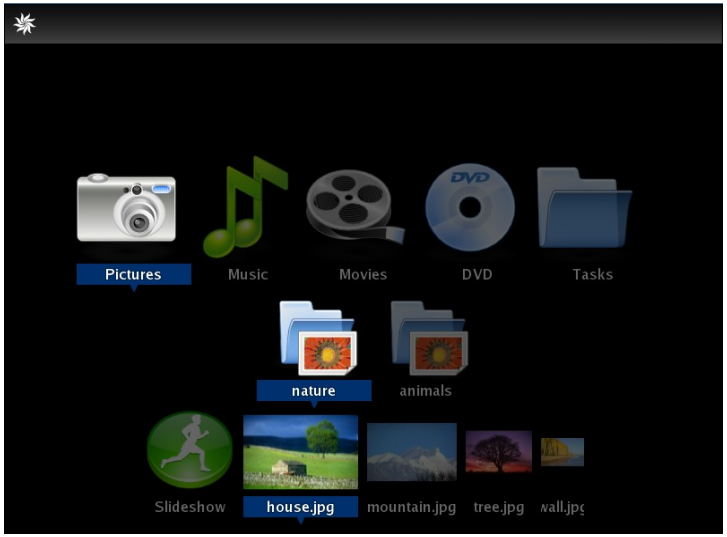

DUAL HDD
NAS
stream
stream
stream
PHILIPS
TERRATEC
NOXON
audio

Intro (4)



who wants to store
media in directory trees?

Intro (5)



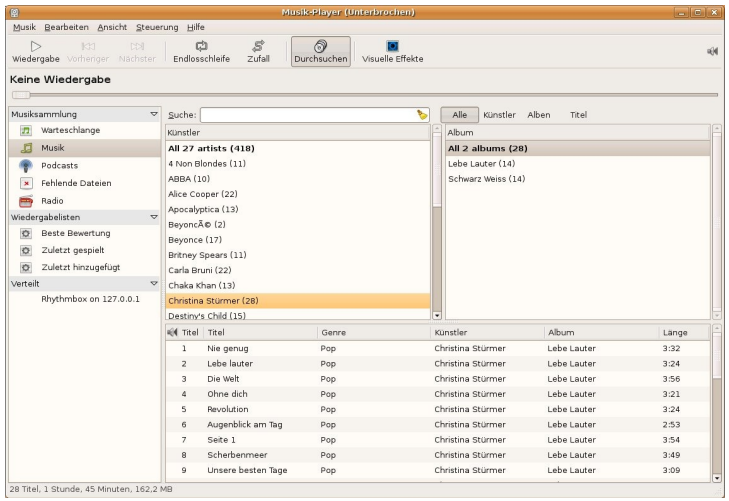
stream

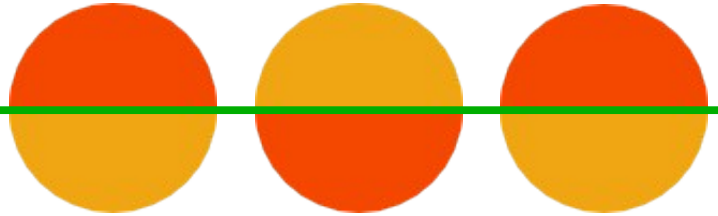
stream

store

stream

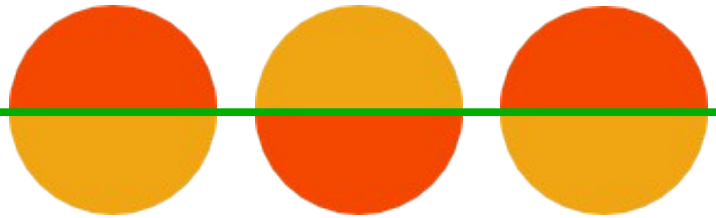
control?





UPnP – what is it (1/3)

- **U**niversal **P**lug a**n**d **P**lay
- some say it is a developers nightmare
- a wierd mixture of bent specs and protocols



specs and protocols

SSDP

ARP

DHCP

GENA

XML

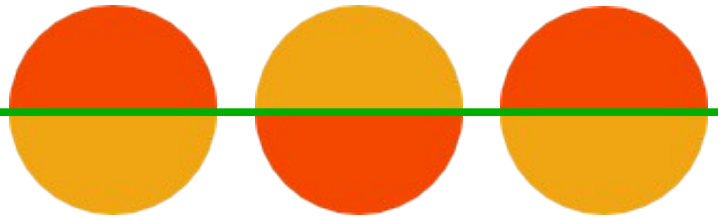
HTML

HTTP

SOAP

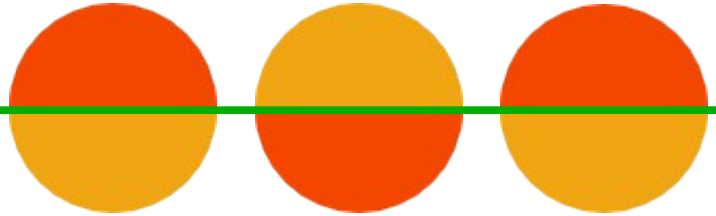
HTTPU

HTTPMU



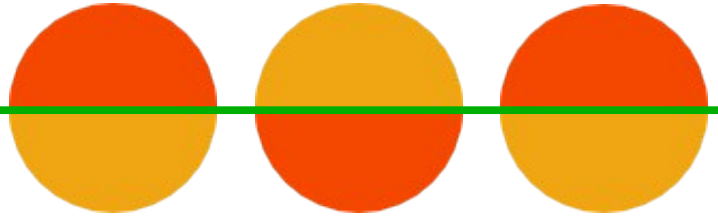
UPnP – what is it (2/3)

- **BUT...**



UPnP – what is it (3/3)

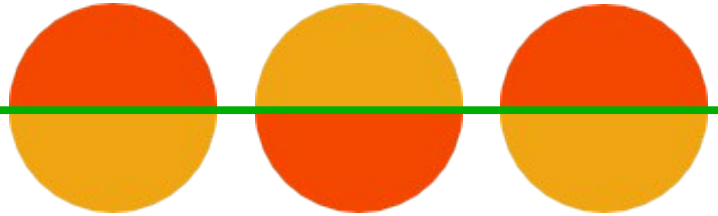
- it is **THE** standard for CE devices to communicate on a network
- it is all about interoperability
- between devices of different vendors!



UPnP – history

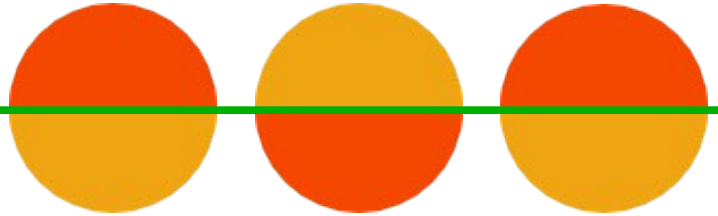
- created by Microsoft
- adopted end of the '90s by the **BIG** players in CE
- and immediatelly a big success

  - on the paper



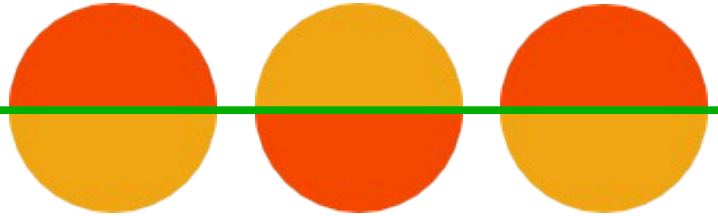
DLNA

- **D**igital **L**iving **N**etwork **A**lliance
- another specification
- on top of UPnP
- refines the UPnP ones
- defines a minimal subset
- introduces detailed media format description and content transcoding



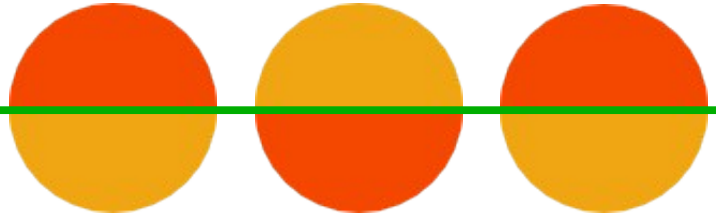
UPnP – a quick overview (1/2)

- composed of six parts
  - Addressing
  - Discovery
  - Description
  - Control
  - Eventing
  - Presentation



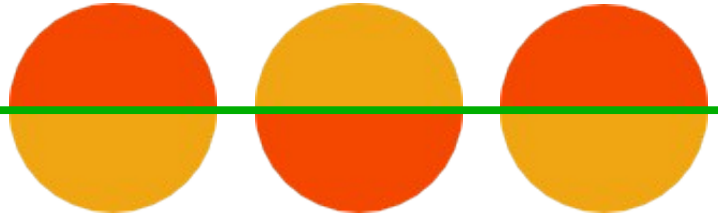
UPnP – a quick overview (2/2)

- actually a set of specifications
  - Networking
    - Internet Gateway Device
    - WLAN Access Point
  - Audio/Video
    - MediaServer and MediaRenderer
    - ControlPoint
  - Home Automation
  - Printer and Scanner



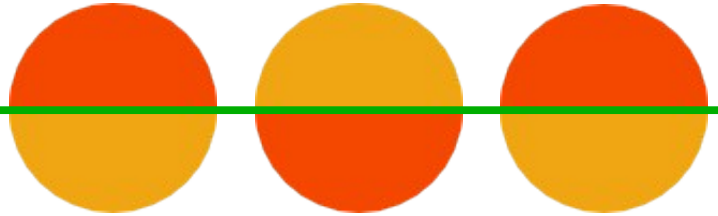
UPnP A/V - devices

- 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



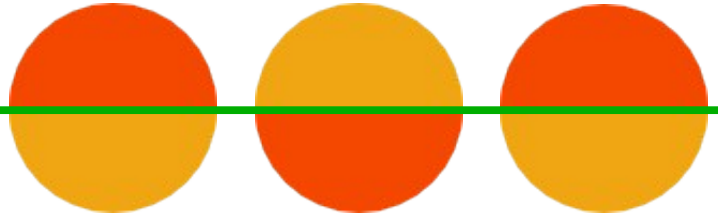
UPnP A/V - capabilities

- media sharing
- recording
- playback and controlling
- organizing
- media exchange



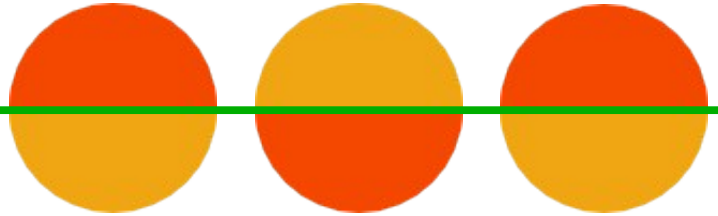
Coherence (1/6)

- 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)



Coherence (2/6)

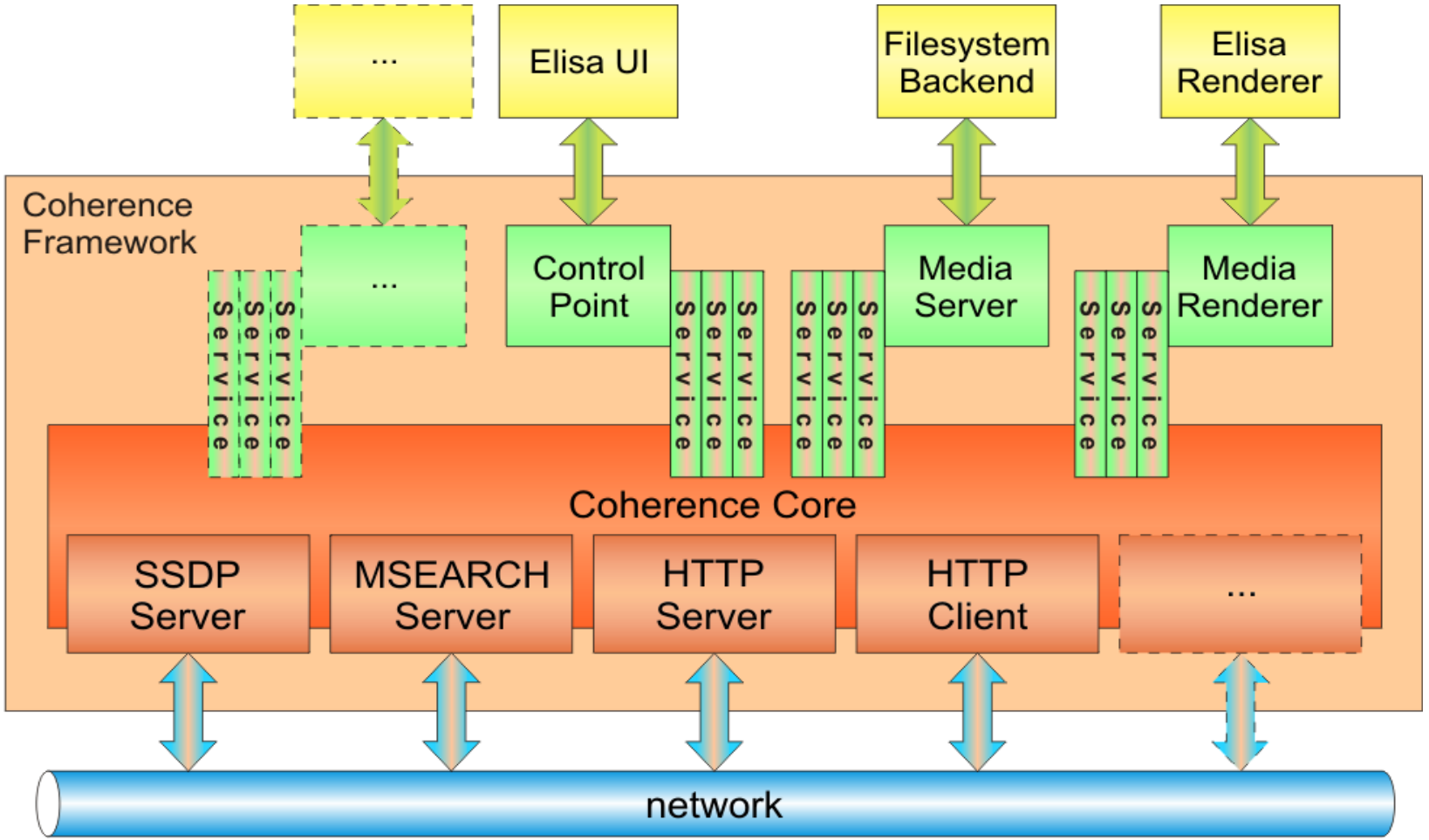
- core is pure Python
- port by copy
- works on „normal hw“, STBs, Nokia Tablets, AVR32,...
- anything that provides a recent Python (>2.4)
- licenced under MIT

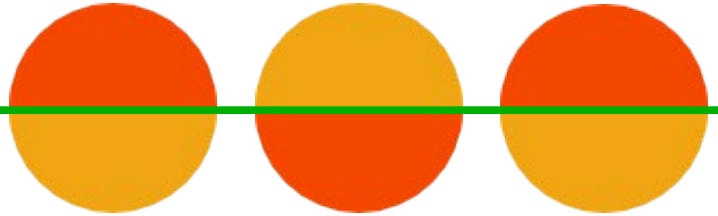


Coherence (3/6)

- 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

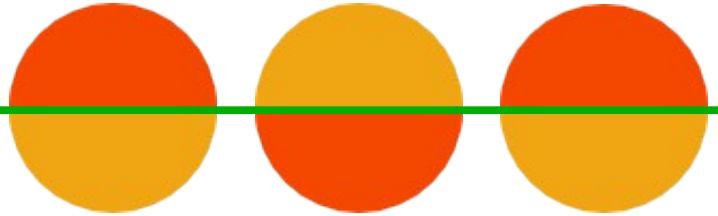
Architecture





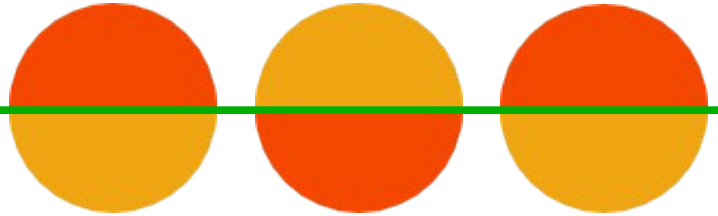
Coherence (4/6)

- has its „own“ device backends:
  - filesystem MediaServer
  - db MediaServer
  - Flickr MediaServer
  - GStreamer MediaRenderer
  - Axis Cam Proxy
  - ...



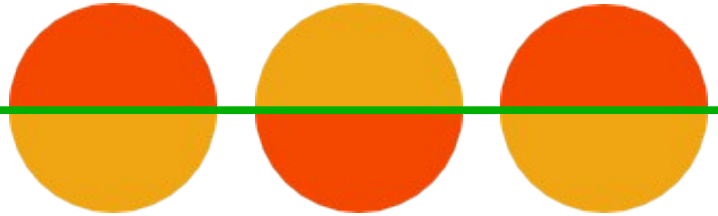
Coherence (5/6)

- and plugins for:
  - Elisa
  - Rhythmbox
  - Dreambox STB (Enigma)
  - Buzztard
  - ...



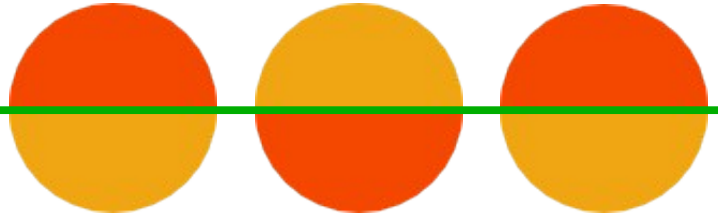
Coherence (6/6)

- side projects:
  - Compère
  - TestSuite
  - DeviceSpy
  - presentation controller
  - FritzBox phonebook



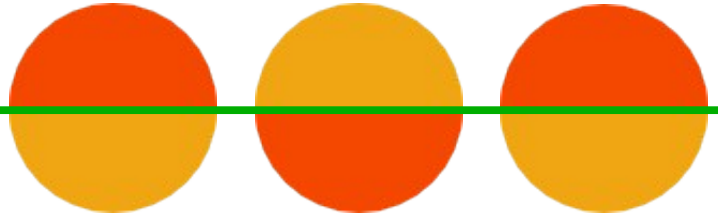
DBus MediaServer client in ~ 30 lines

```
1     BUS_NAME = 'org.Coherence'
2     OBJECT_PATH = '/org/Coherence'
3
4     class CoherenceDBusClient(object):
5
6        def __init__(self):
7             self.bus = dbus.SessionBus()
8             self.coherence = self.bus.get_object(BUS_NAME,OBJECT_PATH)
9
10           self.coherence.get_devices(dbus_interface=BUS_NAME,
11                                reply_handler = self.handle_devices_reply, error_handler = handle_error)
12
13           self.coherence.connect_to_signal('UPnP_ControlPoint_MediaServer_detected',
14                                            ms_detected, dbus_interface=BUS_NAME)
15            self.coherence.connect_to_signal('UPnP_ControlPoint_MediaServer_removed',
16                                                ms_removed, dbus_interface=BUS_NAME)
17
18        def handle_devices_reply(self,devices):
19
20            def reply(r):
21                  if r[1] == 'Coherence Test Content':
22                      for service in r[3]:
23                           if service.split('/')[-1] == 'ContentDirectory':
24                              s = self.bus.get_object(BUS_NAME+'.service',service)
25                         s.browse({'object_id':'0'}, reply_handler = browse_reply,
26                                                  error_handler = handle_error)
27
28            for device in devices:
29                  d = self.bus.get_object(BUS_NAME+'.device',device)
30                  d.get_info(reply_handler = reply, error_handler = handle_error)
```



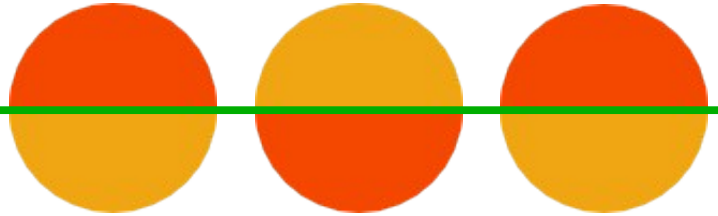
TestSuite (1/2)

- 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



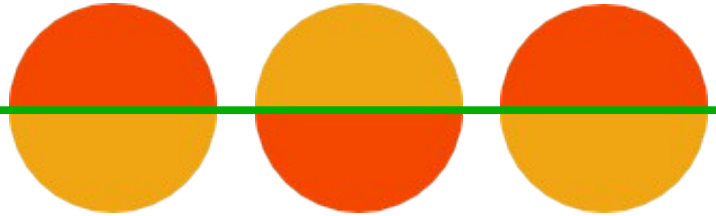
TestSuite (2/2)

- 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



The End

- Thank **YOU**!
- https://coherence.beebits.net
- irc://irc.freenode.net/#coherence
- Questions?