Beyond DAB: another digital radio is possible

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1. Introduction

Like all the other cultural industries, radio finds itself in the middle of a digitalisation process. However, in contrast to the other industries, digitalisation of radio distribution has practically come to a halt, at least via its traditional broadcasting methods. The failure of DAB (Digital Audio Broadcasting) in Spain to digitalise FM broadcasts has made radio into analogue's last stand.

As we have been able to observe, in recent years, digitalisation is a complex process that goes way beyond merely technical questions. It embraces cultural, social and economic aspects as well. Twenty years ago, Europe took an important industrial step by presenting the world a proposal for a digital audio standard: Eureka 147, better known as DAB. Since then, the standard has proved healthy, technologically, and has spread across the globe. However, we cannot say the same for its level of implementation around the world, especially in Europe, where its state of health has depended on each country concerned (Ala-Fossi *et al.*, 2008; Lax *et al.*, 2008; O'Neill, 2008). Generally, the balance has not been particularly positive.

In Spain, we can speak frankly of the failure of this digital audio standard. Although, that is not to say that the Spanish radio sector is not interested in digitalising radio broadcasting. In the Spanish case, we can note the following factors as some of those causing this failure (Bonet *et al.*, 2009):

- Its implementation was carried out 'counter to market trends'. In Spain, we are dealing with an oversaturated market in which private radio has always coexisted with public radio (in notable contrast to the rest of Europe with its great state run operators). What is seen in Europe as an opportunity (DAB opens up the possibility of the appearance of new private players) is seen as a threat in an oversaturated market like the Spanish one, because DAB planning and the consequent distribution of licenses involved allows the entry of new broadcasters without prior experience (combined with a total lack of support, incentives and coordination among all the players).

- There is no social need for DAB, because it does not have any killer application.
- It is not received clearly in some buildings. Although these technical failures have already been rectified, it does not offer many guarantees, and is certainly not good for digital radio's image.
- DAB works well for national services but does not turn out to be the best ally of local radio (Galperin, Levi, 2002; Ala-Fossi, 2005; Lax, 2005). The strong local base of Spanish radio (despite its networks) and its long tradition of local contents on radio stations close to the people it serves has not ended up being a good enticement for this standard.

The failure of DAB in Spain should not make us forget that there are radio broadcasters who won a public tender for one or more broadcasting licences. In 1997, the Conservative Popular Party (PP) government chose to encourage the digitalisation of radio broadcasting and by 2000 it had adjudicated all the digital radio licences that the plan for the spectrum allowed nationwide. At the regional level, by October 2008, digital radio licences had only been granted in Catalonia (in 2000 and 2003).

The general assembly of the Digital Radio Forum requested the Administration to place a three-year moratorium on the obligation to reach 80 percent of the population in 2003. Two years later, the Catalan Association of Private Radio Stations asked the Catalan autonomous government for a moratorium on the start-up of digital broadcasting. Thus, the National Technical Plan for Digital Terrestrial Radio was finally modified[1] and the obligation to reach an 80% coverage figure was postponed until 31st December 2011 'with the aim of harmonising the arena of regulations with the economic and financial reality of the sector of digital terrestrial radio, assigning the process with realistic deadlines for the extension of coverage'.

In 2003, a new standard for digital radio was introduced in Spain via Law 62/2003[2]: DRM (Digital Radio Mondiale). Despite the fact that DRM still does not allow

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[1] Royal Decree 776/2006, of 23rd June, which modified Royal Decree 1287/1999, of 23rd June, through which the National Technical Plan for Digital Terrestrial Radio was approved and Royal Decree 424/2005, of 15th April, through which the Regulations covering the Providing of Electronic Communications Services for the General Public and User Protection Legislation was passed, *BOE (Official State Bulletin)* #150 of 24th June 2006 [http://www.boe.es/boe/dias/2006/06/24/pdfs/A23995-23996.pdf].
[2] Law 62/2003, of 30th December, covering financial, administrative and social order measures, *BOE (Official State Bulletin*, #313, of 31st December 2003 [http://www.boe.es/boe/dias/2003/12/31/pdfs/A46874-46992.pdf].

digitalisation of FM broadcasts, Law 62/2003 took it into account. Meanwhile, in August 2003, the world DAB Forum and the DRM consortium announced their willingness to cooperate on the development of shared receivers and services for the two systems, since they are both complementary technologies (Corominas *et al.*, 2005). At the beginning of September 2008, the Spanish networks with more AM frequencies (the publicly owned *RNE* and the privately owned *SER* and *COPE*) announced their intention of joining forces to promote the broadcast and reception of medium wave broadcasts and develop their digitalisation[3]. *RNE* is already broadcasting on DRM and the two privates companies are carrying out tests, as is the Catalan public radio station *COMRàdio*[4].

The Spanish radio sector has not completely turned its back on the digitalisation of the medium, but the big unknown factor is which standard they are willing to back to complete the process. Meanwhile, new distribution platforms for digital audio are being tested and an analysis of these alternatives is the central purpose of this paper

2. Objectives and Methodology

2.1. Objectives

The basic objectives of this article are:

- to locate and classify the digital radio platforms that can be heard in Catalonia in order to examine the state of these platforms in relation to the programming on offer;

- to investigate the multi-platform policies of the major radio operators in Catalonia, trying to define their guidelines based on four axes which, hypothetically, are presumed to be determinant: their ownership (public/private), their geographical coverage (national/regional/local) and their format (news/talk or specialised[5]) — the three categories through which radio has traditionally been studied in Spain — as well as radio's inclusion in large-scale multimedia

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[3] "RNE, COPE y SER acuerdan potenciar la onda media en España", *Producción profesional*, 19th September 2008 [http://www.produccionprofesional.com/article.php?a=547, consulted 6th October 2008].
[4] "Les proves són per a l'estiu", *Avui*, 3rd August 2007 [http://paper.avui.cat/article/comunicacio/91585/proves/son/lestiu.html, consulted 6th October 2008].
[5] In this paper, we have classified the formats in accordance with the model most used in Spain. It is one that can be understood by a European readership. That is why we use the terms News/Talk (better known in Spain as Generalist or Conventional programming) and Specialised which includes both radio based on a hot-clock (music, all-news) as well as those similar to news/talk shows but that focus on single subjects (sports, finance, youth-oriented or religious programming).

communication groups, since, as a cultural industry, its evolution no longer depends entirely on its own resources, but rather on the global strategy of the group (Bonet, 1995).

2.2. Hypothesis

As has been stated, the starting hypotheses of this research were structured around four axes: ownership, geographical coverage, format and whether a station belongs to a communication group, or is independent.

H1: Publicly owned broadcasters have a greater presence in digital radio platforms as part of their role as a public service.

H2: Broadcasters with national coverage have a greater presence in the networks that are alternatives to DAB, since they normally form part of groups with greater capacities.

H3: In an obvious interrelation with the previous hypothesis, the fact that a broadcaster forms part of a large-scale communication group favours its presence in digital networks, since some of these are owned by, or controlled by, the same groups or their shareholders.

H4: The format (news/talk or specialised) does not have any influence over how much presence a broadcaster has in other platforms.

2.3. The sample

Catalonia has an especially complex radio structure, both in the private and the public sector. In addition, it has the most saturated and dynamic radio spectrum in Spain, making it ideal as an observatory, but also adding a certain complication to its study.

The sample chosen for this research includes stations that can be heard in Catalonia, whether these be chiefly Spanish in nature, or are aimed at a specifically Catalan audience (regional or local), whether they are privately or publicly owned, or if they are on medium wave or FM. All of them had broadcast an analogue signal before being granted a digital radio license. We have excluded from this sample municipal and community broadcasters (cultural and other associations etc) or those that only broadcast over the Internet. None of these latter has a licence for digital broadcasting (given that the L-Band has not even reached the planning stages). However, we must make special mention of the notable efforts being carried out by these broadcasters

(especially the municipal ones) to digitalise, including those who originally only planned to broadcast over the net.

Table 1. Broadcasters forming our research sample

PUBLIC GROUPS	COVERAGE	BROADCASTER	FORMAT
RNE	National	Radio Nacional	News/talk
	National	Radio Clásica	Specialised (music)
	National	Radio 3	Specialised (youth-oriented)
	Regional (Catalan)	Ràdio 4	News/talk
	National	Radio 5	Specialised (all-news)
CCMA	Regional (Catalan)	Catalunya Ràdio	News/talk
		Catalunya Música	Specialised (music)
		Catalunya Informació	Specialised (all-news)
		iCatFM	Specialised (music)
COMRàdio	Local	Ràdio Sabadell	News/talk
PRIVATE GROUPS	COVERAGE	BROADCASTER	FORMAT
PRISA	National	Cadena SER	News/talk
		40 Principales	Specialised (music)
		M80 Radio	Specialised (music)
		Maxima FM	Specialised (music)
		Dial	Specialised (music)
		Radiolé	Specialised (music)
	Regional (Catalan)	Ona FM	Specialised (sports)
COPE	National	Cadena COPE	News/talk
		Cadena 100	Specialised (music)
		Rock&Gol	Specialised (sports/music)
Planeta	National	Onda Cero Radio	News/talk
		Europa FM	Specialised (music)
Vocento	National	Punto Radio	News/talk
Radio Blanca	National	Kiss FM	Specialised (music)
Grupo Godó	Regional (Catalan)	RAC1	News/talk
		RAC105	Specialised (music)
Grup Flaix	Regional (Catalan)	FlaixFM	Specialised (music)
		Flaixbac	Specialised (music)
Cadena Estel	Regional (Catalan)	Ràdio Estel	Specialised (music/religious)
Grupo Tele-Taxi	Regional (Catalan)	RM Ràdio	Specialised (music)
		Radio Tele-Taxi	Specialised (music)
-	Local	Ràdio Salut*	Specialised (music)
UNEDISA	National	Radio Marca*	Specialised (sports)
Grup Segre	Local	Segre Ràdio	Specialised (music)
Grupo Intereconomía	National	Radio Intereconomía	Specialised (financial)
-	Local	Ràdio Marina	Specialised (music)

* Shared frequency. Ràdio Salut is partially owned (30%) by UNEDISA.
Source: author's own research.

2.4. Research phases

Once the objectives, the sample and the hypotheses have been fixed, the working process comes down to the following phrases:

1) Identification of the radio stations that can be received in Catalonia (ones that were already broadcasting before the granting of DAB licences). At the same time, depending on the constraints of the chosen sample, this list was then compared with a list of broadcasters that have been granted one or more digital radio licences as part of the corresponding tenders (excluding public radio stations, which were granted theirs by law).

2) Existing digital audio platforms were then identified.

3) Monitoring was then carried out of the different platforms detected in the first week of October 2008 and cross-referenced with data on the analogue broadcasters. Information was obtained through *in situ* testing of what was available on some platforms, through radio station web sites and broadcasting platforms, through personal consultations with station managers, as well as through consulting secondary sources such as Lyngsat (http://www.lyngsat.com)[6] in the case of satellite broadcasting.

4) Results were analysed based on the four defined axes.

3. Results

Once the DAB licensees were identified, we proceeded to establish the platforms that are the object of this analysis, which added up to a total of 6: Internet, digital terrestrial television (DTT), satellite, cable, IPTV and mobile telephone networks. In the case of cable (operated by Ono) and IPTV (operated by Telefónica through its *Imagenio* service, France Télécom with *Orange* and Jazztel with *Jazztelia*) it was observed that these platforms offered audio but none of the programming offered by any of the stations analysed (nor any other programming available on the FM or AM dial), so they were rejected.

3.1. The Internet

The presence of radio broadcasters on the Internet has been steadily increasing since they first appeared in the middle of the 1990s. A good example of this being that all of the broadcasters analysed had a presence on the Internet through their own web page. In

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[6] Consulted 1st October 2008.

addition, the live programming of *Radio Clásica* and *Radio 3* was also available via *GridCasting*, a technology developed by the Danish company *Octoshape* (Alstrup, Rauhe, 2005) based on a peer-to-peer architecture. This involves a system that provides low cost solutions to problems related to the scalability and robustness of the network (Fernández-Quijada, 2005, 2008). This option was considered redundant, given what they were already offering via their own public web site. *FlaixFM* and *Flaixbac* also used this platform in the past.

Seeking to expand the usefulness of our data, we differentiated between the different types of content offered on the Internet. Firstly, we distinguished between live broadcasts and recorded broadcasts made available to listeners. In the latter case, we further defined three varieties: downloads, in which the listener can save the file for future use; streaming, in which listeners can listen when they choose, but are unable to save the file; and finally podcasts in which the user takes out an RSS (Rich Site Summary) subscription in order to be able to receive programmes.

Live broadcasts are an indispensable element for radio today, as can be demonstrated by the fact that all the broadcasters in this sample offered this option to their listeners via their web pages. On demand programming, however, was only available at 25 radio station web sites, 69.44% of the total. The bulk of these services was concentrated in streaming, with 19 stations (52.78%), and podcasting with 18 (50%), while downloads were only offered by 14 stations (38.89%). In each of the web sites studied, the simple availability of the services outlined was used as a criterion for considering that the broadcaster used this service, independent of the number of programs offered or any specific typologies; for example, the radio formulas *Máxima FM*, *Radiolé* and *FlaixFM* only allowed people to listen, via streaming, to 20 to 30 seconds of the songs that formed part of their hit parade.

Substantial differences, related to the four axes of the analysis, can be appreciated in the study:

   a) In terms of ownership, it can be noted that the public operators were those that took the most active role in providing a presence for radio-on-demand services on the Internet. All the stations offered on-demand services in the form of streaming, although *Ràdio 4* did not allow the downloading of files and their

advertised podcasting service was unavailable. In the case of private broadcasters, 57.69% offered some type of on-demand service, particularly streaming and podcasts (34.62%) and, on a smaller scale, downloads (19.23%).

Table 2. Types of radio services on the Internet

Broadcasters	Live Internet	On-demand Internet (ODI)			
		Total ODI	Downloads	Streaming	Podcast
Total	100%	69.44%	38.89%	52.78%	50%
OWNERSHIP					
Public	100%	100%	90%	100%	90%
Private	100%	57.69%	19.23%	34.62%	34.62%
COVERAGE					
National	100%	63.16%	26.32%	52.63%	47.37%
Regional	100%	84.62%	61.54%	53.85%	61.54%
Local	100%	50%	25%	50%	25%
COMMUNICATION GROUP					
National group	100%	66.67%	28.57%	52.38%	42.86%
Regional group	100%	76.92%	61.54%	53.85%	69.23%
Independent	100%	50%	0%	50%	0%
FORMAT					
News/Talk	100%	100%	55.56%	77.78%	77.78%
Specialised	100%	59.26%	33.33%	44.44%	40.74%

Source: authors' own research.

b) Differences were also observed in relation to coverage. Here, the most active protagonists were those with a regional coverage, which in 84.62% of cases had an on-demand presence on the Internet, mainly through downloads and podcasts (61.54%). In contrast, the protagonists with nationwide coverage offered on-demand services in 63.16% of cases, 20 percentage points less. Besides, the main type of presence was streaming (52.63%). The percentage of nationwide broadcasters that offered downloads (26.32%) was especially low, on a par with local broadcasters (25%).

c) On the subject of belonging to communication group, the most active participants were those with regional coverage (over 50% in the three categories), which represents almost 10 percentage points over nationwide broadcasters. This difference disappears when streaming services are analysed, but increases by more than 30 points in the case of downloads.

d) The format also determined the amount of presence detected for on-demand Internet services. All the news/talk broadcasters use them, in particular

streaming and podcasts (77.78%). Specialised broadcasters, on the other hand, stood at more than 40 percentage points less; none of the three formats rising above 50%.

The analysis confirmed that all of the operators offered live content. The picture changed when it came to on-demand services, in which a profile was outlined of a news/talk regional public broadcaster, within the framework of a regional group transmitting via streaming. Significantly, the only broadcasters offering the three options for on-demand audio content were 9 of the 10 public broadcasters (all of them, except *Ràdio 4*) and the private station *Flaixbac*, although the volume of downloads and programmes in podcast format on offer by the latter was considerably reduced with respect to its total programming.

3.2. DTT

The introduction of DTT permitted improvements in quality of both image and sound, as well as the provision of new services, such as interactive ones. The first studies of the phenomenon reveal that in the Spanish case: 'the implementation of value added services on digital television was not seen as an inevitable and essential phase of digital convergence' (Franquet *et al.*, 2008: 17). Even so, a growing presence of radio broadcasts among the services on offer with DTT could be observed in the analysis. There was also an interactive application from the public regional *iCatFM* based on the MHP (Multimedia Home Platform) standard, in which the user can call up information on the song they are listening to at that moment, as well as see the album cover, a biography of the artist, the lyrics of the song, or read any cultural news written for the purpose.

Illustration 1. MHP application by iCatFM

Data gathered from the sample shows that 52.78% of the 36 radio stations studied could also be received via DTT (along with another station not forming part of our sample, *Onda Melodía*, and municipal stations); although clear differences emerged in relation to each of the axes analysed:

a) In terms of ownership, 12 of the 19 stations available on DTT belonged to the private sector, while seven were public: four regional stations from the *CCMA* (*Corporació Catalana de Mitjans Audiovisuals*, Catalan Audiovisual Media Corporation) and three from the five on offer by the state run *RNE*. However, if we look at this data in relation to the total number of stations, it can be observed that 70% of the public broadcasters are available on DTT, a figure that is reduced by almost 25 percentage points when we compare the private sector (46.15%).

b) In terms of coverage, 11 were nationwide stations and 8 regional stations. No local radio station had a presence on the DTT network. In some cases, this was because very few of the DTT frequencies granted for local coverage were yet in operation. Comparing the total number of stations, 57.89% of nationwide

stations can be received via digital television, a figure that is very close to the 61.54% obtained when we focus on the regional stations. The case of *Ona FM* is worthy of particular note, since it is a regional station controlled by a nationwide group whose availability on DTT is limited to a local DTT frequency within the geographical limits of the city of Barcelona, *Localia*, which is also controlled by the *PRISA* group. A similar case is that of *Radio Tele-Taxi*, a regional group that broadcasts on local DTT in the areas of Tarragona and Cornellà de Llobregat, using a concession already granted to the same communication group.

c) No significant differences were observed in terms of the coverage between the different communication groups, whether nationwide (57.14%) or regional (53.85%), although a lack of presence in the DTT field was detected for independent broadcasters.

d) In terms of format, there were 6 news/talk stations and 13 specialised stations of all types; expressed as percentages this gave 66.67% of the news/talk group and 48.15% of the specialised group.

Table 3. Types of radio services on DTT and Satellite

Broadcasters	DTT	Satellite		
		Total Satellite	FTA Satellite	Pay-Satellite
Total	52.78%	58.33%	58.33%	27.78%
OWNERSHIP				
Public	70%	100%	100%	40%
Private	46.15%	42.31%	42.31%	23.08%
COVERAGE				
National	57.89%	78.95%	78.95%	31.58%
Regional	61.54%	38.46%	38.46%	30.77%
Local	0%	25%	25%	0%
COMMUNICATION GROUP				
National group	57.14%	76.19%	76.19%	28.57%
Regional group	53.85%	38.46%	38.46%	30.77%
Independent	0 %	0%	0%	0%
FORMAT				
News/Talk	66.67%	66.67%	66.67%	22.22%
Specialised	48.15%	55.56%	55.56%	29.63%

Source: authors' own research.

3.3. Satellite

Radio broadcasts via satellite have gone from being a working channel for broadcasters to become an acceptable medium for transmitting to listeners via DTH (direct-to-home)

satellite services. In recent years, these transmissions have also been digitalised and, in some cases, they have become added services within prepaid digital television packages, such as those offered in Spain by the Digital+ monopoly. This is, presumably, the main way that people listen to radio via satellite. This company, controlled by *Sogecable*, a branch of *PRISA*, had a client base in Catalonia of 407,479 subscribers[7] at the end of 2006. Digital+ duplicates its programming via the Hispasat and Astra satellites. What was on offer was identical on both platforms, including some radio stations that could be received in Catalonia via traditional broadcasting: 6 from the nationwide *PRISA* group and 4 from the *CCMA* public group. These ten stations could be received free-to-air (FTA) via the same satellites, as could other programming offers not connected with the platform, up to a total of 21 of those forming part of our sample, 58.33% of the total, divided as follows (some programming are duplicated): 20 on Hispasat, 10 on Astra and 5 on Eutelsat HotBird. Differences, related to the four axes of the analysis, could be appreciated:

a) All publicly owned stations can be received via satellite, in line with their traditional function as a public service, serving both communities within the nation and abroad. In the Spanish case, the latter refers, fundamentally, to Europe (Hispasat, Astra and HotBird) and America (Hispasat), although RTVE also makes some of its programming available (such as its world service) via satellites whose footprint does not cover Catalonia, such as AsiaSat, NSS or Echostar/Galaxy. In the private sector, a total of 11 stations can be picked up using a satellite receiver, 42.31% of the total.

b) Analysing the geographical coverage revealed the special role of satellite transmission in nationwide broadcasts, 78.95% of which use this platform. In contrast, there were only five regional stations using the system, (38.46%) as well as one out of the four local radio stations analysed.

c) Inclusion in a communication group seems to be a key factor in whether or not a station has a presence via satellite, since none of the independent radio stations can be received through a satellite dish. The communication groups that are particularly active are those with a nationwide coverage. Some 76.19% of their

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[7] Latest figures available from information supplied by the company (http://www.sogecable.es/prensa_desarrollo.html?np=569358&id=10&lang=ES&item=I117, consulted 10th October 2008). They have refused to update these figures despite requests from the authors of this paper.

stations transmit via satellite. In the groups with regional coverage, this figure comes down to a little more than half that (38.46%).

d) Format does not appear to be a decisive factor influencing the decision to broadcast on satellite. Some 66.67% of news/talk stations were present in this format, compared with 55.56% of specialised stations, including music radio, all-news, and those specialised in classical music and thematic programmes.

3.4. Mobile telephones

An analysis of the radio content of mobile telecommunications lines was confined exclusively to content transmitted over the network belonging to the telecommunications operator. Many mobile telephones available in the market today include an FM radio tuner, while others allow access to radio broadcasts on the web through the phone's Internet connection. However, we did not take these into account, given that they are covered by services available on other platforms that can be accessed via the phone without using the mobile telephone operator's own frequency network, whether this be *Movistar*, *Vodafone*, *Orange*, *Yoigo* or a virtual mobile operator.

Nevertheless, in this context, two types of services were identified. Firstly, Visual Radio, a Nokia system that synchronizes traditional FM radio with visual data through GPRS (General Packet Radio Service) lines. This service was available through *Movistar* for three music radios of the *PRISA* group: *40 Principales*, *M80 Radio* and *Máxima FM*. However, at the time of writing, the service was temporarily off-line and unavailable in Spain. In addition to Visual Radio, we also discovered that *iCatFM* (part of the publicly funded *CCMA* group) have a portal configured for the Apple's iPhone, a product that, in Spain, is exclusive to *Movistar*. This was the only system, especially adapted to mobile telephone networks, available for Catalan listeners.

4. Conclusions

Analysing the results in line with our hypotheses led to as many confirmations as refutations.

With regards to H1, it was observed that public service broadcasters have a more significant presence in digital radio platforms, related to their role as a public service. However, differences were reduced when referring to closed platforms such as prepaid

satellite services, where private broadcasters had a similar presence (especially those linked to the owner of the platform).

As for H2, there was a different picture to H1. There was a greater presence of stations with nationwide coverage on satellites (both FTA and prepaid). In contrast, when we looked at on-demand Internet services we noted a greater presence of a wide variety of stations with regional coverage, while on DTT the results were practically the same.

When it comes to the position of the independent networks, the fact that we only had access to data on two of them in the sample reduces the validity of the results (H3). Nevertheless, the idea that the large-scale nationwide groups have a greater presence than those of the Catalan regional groups certainly seemed to be confirmed in the case of satellites, mobile telephones and DTT. Although in this latter case, the difference with respect to regional groups is negligible. However, this idea must be qualified when we look at on-demand Internet services. Here the regional groups have taken the lead and are well ahead of the nationwide groups in the three categories. This also demonstrates that the synergies sought for with this type of strategy are not exclusive to larger-scale groups.

With respect to H4, it appears that format has no influence on the total presence in digital platforms such as live Internet or satellite broadcasts. In contrast, it does indeed seem to determine the total presence detected in on-demand Internet services, since specialised formats have a much lower profile than news/talk programmes. In addition, 10 of the 11 stations not offering this type of service are largely music-based stations. Presumably, this can be explained as a consequence of problems related to rights management and the risk of piracy. In the case of DTT, differences in the total presence should doubtless be thought of as a consequence of the results of tenders granting licences.

The results presented here should be understood as an initial approach to the object of this study. In the course of research, gaps have been discovered; such as possible external factors that go beyond those analysed and which could possibly explain the strategies detected. Among others, these include up to what point certain technological platforms are open, as well as the way in which licences are granted for platforms (such

as DTT) that require them. The complexity of the Internet also demands a specific study of the different typologies found there, as well as of the volume of audio content available.

This analysis has demonstrated that there is indeed a desire to digitalise the transmission process, since (in addition to DAB) technological platforms are being tested that were not initially planned to include radio, but were designed for audio. What is certain is that in Catalonia, as in the rest of Spain and in other European countries, analogue radio is sure to exist for some time, side-by-side with a digital radio of a plural and uncertain profile.

References

Ala-Fossi, Marko (2005). 'Mapping the technological landscape of radio: where do we go next?'. First European Communication Conference, Amsterdam, 24th-26th November [CD-ROM].

Ala-Fossi, Marko; Lax, Stephen; O'Neill, Brian; Jauert, Per; Shaw, Helen (2008). 'The Future of Radio is Still Digital - But Which One? Expert Perspectives and Future Scenarios for the Radio Media in 2015'. *Journal of Radio and Audio Media*, 15(1): 4-25.

Alstrup, Stephen; Rauhe, Theis (2005). 'Introducing Octoshape: a new technology for large-scale streaming over the Internet'. *EBU Technical Review*, 303. [On line]: http://www.ebu.ch/en/technical/trev/trev_303-octoshape.pdf.

Bonet, Montse (1995). *La ràdio espanyola en el context dels grups de comunicació. Evolució de la indústria radiofònica 1924-1994.* Ph.D. Dissertation. Bellaterra: Departament de Comunicació Audiovisual i de Publicitat. [On line]: http://www.tesisenxarxa.net/TDX-0506108-205415/index.html.

Bonet, Montse; Corominas, Maria; Fernández Alonso, Isabel; Díez, Mercè (2009). 'Keys to the failure of DAB in Spain'. *Journal of Radio and Audio Media*, 16(1): forthcoming.

Corominas, Maria; Guimerà, Josep Àngel; Fernández, Isabel; Bonet, Montse (2005). 'Polítiques públiques de ràdio i televisió local en l'entorn digital a Espanya (1997-2004)'. *Trípodos*, extra issue, vol. 2: 639-650. [On line]: http://www.portalcomunicacion.com/both/opc/tripodos.pdf. English version: http://www.structuracom.com/eng/pubs/tripodos_eng.pdf.

Fernández-Quijada, David (2005). 'An Optimized Architecture for Content Dissemination: Peer-To-Peer'. *IASA Journal*, 26: 44-52.

Fernández-Quijada, David (2008). 'Aplicación de arquitecturas peer-to-peer a la distribución de archivos audiovisuales'. *El profesional de la información*, 17(5): 526-531.

Franquet, Rosa; Soto, María Teresa; Ribes, Francesc Xavier; Fernández Quijada, David (2008). 'Servicios interactivos en la TDT española: una asignatura pendiente'. *Actas y Memoria Final. Congreso Internacional Fundacional AEIC*, Santiago de Compostela: Asociación Española de Investigación de la Comunicación. [On-line]: http://www.griss.org/curriculums/franquet/publicaciones/aeic_franquet_ribes_soto_fern andezquijada.pdf.

Galperin, Hernán; Levi, Titus (2002). 'The rise of regional standards setting bodies in digital radio technology', paper presented at the Telecommunications Policy Research Conference (TPRC), 28th-30th September. Retrieved 3rd October 2008 from http://intel.si.umich.edu/tprc/papers/2002/71/tprc2002levigalperin.htm.

Lax, Stephen (2005). 'Digital radio: a success store or dismal failure?'. First European Communication Conference. Amsterdam, 24th-26th November [CD-ROM].

Lax, Stephen; Ala-Fossi, Marko; Jauert, Per; Shaw, Helen (2008). 'DAB: the future of radio. The development of digital radio in four European countries'. *Media, Culture & Society*, 30(2):151-166.

O'Neill, Brian (2008). 'Digital Radio Policy in Canada: from analog replacement to multimedia convergence'. *Journal of Radio and Audio Media*, 15(1): 26-40.