

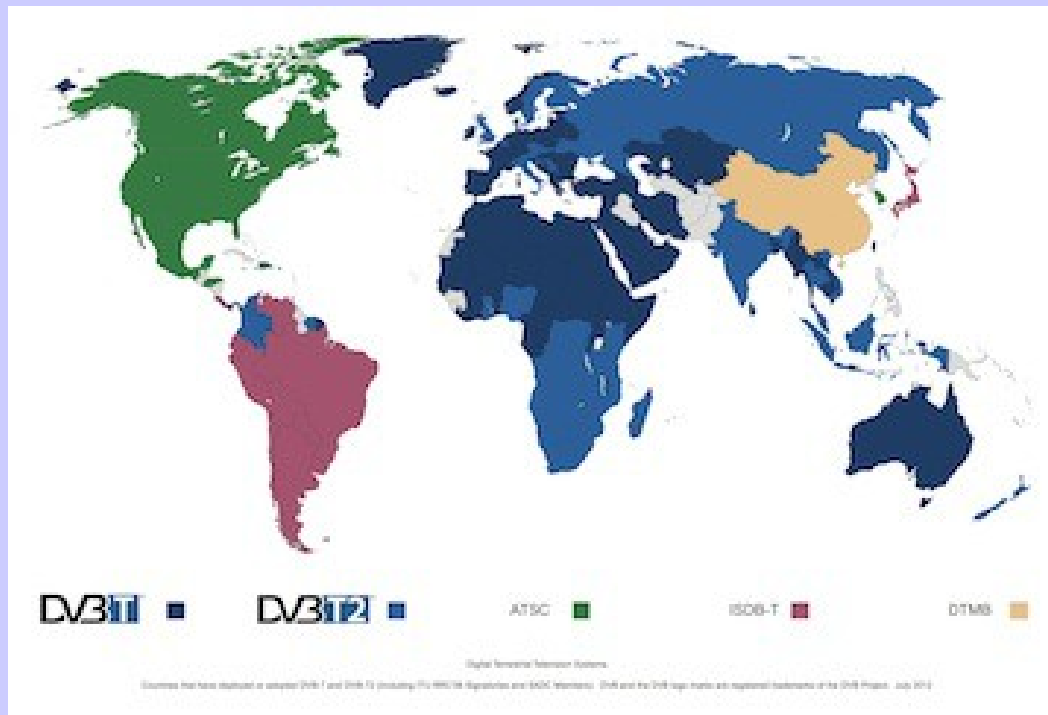
# Open source interactive television in Italy (and Europe too)

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13th Libre Software Meeting  
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# Analog tv is over..

DVB is taking off very well in many parts of the world!



# Interactive tv is here

and many players offering services in the living room:

- Broadcasters with some standard solutions
- TV set manufacturers (Smart Tv)
- Complimentary STB (Google Tv, Apple Tv?)
- Other (generic media centers), user choice



# Broadcast interactive tv

- Three main standards in Europe:
  - MHEG mandatory in UK since around 2000
  - MHP in Italy since 2004 (5 million on STB/TV)
  - HbbTV starting last year in DE FR, now ES  
other
- TV & Internet nets compLeting each other
- TV & Internet player competing  
in a big way!



# Italian issue^Woppportunity

- The analog switch off ended this 4th of July!
- Still more then 500 broadcasters
- 5 million of MHP Java TV/STB growing
- Terrestrial and Sat players fighting in a big way
- Internet is someway lagging behind..
- Interactive tv services still half baked



# The digital tv scenario

The market: many broadcasters looking for transition to digital

End users: many people getting to digital entertainment thanx to the economic turmoil!

The competitors: few large techie companies providing bloody expensive and closed solutions.



# The open source strategy

These guidelines will keep open source relevant:

- Give more focus on creativity from the bottom
- Sharing abundant resources (*free & open software*)
- Adding value to scarce goods (time, content, skills)
- “Keep it simple”
- Rapid prototyping
- Component on the shelf





# Three fingers approach

We share 3 “technologies” for interactive television in open source sauce:

- **OpenCaster**: a DSMCC server and more
- **Wizard**: a sample MHP app as presentation
- **JET**: a Java middleware for DVB STB.



Properly integrated and customized, could deliver reliable services for new content.

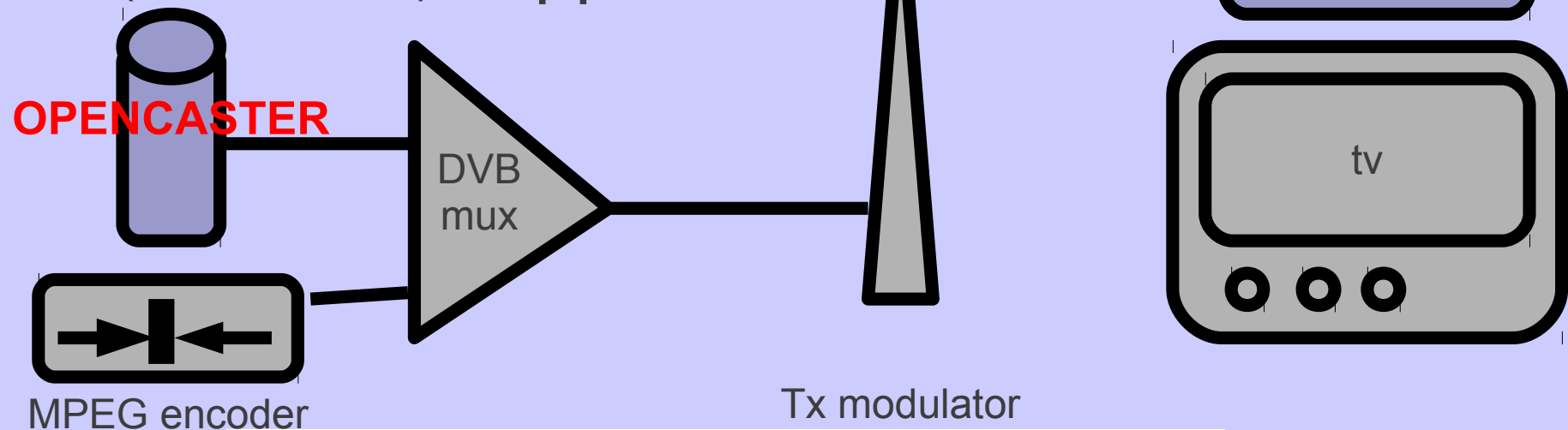




# High level design

Avalpa free software cover both the side of digital television

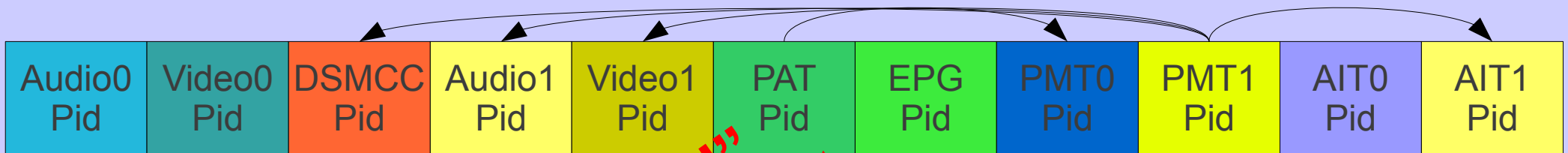
- OpenCaster (server)
- Jet (middleware) / Apps



# Ts multiplex

Many audio visual services are interleaved splitted in packets 188 bytes long, starting with 0x47 sync byte

time



**“Logical”  
Starting point**



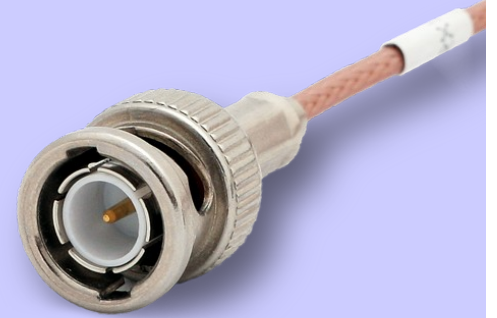
# Key technologies

Digital tv is all about these key technologies:

- MPEG2 system TS & AV
- DSMCC (MHP HBBTV MHEG5 OTA-SSU)
- Java (mobile embedded) C Perl Html/JS
- Linux (Embedded)
- IP (internet protocol.. )



# OpenCaster 1/3



- GPL v2 open source MPEG2 TS “swiss army knife”
- interactive television support (MHP MHEG HbbTv)
- Third parties different vendors HW output support for DVB-T and DVB-ASI
- FUNNY! Support also TS generation over UDP/multicast/IP (and on parallel port IEEE1294 :-)
- Native on x86, ported also on ARM (**Beagleboard**)..
- ACM Paper “An Open Source Software framework for DVB-\* transmission”



# OpenCaster 2/3

The basic concept of Opencaster was born in **2004** as a DSMCC carousel server, for enabling Italian regional providers broadcast MHP interactive applications.



It was released as open source because:

- **We were new-comers and small. We want to become relevant**
- **The BIG money were to be made on applications and not on the engine!!**



# OpenCaster 3/3

- It's freely available on our web site. Go get it..
- More then 5K registered users since 2008.
- The best names of digital television are all there
- So, since one year we scrapped the email registration.





# Tv in a box..

The first fully digital television with interactive services generated by Opencaster is broadcasted in Italy on DVB-T since 2005:

**Lepida TV by Lepida SPA,  
utility of Regione Emilia  
Romagna government**





# The strong points

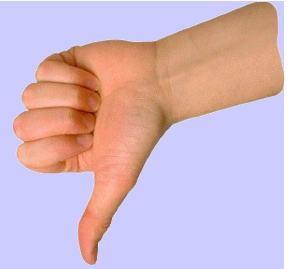


These are key points in value proposition

- Tools are reliable (as are the simplest possible, unix)
- Everything is open source (trustworthy)
- Solutions leverage as far as possible other GNU/Linux tools
- Just fine for the command line (low speed remote access, scriptability)
- The license permit every fair use case and do not force obsolescence.



# The weak points



There are always two faces in a coin..

- Prospects still don't get the free software concept
- This flexibility has long term support issues: two setups are never quite the same!
- Competitors try to raise barriers other than technical merit (because they know free soft is a game changer)
- People always ask for more or “crazy” features , as they think this is easy for an “open” toolset..
- Sustainability is a concern as there's high “churn” rate



# How OpenCaster works

The basic design decisions:

- Command line config
- Many simple tools (ts...something)
- Fifo connections
- Python for tables & structure descriptions
- C for the heavyweight processes



# A look in the gory details..

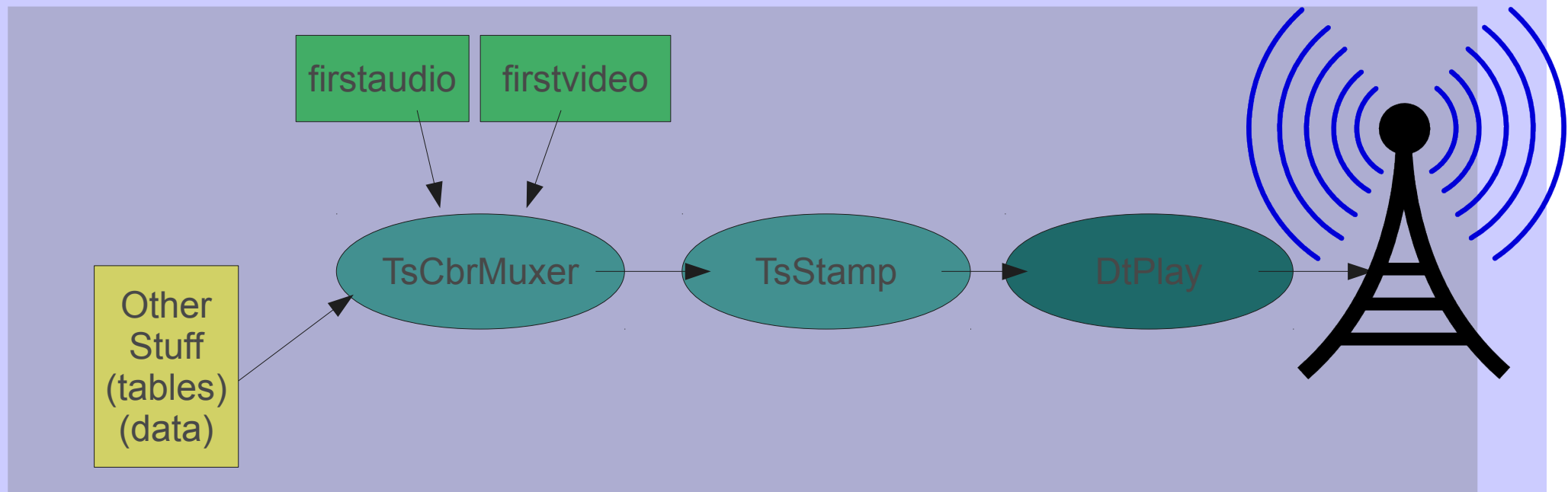
Let's see some internal details of OpenCaster

- It's not relevant the mere technique, here
- Try to “feel” the deep spirit buried into the project: the GNU/Linux “way of life”: the “kiss” approach.



# How this stuff works..

A graphical representation of a real “world-class” product:



# The runtime engine..

- Few rows of scripting and a continuous stream flows out on the digital air..

```
tscbrmuxer b:2300000 video.ts b:188000 audio.ts b:3008 pat.ts  
b:3008 pmt.ts b:1500 sdt.ts b:1400 nit.ts b:1000000 ocdid1.ts  
b:2000 ait.ts o:13271000 null.ts> a_fifo.ts &
```

```
tsstamp a_fifo.ts 13271000 > another_fifo.ts &
```

```
DtPlay another_fifo.ts -t 110 -mt OFDM -mC QAM16 -mG 1/4  
-mc 2/3 -mf 578
```



# Datacast & Updates

- DSMCC “packetize” a filesystem (FS).
- The FS is “aired” as a loop, a carousel..
- You can update files on air on the fly
- Signal the change to the middleware on the client to perform dynamic update

# simple command:

```
oc-update.sh ocdir1 0xB $ver $pid 1 1 0 0
```

# 0xB: component tag of the carousel





# PSI/SI table natural description

A python snippet

# Service Description Table (ETSI EN 300 468 5.2.3)

```
sdt = service_description_section(
    transport_stream_id = 1,      # demo value, an official value should be demanded to dvb org
    original_network_id = 1,     # demo value, an official value should be demanded to dvb org
    service_loop = [
        service_loop_item(
            service_ID = 1, # demo value
            EIT_schedule_flag = 0, # 0 no current even information is broadcasted, 1 broadcasted
            EIT_present_following_flag = 0, # 0 no next event information is broadcasted, 1 yes
            running_status = 4, # 4 service is running, 1 not running, 2 starts in a few seconds, 3 pause
            free_CA_mode = 0, # 0 means service is not scrambled, 1 means at least a stream is scrambled
            service_descriptor_loop = [
                service_descriptor(
                    service_type = 1, # digital television service
                    service_provider_name = "Avalpa",
                    service_name = "Avalpa 1",
                ),
            ],
        ),
    ],
)
```



# Don't reinvent the wheel..

- Whenever you have to design a feature think about the good old traditions (google relieves memory hiccups..)
- We bet the 99% of times you'll find a ready made approach.
- Here the two tools we use ALWAYS put in our setups (and there's not cron..)



# Auto Updates

- With “**inotify**” you can auto update carousel easily enough

```
# looping and waiting for something to update the data dir!  
echo "waiting for updates on the ocdir1 directory"  
VER=1  
while inotifywait -rq -e close_write $CFGDIR/ocdir1; do  
    DATE=`date`  
    let "VER+=1"  
    let "VER%=15"  
    echo "[$DATE]: updating ocdir1.ts filesystem to ver: $VER."  
    /oc-update.sh $CFGDIR/ocdir1 0xB $VER 2003 1 1 0 0  
    sleep 1
```

done



# Scripts in background

- With “screen” you can execute scripts as if they were attached to a terminal
- execute from **/etc/rc.local** for a proper restart

```
## create a screen with eit-generation for each pid; put pid into  
pids list separated by space  
muxids="01 02 03 04 05 06 07 08 09 10 11"  
for muxid in $muxids; do  
    /bin/su -c "/usr/bin/screen -d -m -S ts-$muxid sh -c \  
    '/usr/bin/screen -X zombie qr; /home/avalpa/config/start.sh \  
    $muxid'" $user  
done
```



# Scripts in background/2

- Here the list of screen you can reattach

```
avalpa@TelePippo:~$ screen -d -r
```

There are several suitable screens on:

18031.ts-11 (07/05/2012 05:17:56 AM) (Detached)

11874.ts-10 (07/05/2012 05:17:46 AM) (Detached)

.....

22510.ts-01 (06/26/2012 10:35:51 AM) (Detached)

Type "**screen [-d] -r [pid.]tty.host**" to resume one of them.



# OpenCaster 3.1.4

In 2012, the latest release!

These are the main new features of OpenCaster 3.x:

- seamless playout of MPEG2 offline encoded videos
- transport stream over IP support for IP headend
- updated pdf manual with plenty of examples and 100 pages (doc is always key for open source!)

***NOW you can do digital television in a box!***



# Make money on free soft?

How are we running this business..

- Consultancy and training
- Integration of products in complex environment
- Maintenance (assurance!) of software
- Development and customization
- Content and service creation
- Remote management and service center





# Last few words

- This is not rocket science at all..
- Technology is just a piece, creativity is key
- Since the Net has come, people “borrows” everything; got it? so do the same (legally)
- Right people in the right place do make the difference
- Viral software freedom is an avalanche, ride it!  
(or try to keep your last breath forever)



# have a B plan

And always keep in mind the other plan!

- x Have fun
- x Pump up the volume
- x Wait the Big  !! :-)

That's what business @ internet time is all about!

