How to setup your Internet streaming to record and archive your audio streams

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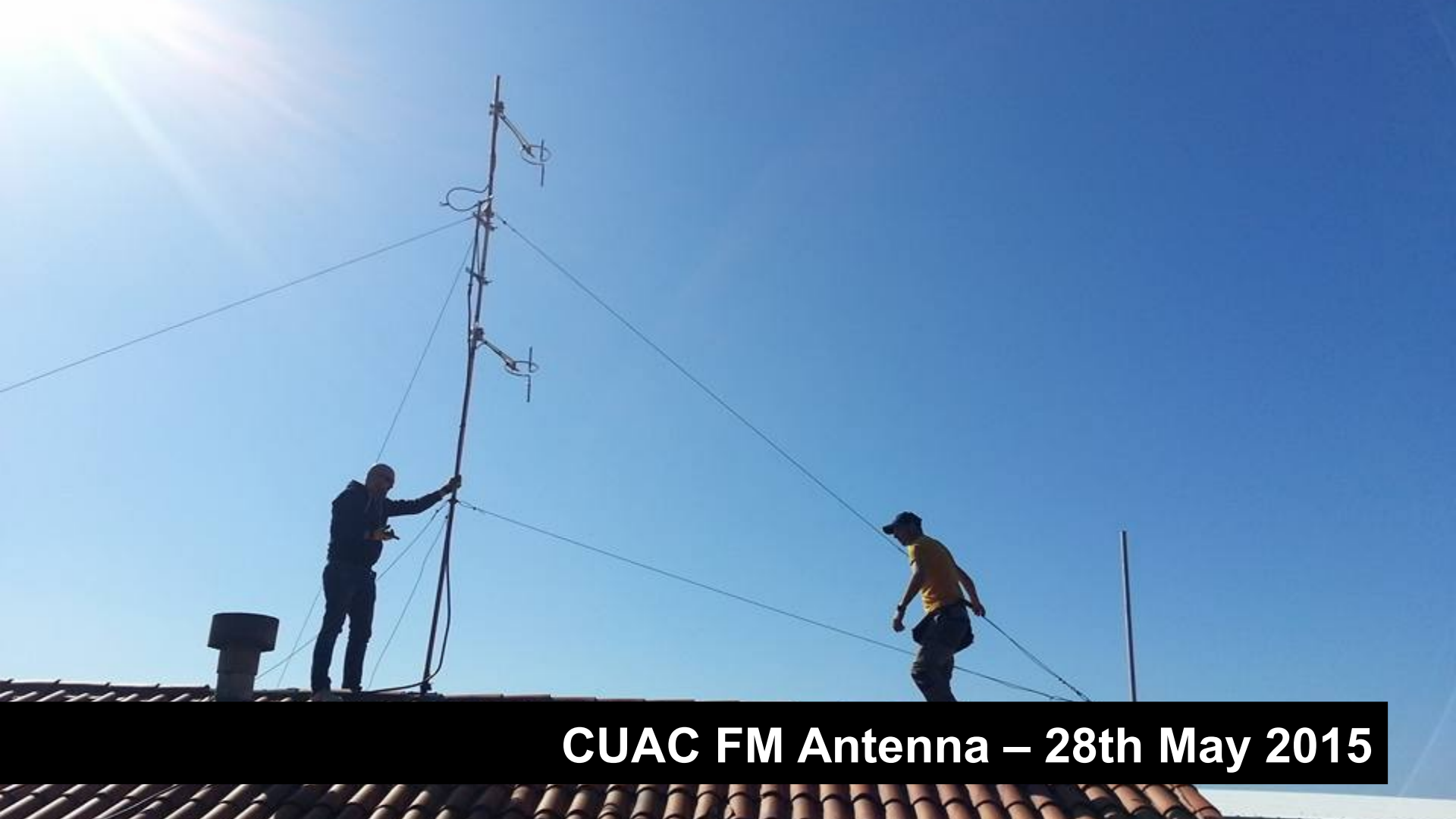# Our History in 2 minutes
CUAC Association

CUAC FM 103.4

- Founded in 1996
- Community Radio
- +430 shows
- +1000 members in 19 years.
- Volunteer management

Summary

- FM vs Internet Streaming.

- Who is who in the streaming. Some tools.

- Streaming and synchronization. Outdoors example…. (buffering…..)

- Deploying your streaming service.

- Your basic archive created streaming tools.

CUAC FM Antenna – 28th May 2015

Community Radio loves FM

- FM is one of the basis of Community Radio
- You can broadcast your contents to your local community with an FM license.
- Listening your community radio is quite cheap, FM receivers are available at home, in your car and in "your mobile". **No subscription cost.**
- But broadcasting is expensive: you need an Antenna, the FM transmitter and a audio source (your studio our a audio link).
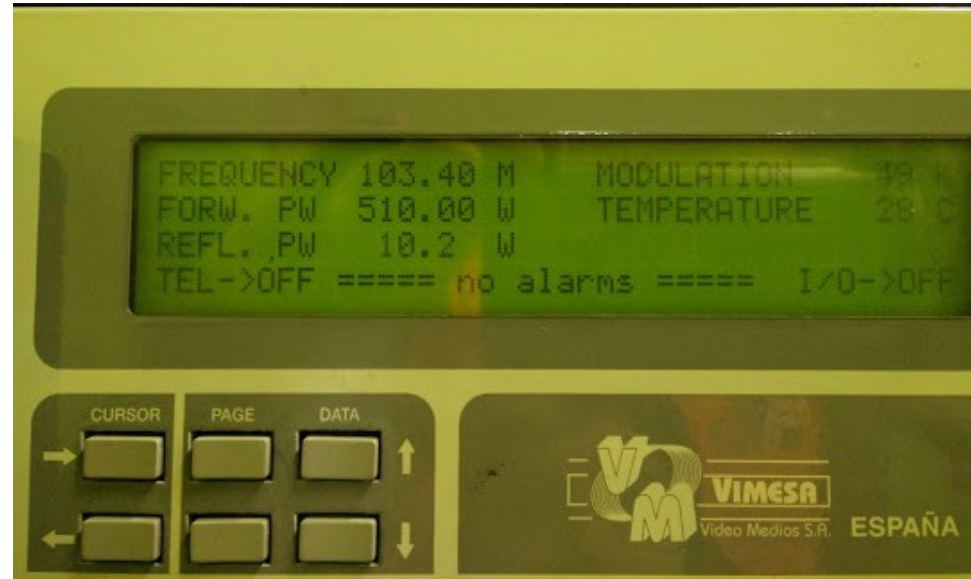
Internet streaming

- Although FM is awesome for local coverage, the Internet streaming have some interesting advantages for your Radio Station.

- You increase the number of potential listeners to everybody with an Internet connection. But it implies that there is a cost/subscription associated with the received.

- You can increase your shows FM coverage so your shows can be syndicated live from other community radio.

Icecast2 Status

Administration   Server Status   Versi

Mount Point /cuacfm-128k.mp3

Stream Name:	CUAC FM - 103.4 FM (MP3 Alta Calidade)
Stream Description:	CUAC FM - 103.4 FM - A radio comunitaria da Coruña (128kbps)
Content Type:	audio/mpeg
Stream started:	Wed, 20 May 2015 02:07:48 +0200
Bitrate:	128
Listeners (current):	1
Listeners (peak):	41
Genre:	Radio
Stream URL:	http://www.cuacfm.org
Currently playing:	Musica Nocturna

Mount Point /cuacfm.aac

Stream Name:	CUAC FM - 103.4 FM (AAC)
Stream Description:	CUAC FM - 103.4 FM - A radio comunitaria da Coruña (128kbps)
Content Type:	audio/aac

The components of the Streaming

3 components involved

- The Streaming Server: icecast

- The source streaming client: darkice

- The streaming player: vlc

Streaming Server

- The streaming server is the responsible of distributing your audio stream.

- It receives audio streams from sources and distributes it to every listener connected.

- The more listeners you have, the more upload bandwidth you need for the streaming.

- With 10Mbits upload you can serve 150 clients at 64kbps.

Icecast: Streaming server software

- Icecast is a streaming media server which currently supports Ogg (Vorbis and Theora), Opus, WebM and MP3 audio streams.

- It can be used to create an Internet radio station or a privately running jukebox and many things in between. It is very versatile in that new formats can be added relatively easily.

- Icecast is Free Software distributed under the GNU GPL, version 2.

- Icecast is maintained by the Xiph.org Foundation.

- http://www.icecast.org/

The Streaming source client

- In the transmission chain, the source client is in charge of the generation of the audio streams.

- The source client runs where the audio is generated. Usually at the studio. So typically you connect a copy of your mixer master to the computer with a sound-card that runs the source client.

- Usually this software has the capability of audio capture, encoding and transmission of the generated stream to the streaming server.

DarkIce: live audio streamer

- It is an open source streaming source client under GPLv3.

- Records audio from an audio interface, encodes it and sends it to a streaming service.

- It can encode in MP3, Ogg-Vorbis or AAC.

- It supports different streaming servers IceCast, ShoutCast, Darwing Streaming and "**Archive in Files".**

- **http://darkice.org/**

The Streaming Player

- It Is the software used to listen the internet audio. It connects to the server and reproduces the sound locally.

- You can use a web browser or your favorite music or video player.

- The most useful for your radio station is to include a player in your website so user doesn't need any extra software.

- VLC is one of the most powerful clients.

VLC as Streaming Player

- VLC media player is free and open source software.

- VLC is multiplatform and is able to reproduce almost any kind of multimedia file.

- VLC has an interesting transcoding capability that allows chaging formats.

- In terms of streaming can play the role of streaming source client and streaming player.

https://www.videolan.org/vlc/

Web Streaming

DIRECTO

Escoita o noso streaming en directo as 24 horas do día e sigue as últimas novedades da emisora nas redes sociais ou chateando cos programas

Web Streaming

This is the HTML5 code to support streaming with 3 different formats.

```
<audio controls autoplay>

<source src="https://streaming.cuacfm.org/cuacfm.ogg" type='audio/ogg; codecs="vorbis"'>

<source src="https://streaming.cuacfm.org/cuacfm-128k.mp3" type='audio/mpeg; codecs="mp3"'>

<source src="https://streaming.cuacfm.org/cuacfm.aac" type='audio/mp4'>

</audio>
```

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  https://www.videolan.org/vlc/

Day of the Science on the Street – 9 th May 2015

Behind the Scene

Streaming & Outdoors Studio (I)

CUAC FM 103.4

- Your outdoors radio shows can use streaming to transmit your audio from mixer to the radio station.

- All you need is a computer with Internet connection and the streaming source client installed.

- The more stable is the connection the higher the quality of your transmission can be. From 64kbps to 256kbps.

- Strongly recommended having a wired connection, if not possible Wifi or mobile connection as LTE(4G) or UMTS(3G) are always an option.

Watch you tube videos without buffering

Streaming & Outdoors Studio (II)

- Delays and buffering should be taken into account. You need to know the delay on your transmission in order to synchronize the beginnings of your show (From 6 to 20 seconds with different setups).

- Studio and Outdoors computers need to be synchronized

- There are three buffers:

  - The source client buffer needed to encode the stream.

  - The streaming server buffer for the distribution of the audio.

  - The streaming client buffer in order to have margin to reproduce sound if there are network problems

Streaming & Outdoors Studio (III)

- Sometimes you reduce the quality of your streams and the delays are increased.

- Many stream players start playing after receiving an amount of data based in a fixed size of data.

- Situation: Your player has 128 Kbytes buffer.

  If you stream bitrate is 32kbps -> 128*8/32 = 32 seconds.

  If you stream bitrate is 256kbps -> 128*8/256 = 4 seconds.

- So the player you use is quite important.

Let's try to stream at CAPTCHA

CUAC FM 103.4
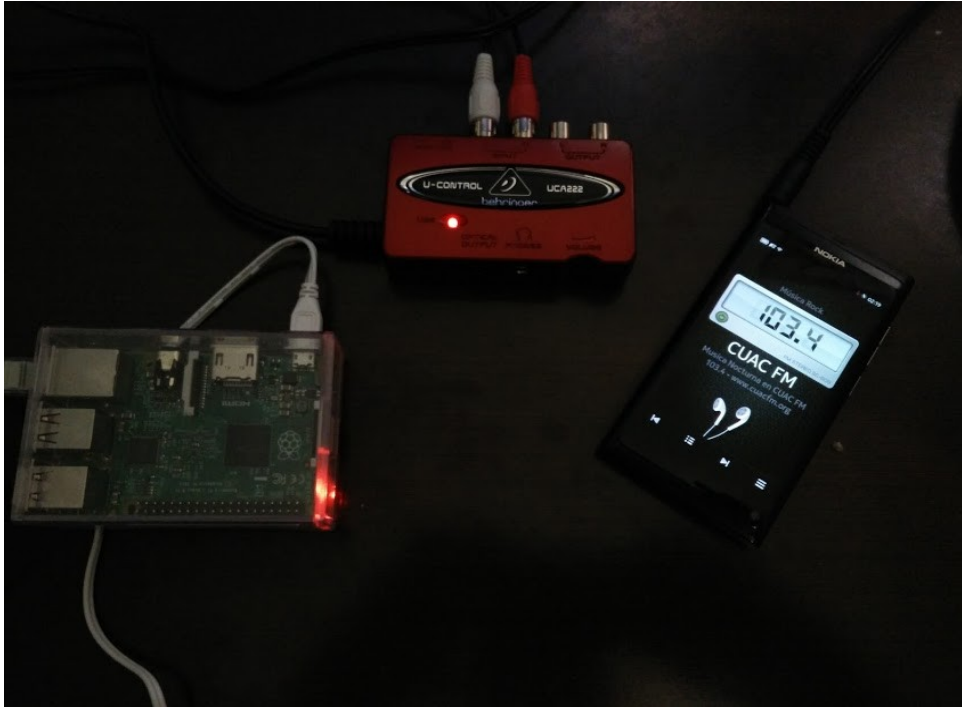
Hardware

- Raspberry Pi 2

- U-Control UCA 222

- Mobile Phone with FM receiver.

Archiving using the streaming

- One of the best advantages of doing archiving with internet streaming is that you have a lot of possible points where you can record the stream.

- You can record in the source client, at the streaming server or using the streaming player. Take into account the delays at each point because of buffering.

- The quality you obtain at the different points of the streaming chain is the same because digital audio doesn't lose quality on normal conditions.

Archiving using the streaming

- The best option to record your audio is the source client because there you have the always the source, so even if your internet connection to the server fails you can still record the audio. And the delay because of buffering can be reduced almost to zero. This is the only point that has control of the quality.

- If your radio station isn't recording its content but provides a streaming server, you can at least record the streaming with VLC. You can do it automatically at your show time.

- If you have your own stream server, you can record all the streams that go throw it.

Archiving with Darkice

- DarkIce, this source client is prepared to be working for months continuously.

- Its has the possibility of saving to a file the audio stream that is being transmitted to the server. In the case of MP3 you can send a signal to the software so it can already split and rename the filename based in your naming schema.

- It has the advantage that no second of the recording is lost.

- It doesn't have interface but with some lines of code you can create the most basic archive for recording 24h your broadcasting.

- It allows you to stream multiple qualities or formats from a unique audio source. Really nice feature for interoperability.

Archiving with 21 lines of code (I)

```
DARKICE_ARCHIVE='/home/cuacfm/backup-streaming'

PID=`cat $DARKICE_ARCHIVE/darkice.pid`

TIMESTAMP=`date +%F-%a-%H%M`

TARGET_EXT=mp3

TARGET_FILE=`cat $DARKICE_ARCHIVE/darkicecut.index`

MONTH=`cat $DARKICE_ARCHIVE/darkicecut.index | sed 's/cuacfm-\([0-9]*-[0-9]*\).*/\1/g'`

TARGET_DIR=$DARKICE_ARCHIVE/$MONTH
```

```
if [ ! -d "$TARGET_DIR" ]; then

        mkdir -p "$TARGET_DIR"

        chmod 755 "$TARGET_DIR"

fi

echo "$TARGET_DIR/$TARGET_FILE.$TARGET_EXT" > /tmp/darkice.file-0.$PID

echo "cuacfm-$TIMESTAMP" > /$DARKICE_ARCHIVE/darkicecut.index

kill -SIGUSR1 $PID; sleep 10;   rm /tmp/darkice.file-0.$PID

chmod 644 "$TARGET_DIR/$TARGET_FILE.$TARGET_EXT"

/home/cuacfm/bin/upload-programacion.sh $TARGET_DIR/$TARGET_FILE.$TARGET_EXT
```

What's next ?

- You can add metadata to the recorded material.:the name of the show, the kind of content and even publish the recording it if it's a live show.

- You can update the metadata of the streaming like you would do in the RDS.

- You can manage the re-broadcasting of shows based in the name schema.

```
211 0  3 Cuac esta a pasar
212 0  3 Carne Cruda
213 0  3 Carne Cruda
214 0  1 Informativos Mediodia
215 1 11 Multiplex
216 0  3 A Meiga das Palabras
217 0 18 A fume de carozo
218 0  3 Alegria
219 0  7 Recendo
220 1 11 Frankly
221 1 14 Una noche en la opera
222 0 23 Spoiler
```

```
# Viernes
vie17 1
vie19 1
vie20 1
# Sabado
sab10 1
sab11 1
sab12 2
sab18 2
sab20 1
sab21 1
sab22 1
# Domingo
```

You can get stats
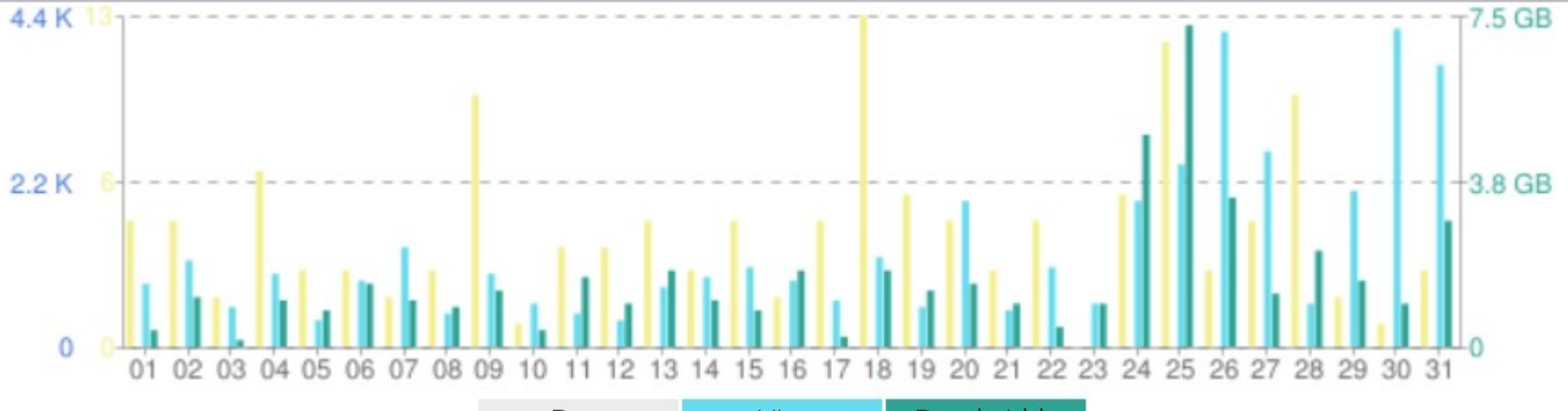
You can get more stats

CUAC FM 103.4

	Countries		Hits	Bandwidth	
	Spain	es	10,361	34.64 GB	
	Unknown	unknown	1,453	1.35 GB	
	United States	us	8,157	1.43 GB	
	Ireland	ie	67	3.61 MB	
	Hungary	hu	28	26.92 MB	
	Iran	ir	6	1.29 MB	
	China	cn	4	1.34 MB	
	Netherlands	nl	102	3.93 GB	
	Russian Federation	ru	71	103.78 MB	
	Argentina	ar	25	67.75 MB	
	Others		21949	4.59 GB	

Questions ?

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