

Free Software for Radio Broadcasting: What ? Why ? Participate ?

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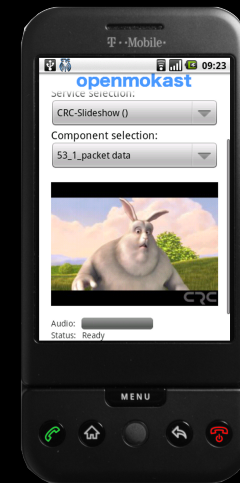


Mobile Multimedia Broadcasting Systems R&D Program

- CRC: 20 years in DAB
- Standardisation
- Field trials
- Datacasting, applications
- Equipment, receiver tests
- Understand
- Demonstrate: industry, regulator, broadcasters

What ?

End-to-End Software DAB



CRC-mmbTools Timeline

- 2000 – 2006 : Main tools developed
- 2006: IBC demo DAB, DRM, DMB (USRP)
- 2007: First live CD released (freeware)
- 2007: DAB Openmokast on NEO FreeRunner
- 2008: GPL CRC-DABMUX, CRC-DABMOD, ...
- 2009: Demo EBU Village IBC, Android DAB
- 2010: NAB demo Live CD FM tx + FM hybrid app
- 2011: FM-RDS Android Library, FM TwoO
- 2011: ??? ...

Software + Generic HW

CRC-mmbTools
DAB Transmitter



OpenBTS
GSM Base Station



USRP Oscilloscope
Test System



???



The Software Advantage

- Can be changed, fixed, enhanced... easily
- Can be copied at almost no cost
- Can be distributed at almost no cost
- Functionality can be enhanced after HW has been produced, distributed: upgrades, ...

Defining Free Software

- As in free beer or as in free speech ?
- You are free to do what you want with it ... once you've paid for it !
- Executable software available at no cost with limited or full functionality: freeware, shareware
- Free open source: license limits redistribution
- Free libre open source (FLOSS): copyleft (GPL)
- Free open source BSD: free to do anything
- **WARNING:** Software Patents = Legal Gray Zone

CRC SW Distribution Models

TOOL	F/LOSS	Freeware	Pay
CRC-DabMux	✓		
CRC-DabMod	✓		
CRC-OpenMokast	✓		
CRC-DabCeltCoder	✓		
CRC-SlideShow		✓	
CRC-EtiStreamer		✓	
DAB CU Calculator		✓	
FM TwoO		✓	
CRC FM-RDS Android Library		✓	
CRC-Dabplus			✓

CRC-mmbTools Live CD

- Free
- "One-click" transmitter
- CRC-DABMUX
- CRC-DABMOD
- Pre-encoded content:
DAB, DAB+, DLS,
MOT, Slideshow, DMB,
...
- Installable



Why ?

Too Many Good Reasons

- Open + free leads to ubiquity (TCP/IP, WWW, ...)
- Accelerates innovation: more brains on issues
- Accessibility catalyses organic adoption and deployment
- Inclusive: small players can join the parade
- Public money builds public property
- Re-use instead of re-invent
- No lock-in (ex. manufacturer goes bankrupt)
- Focus on enabling new services not new tech
- Create more value than you capture
- Collaboration on steroids
- Internet runs on free software (Google, ...)
- **USE CASES :**



RAI + Rai Way: TPEG



CRC Openmokast

Tools Controls

Rai OpenTPEG

peg packet # 1 received
Stream directory # 0 received
Tpeg packet # 3 received
Conventional data # 2 received
Tpeg packet # 4 received
Chunk # 113 received of size :1056
Chunk # 114 received of size :1056
Chunk # 115 received of size :1056
Chunk # 116 received of size :1056
Chunk # 117 received of size :1056
Chunk # 118 received of size :1056
Chunk # 119 received of size :1056
Chunk # 120 received of size :1056
Chunk # 121 received of size :1056
Chunk # 122 received of size :1056
Chunk # 123 received of size :1056

Error: wrong CRC in TPEG messages list

```
service_frame<0x01> (conventional data): SID-A, SID-B, SID-C: 0x0a, 0x0b, 0x0c
service component : SCID, AID, LENGTH :1, 1, 65264
list of 40 messages : rtm->Road Traffic Message Application
rtm [mid: 0x872c rtm ver: 0x02 len: 0x008c bitswitch: 0x93 message generatio
rtm [mid: 0x8227 rtm ver: 0x01 len: 0x0096 bitswitch: 0x93 message generatio
rtm component<0x85> [ length: 0x0003 Network conditions class]
network_conditions_component<0x03> [ length: 0x0001roadworks (def
rtm component<0x90> [ length: 0x0082 tpeg_loc_container ]
loc container
tpeg_loc_component(0x00) [ length: 0x007earea type: segment]
loc co-ordinates_component(0x04) [ length: 0x003cco-ordinate
loc location_point_component(0x00) [ length: 0x0008 latitude:
loc location_point_component(0x01) [ length: 0x0006]
loc descriptor_component(0x00) [ length: 0x0001language :
loc location_point_component(0x01) [ length: 0x0028]
loc descriptor_component(0x00) [ length: 0x0001language :
loc co-ordinates_component(0x04) [ length: 0x003dco-ordinate
loc location_point_component(0x00) [ length: 0x0008 latitude:
loc location_point_component(0x01) [ length: 0x0006]
loc location_point_component(0x01) [ length: 0x0029]
rtm [mid: 0x873c rtm ver: 0x01 len: 0x0085 bitswitch: 0x93 message generatio
rtm [mid: 0x8d70 rtm ver: 0x05 len: 0x0079 bitswitch: 0x93 message generatio
rtm [mid: 0x7eed rtm ver: 0x02 len: 0x00a4 bitswitch: 0x91 message generatio
rtm [mid: 0x83cf rtm ver: 0x08 len: 0x007c bitswitch: 0x93 message generatio
rtm [mid: 0x8006 rtm ver: 0x01 len: 0x0076 bitswitch: 0x93 message generatio
rtm [mid: 0x79fa rtm ver: 0x01 len: 0x007a bitswitch: 0x93 message generatio
rtm [mid: 0x871f rtm ver: 0x09 len: 0x008d bitswitch: 0x93 message generatio
rtm [mid: 0x8057 rtm ver: 0x03 len: 0x0074 bitswitch: 0x93 message generatio
rtm [mid: 0x876d rtm ver: 0x01 len: 0x008f bitswitch: 0x93 message generatio
rtm [mid: 0x8058 rtm ver: 0x01 len: 0x0044 bitswitch: 0x93 message generatio
rtm [mid: 0x8074 rtm ver: 0x03 len: 0x008f bitswitch: 0x91 message generatio
rtm [mid: 0x83d0 rtm ver: 0x01 len: 0x0088 bitswitch: 0x91 message generatio
```



EBU IBC 2010 Demo

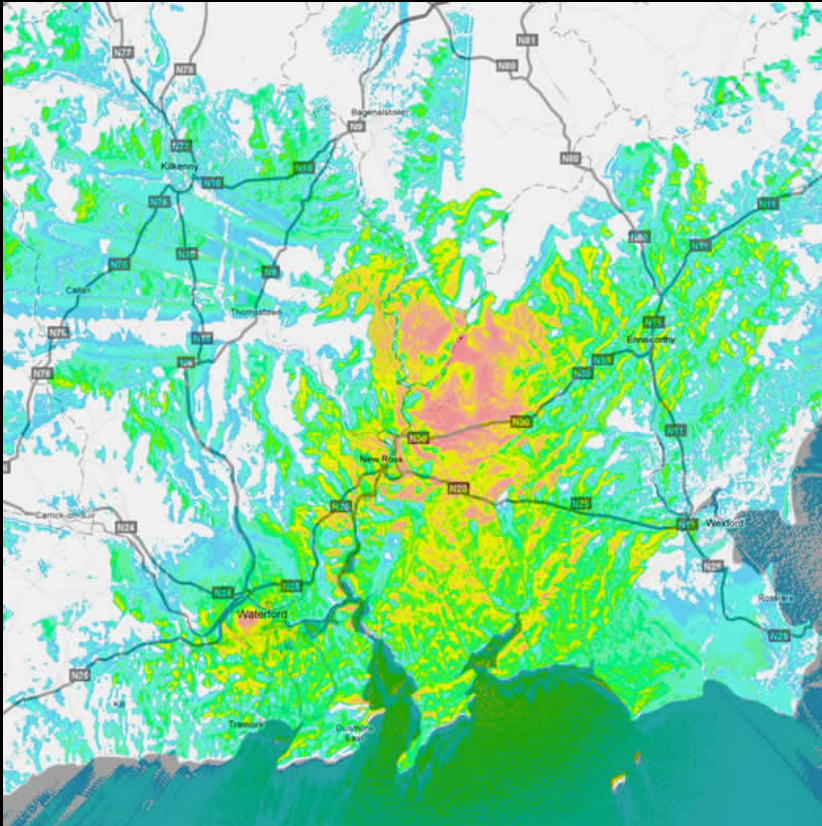
3500 Euros 10 Watts TX



EBU Village IBC 2010



Total Broadcast Consultants



Coverage in Dublin, Ireland

- ◆ Experimental license
- ◆ Since April 2010
- ◆ Dedicated lines, wireless links
- ◆ 11 DAB and DAB+ services
- ◆ Internet mp3audio streams

- ◆ Barix Exstreamers (mp3 decoding)
- ◆ CRC-DABPLUS audio encoder
- ◆ CRC-DABMUX
- ◆ Farsite ETI Interface
- ◆ UBS Modulator
- ◆ SFN, 2 transmitters: 28dBw, 15dBw

- ◆ Stability: from hours to weeks without "crash"

Total Broadcast Consultants



Free/Libre Software Inside



Workshop EBU Radio Week 2011



10 DAB Multiplexes in a room !

Testing in the "Cloud" CRC Web Appliances

The screenshot shows the CRC mmbTools website. The main menu on the left includes sections for MAIN MENU, SYNDICATE BLOG, and RSS. The main content area is titled "DAB+ Audio WAPP" and provides instructions on how to create an ETI file. It includes a "Step 1: Audio Source" section with a file upload field and a "Step 2: Optional Parameters" section with various configuration options like Ensemble name, Service name, Subchannel bitrate, Protection level, SBR, PS, and ETI output format. A "Step 3: Your eMail address" section is also visible at the bottom.

MAIN MENU
Home
DAB/DMB Tools
‣ Live CD
‣ CRC-DABMUX
‣ CRC-DABMOD
‣ CRC-DABPLUS
‣ CRC-DABRMS
‣ Openmokast
‣ CRC-DWAP
‣ CRC ETI Streamer
‣ CELT Audio
‣ DAB CU Calculator
FM/RDS Tools
‣ FM on Android *New*
‣ FM TwoO App *New*
‣ Android Library *New*
‣ USRP Tools *New*
‣ FM-RDS PI Code *New*
Web Appliances
‣ CELT WAPP
‣ DabAudio WAPP
‣ DAB+ Audio WAPP
‣ MOT SlideShow
References
‣ In the "Press"
‣ Documentation
‣ Useful links

SYNDICATE BLOG
RSS

DAB+ Audio WAPP
With Dab+ Audio WAPP you can create an ETI file that contains a DAB+ sub-channel with your own audio content in **5 Simple Steps**. The resulting ETI file will be limited to 10 minutes.

Step 1: Audio Source
Select an audio file from your own computer (max. size = 100 MBytes).
Most typical audio file formats are supported: (*.mp2 *.mp3 *.wav *.flac *.ogg *.aac *.m4a).
Audio file:

Step 2: Optional Parameters
Ensemble name: (max. 16 characters, default: CRC-Dr.Radio)
Service name: (max. 16 characters, default: CRC-Service1)
Subchannel bitrate: (default: 56 kbps stereo) for more info, see our [forum](#)
Protection level: (default: 3)
SBR: (auto)
PS: (auto)
ETI output format: (default: framed) for more info, see our [forum](#)

Step 3: Your eMail address

- First DAB+ encoder
- Upload .mp3
- Get .ETI
- Playback with CRC-EtiStreamer
- Reference encoders, compliance, ...

Other Users

- Most of all industry sectors: testing of receivers, chipsets, new applications,...
- CRC-DABMUX embedded in commercial test equipment
- Low power events broadcasting
- ...

Participate ?



Many Ways to Participate

- Use : share feedback, comments, issues, use cases
- Tweak, modify, adapt, fix and share results
- Report your success stories
- Invest in talent (hire geeks, hackers, ...)
- Integrate HW devices (local industry)
- Donate
- Fund development of new features you need
- Join communities:
 - [mmbtools forum](#)
 - crc-mmbtools+subscribe@googlegroups.com
 - www.opendigitalradio.org



Fund New Features

Features	Price
Mode I, III, IV	\$ 18 000
SFN	\$ 80 000
DMB	\$ 150 000

GPL Pricing

Announcement



CRC FM-RDS Android Library



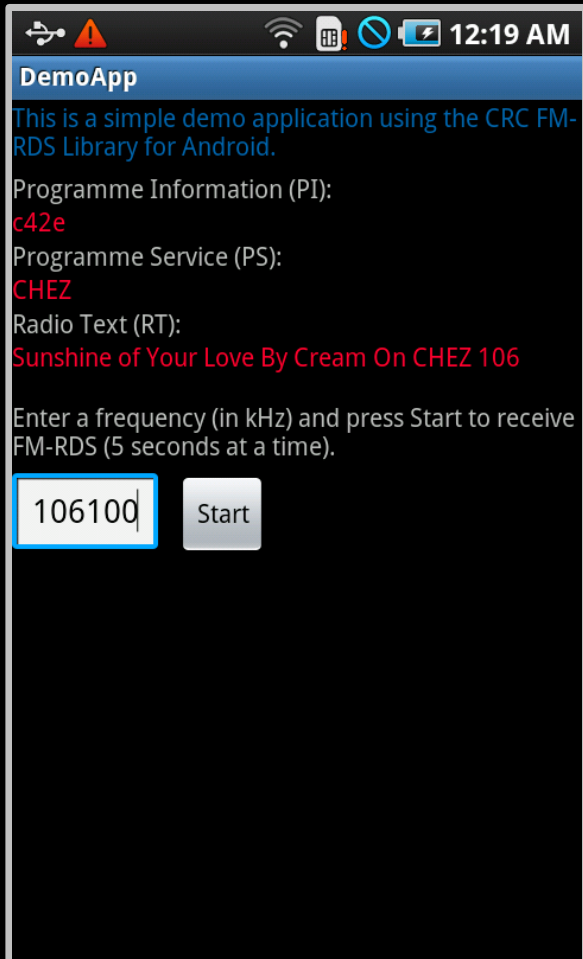
- Samsung Galaxy S
- Silicon Labs FM chipset
- High level API
- Receive PI, PS, RT
- Free of charge
- Redistribute on Android Market
- Give Credit to CRC
- Notify CRC
- Get from mmbtools.crc.ca

FM TwoO App



- Demo App
- Get from Android Market
- Test mode
- RT+

Demo App: Free Source Code



www.youtube.com/crcmmb

Video: Step by Step, Building a Basic FM-RDS Android Application!



TEAM

Francois Lefebvre, Pascal Charest,
Jean-Michel Bouffard, Roy Kyrillos

PRESENTATIONS

www.slideshare.net/tag/crcmmb

www.youtube.com/crcmmb

PROJECTS

www.crc.ca/mmb, mmbTools.crc.ca, openmokast.org

BLOG

Broadcasting20.org

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