TERRESTRIAL DISTRIBUTION VS. ONLINE RADIO

MARCELLO LOMBARDO (LOMBARDO@EBU.CH)

07 OCT 2016

EBU
OPERATING EUROVISION AND EURORADIO

IS DAB CHEAPER THAN INTERNET RADIO AND FM?

SPOILER ALERT

1) INTERNET RADIO IS EXPENSIVE

2) DAB IS NOT

... END OF PRESENTATION

CONTENT

1. SCOPE

- To provide an indication of the costs to transmit and to listen to radio
- Not all possible variables are considered
- The big 5 (France, Germany, Italy, Spain, UK) are taken as benchmark

Transmission:

Analysis of the broadcaster costs for distributing radio content on FM, DAB and internet.

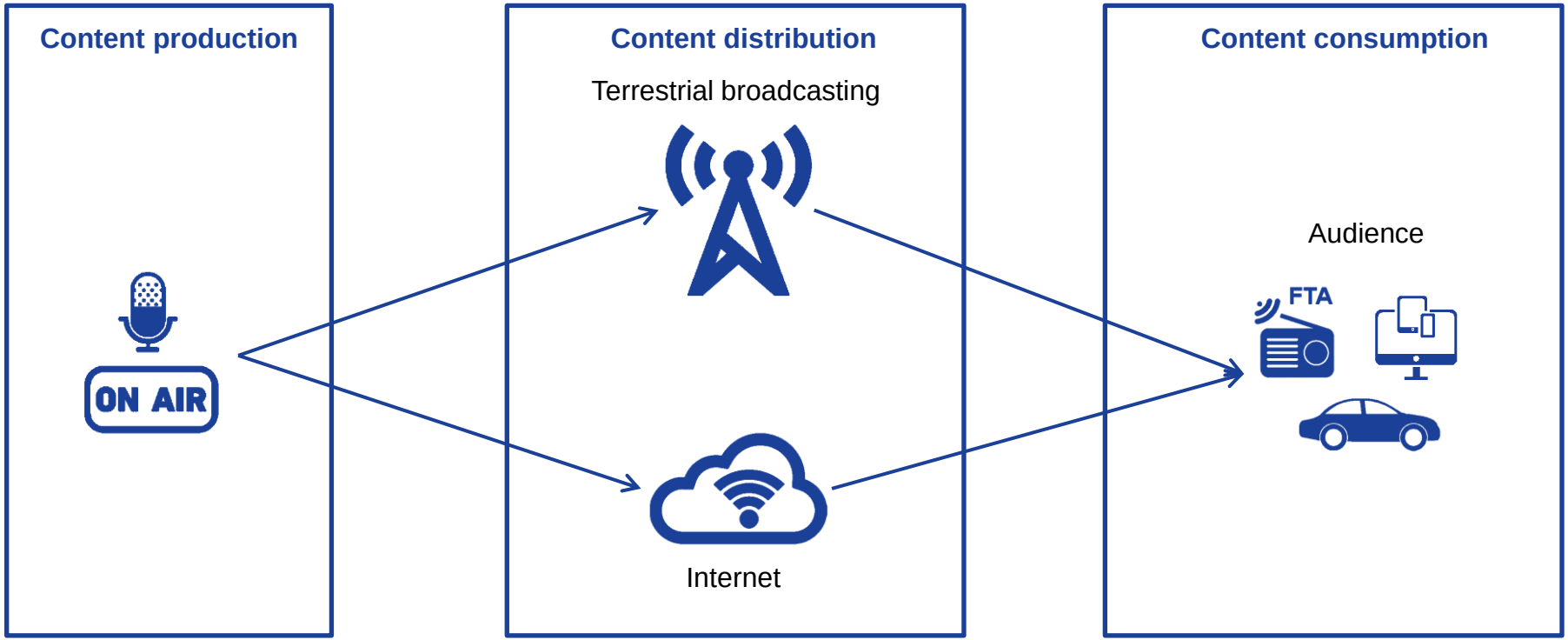
Reception:

Analysis the price listeners pay to listen to radio on the move on their favourite platform.

1. KEY PARAMETERS TO CONSIDER AND ASSUMPTIONS

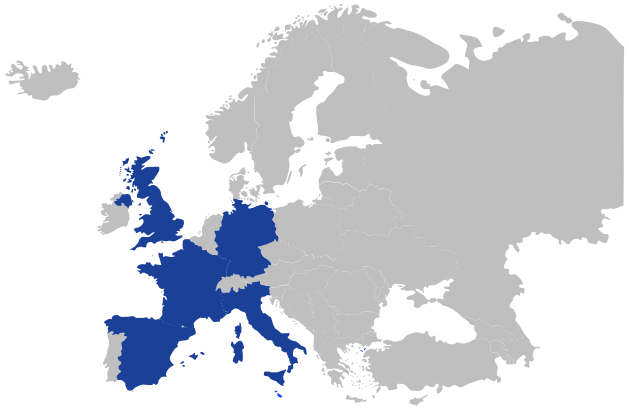
Broadcaster	Listener
Parameters analysed	
1) Distribution cost (OpEx)	1) Reception cost
Parameters ignored to simplify the study	
2) Universality	2) Choice
3) Reach	3) Ease of use
4) Gatekeepers	4) Quality of reception and availability

1. KEY PARAMETERS TO CONSIDER AND ASSUMPTIONS



RADIO DISTRIBUTION COST

2. RADIO DISTRIBUTION COST: SCENARIOS DEFINITION



The big 5 European markets as baseline

- EU28 = 510M people
- Big 5 = 321M people (60% of the whole union)

The three scenarios to be defined:

1) A radio with national coverage
2) A radio with regional coverage
3) A radio with coverage of the capital

Source: http://ec.europa.eu/eurostat/statistics-explained/index.php/Population_and_population_change_statistics

2. RADIO DISTRIBUTION COST: SCENARIOS DEFINITION

To assess the number of transmitters to ensure coverage for each scenario, we looked at public radios in the Big 5.

The national broadcaster	The regional broadcaster	The local broadcaster
France Population: 67M Area: 675417 km²	Hauts-de-France Pop: 6M Area: 31713 km²	Paris Pop: 2.2M Area: 105 km²
Germany Pop: 82M Area: 357030 km²	Hessen Pop: 6M Area: 21115 km²	Berlin Pop: 3.5M Area: 891 km²
Italy Pop: 61M Area: 301340km²	Sicily Pop: 5M Area: 25832 km²	Rome Pop: 2.1M Area: 1287 km²
Spain Pop: 46M Area: 504645 km²	Valencian Community Pop: 5M Area: 23255 km²	Madrid Pop: 3.6M Area: 604 km²
UK Pop: 65M Area: 242521 km²	South West Pop: 5.2M Area: 23829 km²	London Pop: 8.6M Area: 1572 km²
Average Population: 64.2M	Average Population: 5.4M	Average Population: 4M

2. RADIO DISTRIBUTION COST: COST DEFINITION

OPEX	CAPEX	INPUT
• Energy consumption • Heat dissipation • Site maintenance cost • Site renting cost • …	• Transmitter cost • Tower cost • Installation cost • …	• Number of transmitters • Transmitter power • Transmitter energy profile • Site categorization

OPEX	CAPEX	INPUT
• GB of data distributed via CDN	• No capex	• Price per GB • Listening time • Bitrate • Population reach

2. RADIO DISTRIBUTION COST: FM MODEL

To assess the number of transmitters to ensure coverage for each scenario, the number and types of sites for public radios of the big 5 have been considered:

- France Inter
- Deutschlandradio Kultur
- Radio Rai 1
- Radio Nacional de España
- BBC Radio 1

… sites radiation power varies from 1W to 250kW -> need to categorize them

Maintenance and renting categorization:

1) Small (1W erp to 999 Watts erp)
2) Medium (1kW erp to 99kW erp)
3) Large (more than 100kW erp)

Energy consumption and energy dissipation categorization:

1)	1W erp	up to	200W erp	-> 30W TX
2)	200W erp	up to	1kW erp	-> 100W TX
3)	1kW erp	up to	5kW erp	-> 500W TX
4)	5kW erp	up to	15kW erp	-> 1kW TX
5)	15kW erp	up to	50kW erp	-> 5kW TX
6)	50kW erp	up to	150kW erp	-> 10kW TX
7)	more than 150kW erp			-> 20kW TX

2. RADIO DISTRIBUTION COST: FM MODEL

	The national broadcaster Coverage: 64.2 millions inhabitants	The regional broadcaster Coverage: 5.4 millions inhabitants	The local broadcaster Coverage: 5.4 millions inhabitants
FM Network	Small sites: 296 Medium sites: 108 Large sites: 10 30W TX: 194 100W TX: 102 500W TX: 60 1kW TX: 25 5kW TX: 16 10kW TX: 4 20kW TX: 3	Small sites: 16 Medium sites: 8 Large sites: 2 30W TX: 10 100W TX: 6 500W TX: 4 1kW TX: 2 5kW TX: 1 10kW TX: 2 20kW TX: 0	Small sites: 2 Medium sites: 2 Large sites: 0 30W TX: 0 100W TX: 2 500W TX: 0 1kW TX: 0 5kW TX: 1 10kW TX: 1 20kW TX: 0

2. RADIO DISTRIBUTION COST: DAB MODEL

The procedure followed in the FM case can't be applied for DAB, as nationwide networks with similar coverage are yet to be deployed, therefore precise number of sites and transmitters can't be evaluated.

Reverse engineering a number of real cases:

- On average a DAB network is more dense than a FM network by a factor 1.6
- The total power of a set of DAB transmitters (one or more than one) needed to replace a single FM transmitter can be roughly assessed applying the peak to root mean square factor (about 0.707) and the densification factor to the maximum output power of the FM transmitter

	The national broadcaster **Coverage: 64.2 millions inhabitants**	**The regional broadcaster** **Coverage: 5.4 millions inhabitants**	**The local broadcaster** **Coverage: 5.4 millions inhabitants**
DAB Network	18W rms TX: 194 60W rms TX: 102 300W rms TX: 60 600W rms TX: 25 3kW rms TX: 16 6kW rms TX: 4 12kW rms TX: 3	18W rms TX: 10 60W rms TX: 6 300W rms TX: 4 600W rms TX: 2 3kW rms TX: 1 6kW rms TX: 2 12kW rms TX: 0	18W rms TX: 0 60W rms TX: 2 300W rms TX: 0 600W rms TX: 0 3kW rms TX: 1 6kW rms TX: 1 12kW rms TX: 0

2. RADIO DISTRIBUTION: FM AND DAB COSTS

OPEX

Energy consumption per FM transmitter	
Power	**Annual cost of energy ($0.15 per kW/h)**
10kW	Efficiency: 70% Consumption: 14.2 kW Cost of energy: $18.77k

Energy consumption per DAB transmitter	
Power	**Annual cost of energy ($0.15 per kW/h)**
6kW rms	Efficiency: 40% Consumption: 15 kW Cost of energy: $19.71k

Heat dissipation per FM transmitter	
Power	**Annual cost of cooling ($0.15 per kW/h)**
10kW	Wasted power: 4.2 kW Cost of cooling: $5.63k

Heat dissipation per DAB transmitter	
Power	**Annual cost of cooling ($0.15 per kW/h)**
6kW rms	Wasted power: 9 kW Cost of cooling: $11.82k

2. RADIO DISTRIBUTION: FM AND DAB COSTS

OPEX

Annual maintenance cost per site		
Type of site	**FM**	**DAB**
Small	$1k	2x the effort for FM 1.6x of the total for FM for densification
Medium	$2.5k	
Large	$5k	

Annual renting cost per site		
Type of site	**FM**	**DAB**
Small	$3k	1.6x of the total for FM for densification
Medium	$30k	
Large	$50k	

2. RADIO DISTRIBUTION: FM AND DAB COSTS

CAPEX

Transmitter cost

FM		DAB
Power	**Price***	
30W	$1k	1.5x total expense of FM (more expensive technology) 1.6x due to densification
100W	$1k	
500W	$5k	
1kW	$10k	
5kW	$30k	
10kW	$50k	
20kW	$70k	

* The numbers indicated are a combination of real prices.

Tower cost per site

Type of site	FM	DAB
Small	$10k	0.6x new sites are needed
Medium	$75k	
Large	$120k	

Installation cost per site

Type of site	FM	DAB
Small	$5k	1.6x due to densification
Medium	$25k	
Large	$45k	

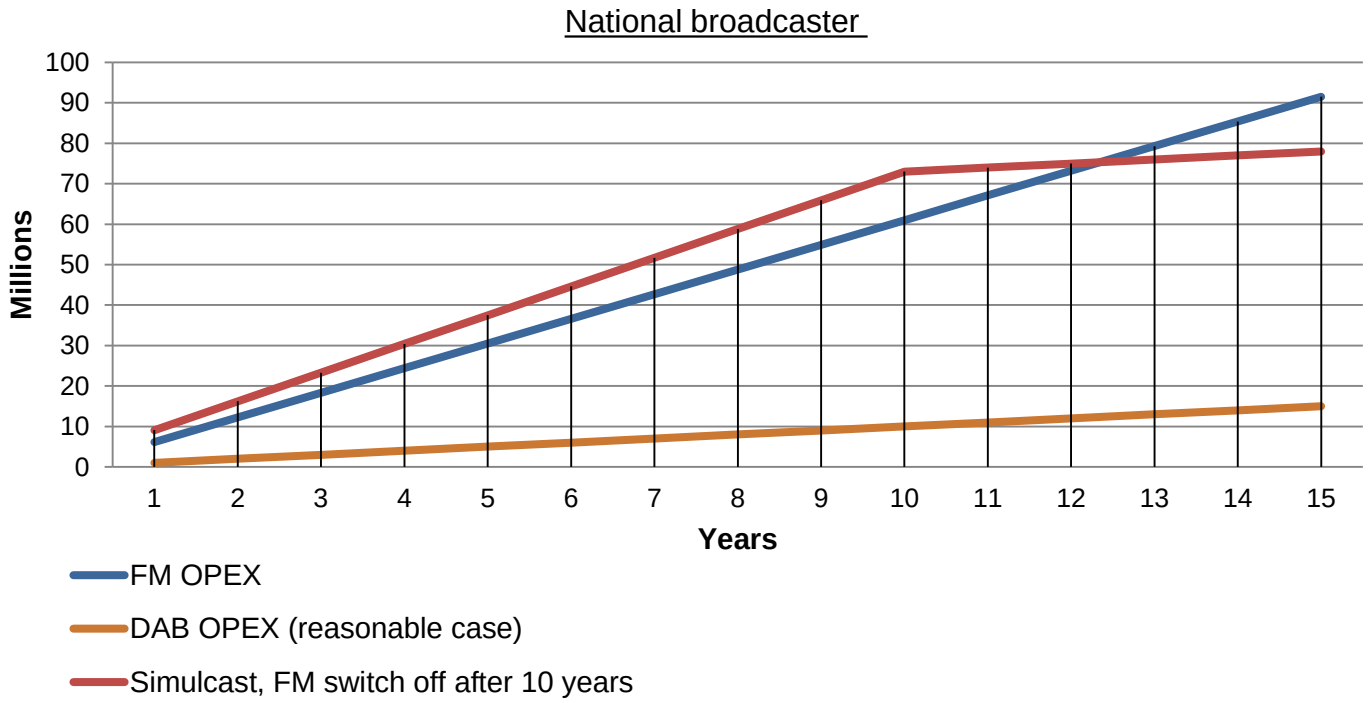
2. RADIO DISTRIBUTION: FM AND DAB COSTS

		The national broadcaster	The regional broadcaster	The local broadcaster
FM		Opex= $6.1M	Opex= $500k	Opex= $110k
DAB	Best case (full MUX)	Opex= $580k Capex= $1.1M	Opex= $50k Capex= $90k	Opex= $10k Capex= $22k
	Worst case (Mux not shared)	Opex= $10.5M Capex= $20.1M	Opex= $860k Capex= $1.6M	Opex= $175k Capex= $395k
	Reasonable case (MUX shared with 9 stations)	Opex= $1M Capex= $2M	Opex= $86k Capex= $160k	Opex= $17k Capex= $40k

This is the chosen case for the rest of the document

2. RADIO DISTRIBUTION: FM VS DAB

In case the simulcast would last 10 years, the break even point would be met in about 3 years.



2. RADIO DISTRIBUTION: INTERNET DELIVERY COST

When it comes to analyse the cost to distribute radio over the internet the first to step is to compute the expected data traffic. The input figures required are: Radio bitrate, Radio listening per day, Population reached

The cost per GB varies according to the traffic.

Customers spending more than $1M per year 2016:
- on average, customers doing **20PB a month**, paying **low of $5k per PB, high $8k per PB**
- on average, customers doing **4-8PB a month**, paying **low of $7k per PB, high $12k per PB**

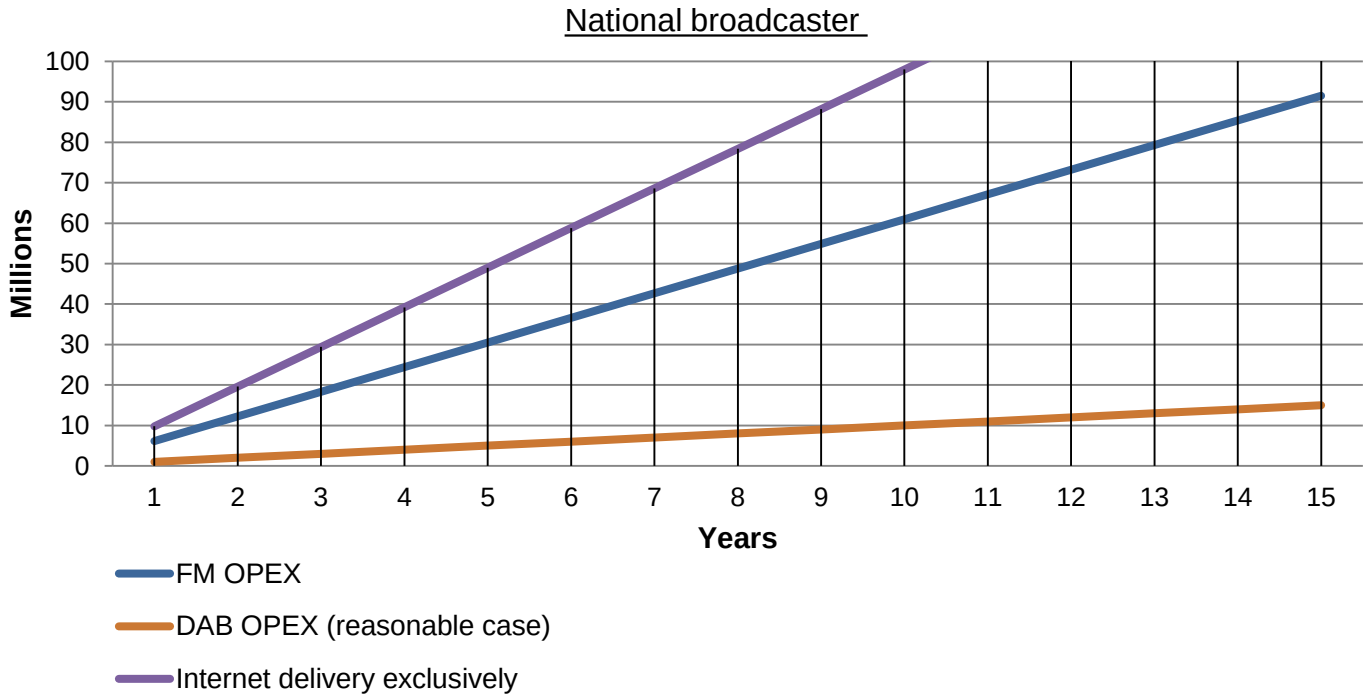
The national broadcaster	The regional broadcaster	The local broadcaster
Radio bitrate: 96kbps Share: 1:30 hours Population: 64.2 M Expected traffic: 1518 PB Expected cost: $9.8M	Radio bitrate: 96kbps Share: 1:00 hours Population: 5.4 M Expected traffic: 85 PB Expected cost: $0.8M	Radio bitrate: 96kbps Share: 0:50 hours Population: 4 M Expected traffic: 52 PB Expected cost: $0.5M

The actual cost depends on the size of the audience and the listening time.

Source: http://blog.streamingmedia.com/wp-content/uploads/2016/05/2016CDNSummit-Rayburn-Pricing.pdf

2. RADIO DISTRIBUTION: DAB VS FM VS INTERNET

An internet only delivery is too expensive.



2. RADIO DISTRIBUTION: DAB VS FM VS INTERNET

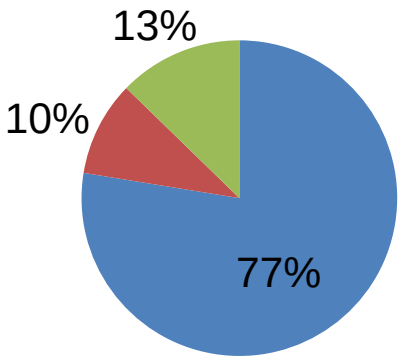
According to statistics, radio listening over the internet is the 8% of the total. With this assumption we can compute realistic expenses for the three scenarios

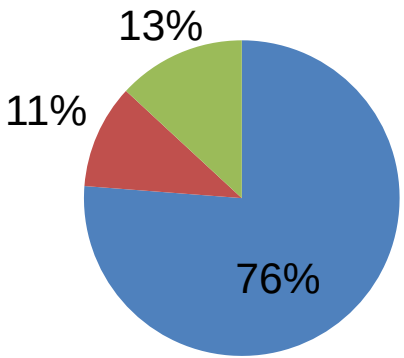
	The national broadcaster	The regional broadcaster	The local broadcaster
FM	Opex= $6.1M	Opex= $500k	Opex= $110k
DAB	Opex= $1M	Opex= $86k	Opex= $17k
Internet	Online share: 7 minutes Expected traffic: 118.1 PB Expected cost: $765k	Online share: 5 minutes Expected traffic: 7.1 PB Expected cost: $70k	Online share: 4 minutes Expected traffic: 4.2 PB Expected cost: $40k

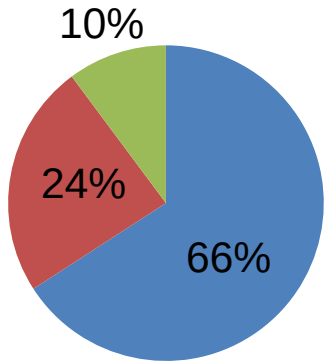
2. RADIO DISTRIBUTION: DAB VS FM VS INTERNET

The next step is to calculate the impact of the chosen technologies combined

	The national broadcaster	The regional broadcaster	The local broadcaster
FM+ DAB+ online	Total budget: 7.8M	Total budget: 650k	Total budget: 160k







FM costs
Online costs
DAB costs

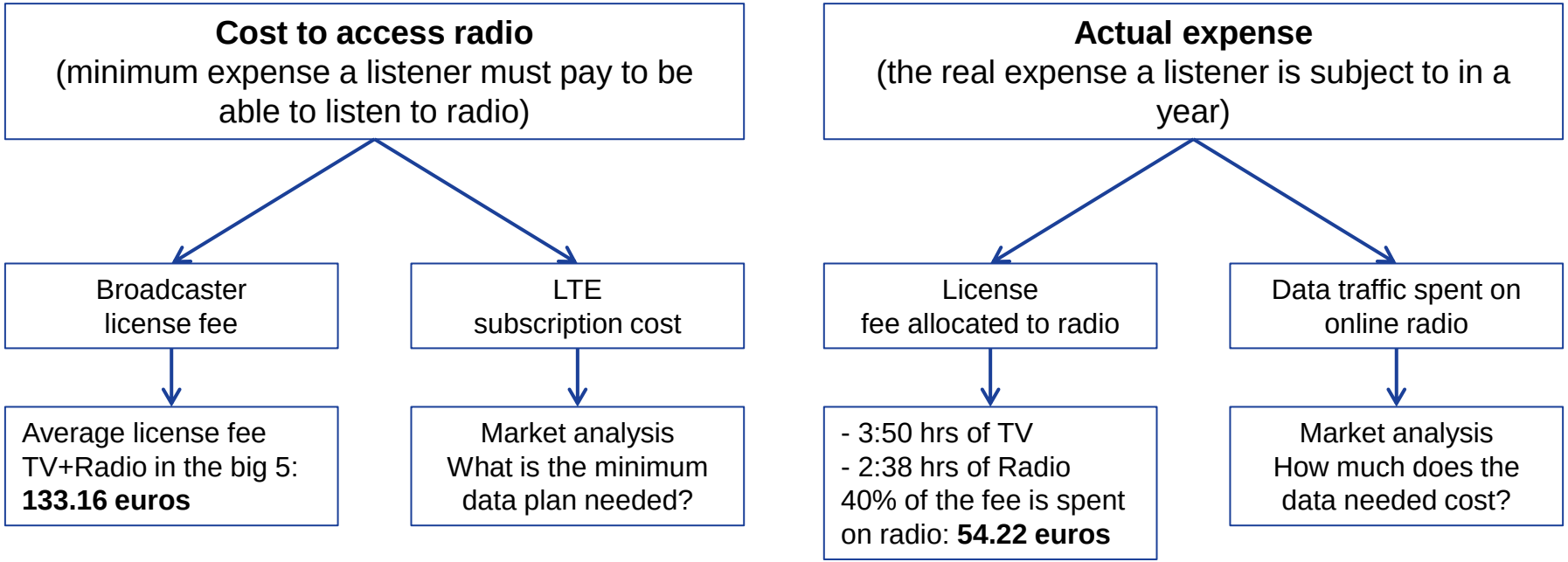
FM costs
Online costs
DAB costs

FM costs
Online costs
DAB costs

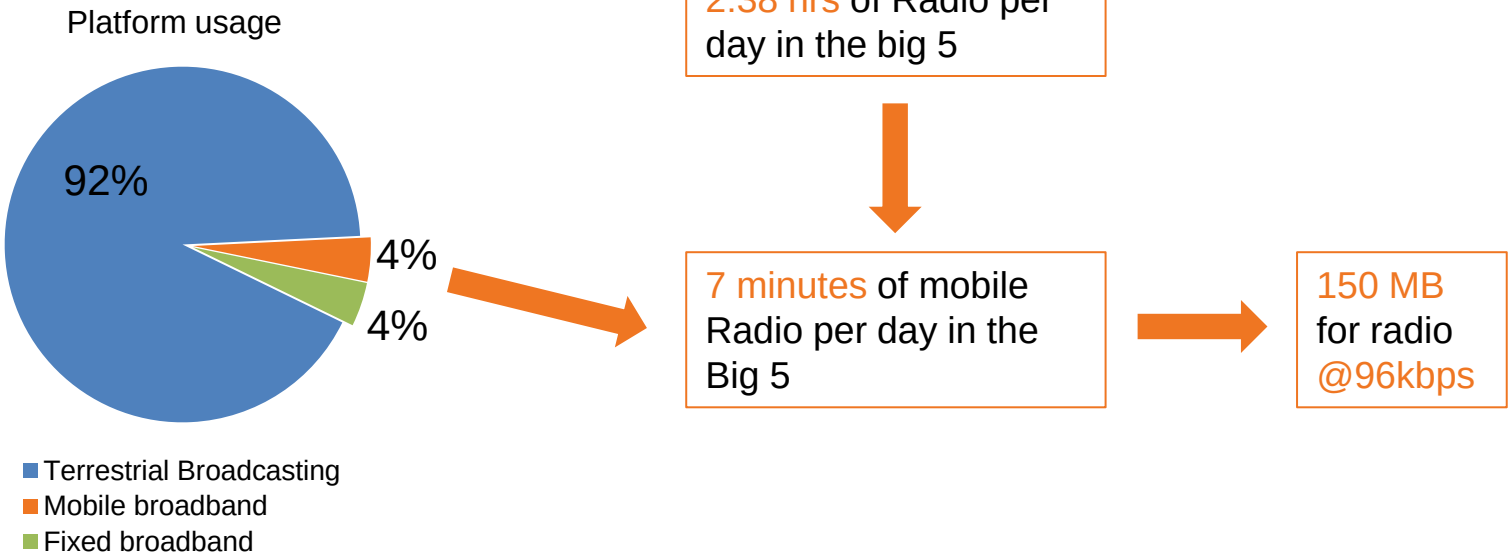
RADIO LISTENING COST

3. RADIO LISTENING: COST DEFINITION

When it comes to assess the cost to listen to radio two different figures must be considered.



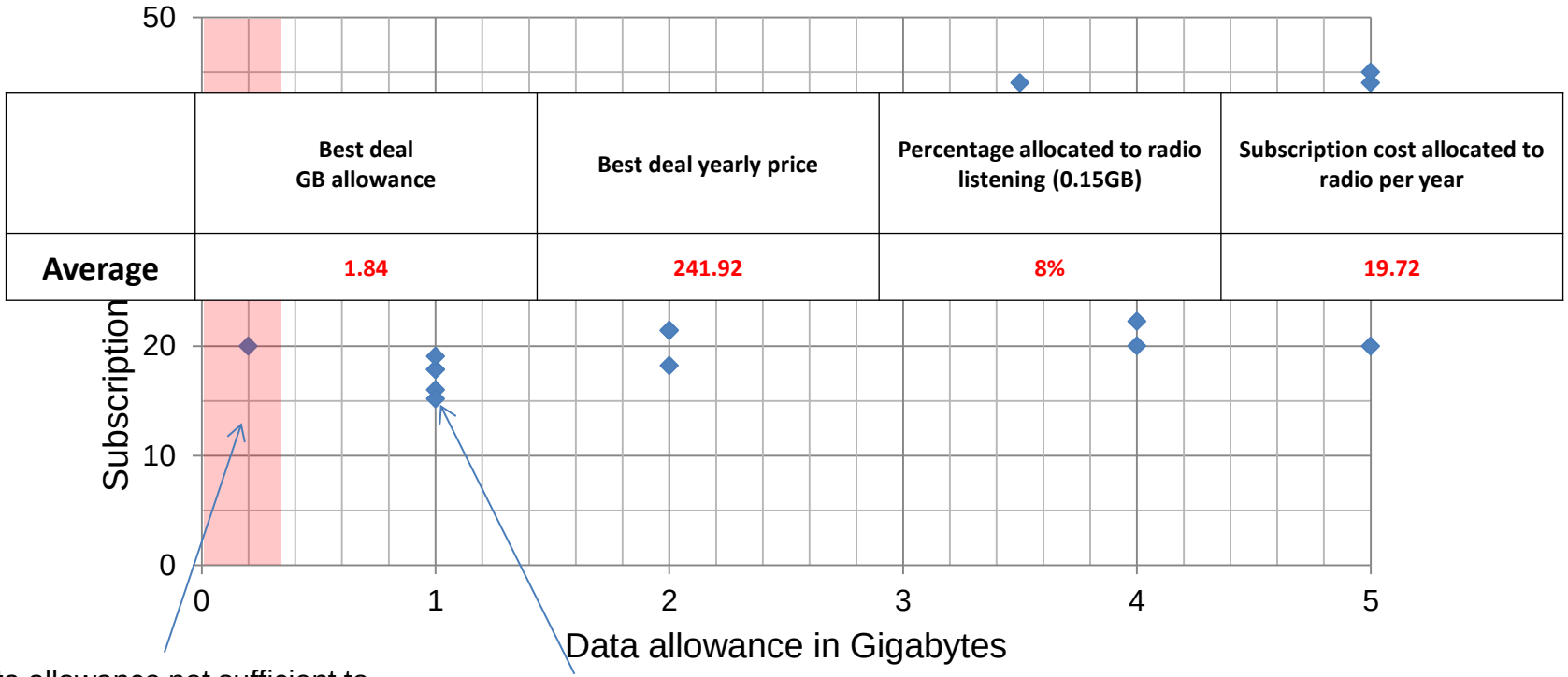
3. RADIO LISTENING: WHICH DATA PLAN?



3. RADIO LISTENING: WHICH DATA PLAN

Overview of all LTE subscription offers in the big 5

	Best deal GB allowance	Best deal yearly price	Percentage allocated to radio listening (0.15GB)	Subscription cost allocated to radio per year
Average	1.84	241.92	8%	19.72



Data allowance not sufficient to accommodate Radio listening

Minimum subscription cost 15 euros

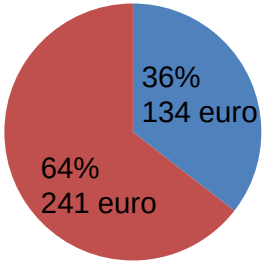
EBU
OPERATING EUROVISION AND EURORADIO

http://dfmonitor.eu/prices/country/

3. RADIO LISTENING: DAB AND FM VS LTE

Cost to access radio

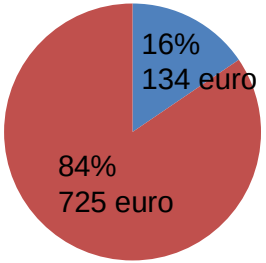
Individual: 375 euro



Broadcaster licence fee

LTE subscription cost

Family of 3: 858 euro

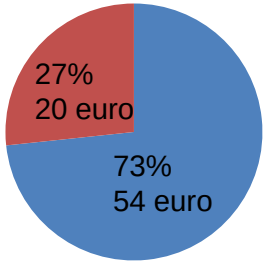


Broadcaster licence fee

LTE subscription cost

Actual expense

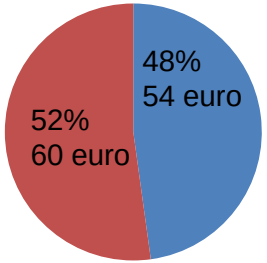
Individual: 74 euro



Broadcaster licence fee allocated to radio

LTE subscription cost allocated to radio

Family of 3: 114 euro



Broadcaster licence fee allocated to radio

LTE subscription cost allocated to radio

4% of Radio consumption is done over mobile broadband …
but it accounts for the 27% of the cost to listen to radio for listeners.

4. CONCLUSIONS

Radio transmission

1) DAB is a much cheaper option than FM, it allows cost sharing due to the MUX architecture.
2) DAB cost saving is significant and it would allow the creation of new content and employment
3) Internet delivery only is not competitive with the current pricing level
4) Internet delivery expense is much higher than its current percentage market share

Radio listening

1) Internet is now part of everybody's life but mobile broadband is too expensive for media consumption
2) Internet-only delivery would prevent many families from accessing information and entertainment due to a prohibitive access cost
3) The current expense for internet radio listening is much higher than its current percentage market share.

A DAB backbone with low data hybrid services on top is the way forward.

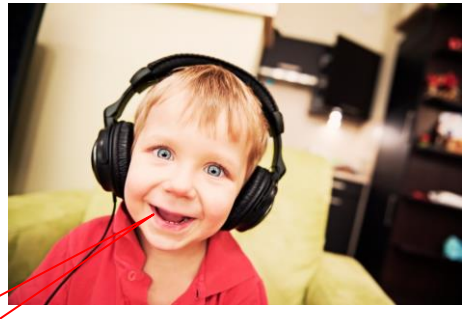
No radio receivers in handheld devices is a threat to public information.

4. CONCLUSIONS

Need to modernize….

Google search:
“kid listening to radio”

Google search:
“kid streaming radio”



I don’t pay the bill!!