Both Sides of the Digital Radio Question

Carmen Peñafiel

■ *The implementation of digital radio is not being carried out in an equal fashion: on the one hand, and despite its promotion by international forums to find new ways to market it, it requires major investment to create a stock of digital receivers. On the other hand, digital radio will have to compete and coexist with analogue stations that are strongly established on the market.*

Despite the difficulties involved, DAB offers many advantages, including improved reception quality, the possibility of additional information, freeing up the radio spectrum and increasing the number of programmes offered, which could make it a new challenge for journalists and radio firms alike.

1. The Genesis of Digital Radio

The process of digitalisation in radio stations began in the mid-1980s. Production processes were the first element to be digitalised and, during the 1990s, broadcasts were transferred, thus completing the computerisation of radio stations. Efforts today focus on articulating traditional systems with the innovations and potentialities of the new techniques and technologies. The search is on for improved quality, increased transmission speed, additional efficacy and a rise in audience participation. This demand can be provided by DAB digital radio or an alternative digital system (DRM or RDS[1]) or even radio over the Internet.

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Digital radio in Europe was established with the Eureka 147 project, which in the late 1980s developed a system called DAB (Digital Audio Broadcasting), based on a new and original modulation system that defined a high-quality multi-service digital radio able to be broadcast by land, satellite or cable. From then on, the digitalisation process has been the subject of problems, uncertainties and, it must be said, a great many expectations.

The Forum de la Radio Digital (DRF)[2] was established to develop the system in the European sphere and in particular, in Spain. It includes public and private broadcasters, network operators and transmitter and receiver manufacturers who try to promote the new digital model in an environment where few listeners know what it is, where broadcasters make little effort to create specific content and where equipment manufacturers won't take the first step because they fail to see the maturity of the market. In short, a fairly bleak picture in which big investments and shaky financial results are anticipated.

DAB is undergoing a very unequal development. It is a system implemented in Europe and a number of other countries, e.g., Canada, where it was necessary to create a new frequency band (in Spain, Band III). At the same time, other countries, e.g., the United States, opted for an alternative model based on sharing analogue (AM and FM) and digital systems, called IBOC (In Band On Channel) and marketed under the name HD Radio. European analysts have pointed out a number of problems with the American model, e.g., the interference created between the analogue and digital signals; the need to put up with a certain level of mutual interference, the need to control power relations. However, there are also a number of advantages, such as the fact that the system does not make it necessary to share a multiplex with other broadcasters and that listeners only have to adapt current

receivers rather than buy new ones, as occurs with the DAB model.

The DAB system is in its early stages in the vast majority of EU countries. An international organisation called the WorldDAB Forum was established to ensure its proper integration and development, bringing together more than 200 organisations including companies, institutions and national forums to generate promotional activities that would help consumers discover how radio broadcasts are transmitted and received and to check its evolution, obtain radioelectric resources and establish the conditions needed for its introduction.

DAB features a number of novelties and advantages over conventional analogue systems: it can relieve overcrowding on the saturated FM radio spectrum, it makes it possible to receive audio as well as data and images on the same receiver, it permits improved sound quality, increases the range of programmes with digital quality and allows access to other services. The only standard imposed is that is must be flexible enough to handle any possibilities that may arise in the future[3].

2. The Situation of Digital Radio in Europe

To date, the countries that have experimented most with digital reconversion are the United Kingdom, Germany and Spain. The other countries are in experimental phases and have a very unequal implementation.

The DAB system has been working in the UK since 1995 and currently covers 80% of the territory. The UK is the country with the greatest success in development and

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10 Reasons why DAB Could Be of Interest

1. Improved reception, completely eliminating interference and atmospheric disturbances through the use of a COFDM system, which uses a particular code for distributing information among a high number of frequencies;
2. A sound quality equivalent to compact discs. DAB uses a sound-compression system called MUSICAM that reduces the amount of information broadcast.
3. As well as the digital audio signal, other types of information can be broadcast on an "information channel" that carries the multiplex configuration, service, date and time information, general information (traffic, emergency services, radio-station searches, global positioning systems, etc.). It can also broadcast data[4] associated with radio programmes (track titles, author, lyrics, etc.) and transmit additional services, i.e., services addressed at a reduced group of users, e.g., the cancellation of stolen credit cards, sending images and texts to electronic announcement boards, etc. All this information is received on a screen incorporated into the receiver.
4. The DAB system makes it possible to multiplex different programmes and data services to form a block that can be broadcast together. The same service area is received by all listeners and then each listener can choose what they are interested in.
5. Coverage may be local, regional, national or international. The system can, in the same channel, add the signals coming from different transmitters, thus making it possible to establish single-frequency networks to cover a particular geographic area where it is possible to use small transmitters to cover shadow areas.
6. Efficient use of spectrum and strength. A single block can be used by a State, territorial or local network, with low-strength transmitters.
7. The DAB system works on the spectrum from 30-3,000 Mhz and specially adapted receivers are needed to listen to it.
8. Distribution can be by satellite and/or land or cable transmitters using different forms that the receiver detects automatically.
9. Each block or multiplex has a useable capacity of around 1.5 Mbits/second, making it possible to carry six stereo programmes and various additional services.
10. Services can be structured and configured dynamically. The system can accommodate transmission speeds of between 8 and 380 Kbits/second, including adequate protection.

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social implementation. The BBC and the private operator Digital One have created a consortium for providing digital broadcasts sharing a multiplexor. The BBC has 12 stations and Digital One has eight commercial digital stations. There are also a large number of local and regional stations, which in total include 35 radio operators with more than 250 digital stations. It is expected that another five multiplexors will be approved in the near future, with which the number of stations will rise noticeably. However, the advantages of DAB are not exploited to their full extent, as most of the services offered are traffic reports and programme guides.

The UK has made a particular effort to promote marketing campaigns presenting the advantages of digital-radio reception and stimulating the sale of new digital receivers, as well as undertaking experimental tests and continuing to research the digital divide.

In Germany, the system began to be developed in the southern länder and there are now digital broadcasts in all 16 federal states. We could classify the implementation in Germany as acceptable: it is considered the second driving force of European countries in the implementation and development of DAB. By mid-2003, there were more than 150 digital stations covering 65% of the territory and the WorldDAB Forum considered Germany to be the key country in Europe in terms of developing the DAB system because of its potential market size. It would also be good for countries such as France and Italy, where implementation has ground to a halt, to take steps to ensure a strong potential market for the new model.

The implementation of digital radio is insignificant in the other European countries, although the more optimistic analysts think it could become a reality by the end of 2010.

In Spain, Royal Decree 1287/1999 of 23 July, establishing the National Digital Broadcasting Technical Plan[5] was approved, setting out that DAB would be a public service subject to direct and indirect management and framing the phases for its introduction. The new model forced small broadcasters to group together to bring down costs and make the contracted frequencies profitable. 50% of the Spanish territory has been covered so far and regular broadcasts began in October 2000, although experiments were carried out in 1995, when RNE ran some tests in Santander, within the framework of the summer course of the Menéndez & Pelayo International University. SER held an annual directors' meeting that was broadcast digitally from Pamplona in 1996; and in 1997 Catalunya Ràdio, COPE and Radio Galega also tried out digital broadcasts. But the truth is that almost nobody listened to them because there were no receivers available on the market at an accessible price[6].

11 broadcasters have transmission licences and the first tests were carried out in Madrid, Barcelona, Valencia, Catalonia, the Basque Country and Galicia.

The 11 licences went to Radio Nacional de España, which does not take part in any tender and by law can have six programmes for its various content; Popular (COPE); Sauzal (Interconomía); Recoletos; Unedisa (El Mundo); Unión Radio Digital (SER); Uniprex (Onda Cero); Quiero TV; Sociedad de Radiodifusión Terrenal (Onda-Rambla Planeta); Prensa Española de Radio por Ondas (ABC) and Unión Ibérica Radio (Cadena Ibérica). In a second phase, digital radio will be regulated at the autonomous-community and local levels. The validity period for the licences is 10 years, renewable for periods of a similar length.

In Catalonia, the Catalonia Telecommunications Centre has a network of five transmitters in Alpicat (Lleida), Collserola (Barcelona), Montecaro (Tarragona), Musara (Tarragona) and Rocacorba (Girona), which operate on channel 11D. The five transmitters cover approximately 80% of the population. It was expected that by the end of 2003 Catalonia would have not only the 18 digital broadcasts it received under State coverage, but a further 12 regional and 15 local ones (six in Barcelona, four in Tarragona, three in Lleida and two in Girona). In Barcelona, for example, people will soon be able to choose from among 36 digital broadcasters.

Meanwhile, in San Sebastián, Barcelona, Valencia and Madrid, Retevisión has a network of five transmitters (Jaizkibel, Torrespaña, Navacerrada, Collserola and Picayo) operating on channel 11B. This network transmits the test programmes of RNE and other commercial stations.

The Basque government has a 300W transmitter in Zaldiarán, which has been running test broadcasts since November 1999 and which provides coverage to 230,000 people living around the city of Vitoria, as well as the conventional programming of Radio Euskadi, i.e., programme 2 of Eusko Irratia.

Coverage of Populations That Can Receive DAB Broadcasts (January 2003)

Germany	65%	Israel	85%
Australia	15%	Italy	30%
Austria	19%	Lithuania	20%
Belgium	98%	Norway	50%
Canada	35%	Poland	8%
China	2%	Portugal	75%
Croatia	30%	U.K.	80%
Denmark	75%	Czech Rep.	12%
Spain	50%	South Africa	18%
Estonia	28%	Singapore	100%
Finland	40%	Sweden	35%
France	25%	Switzerland	58%
Holland	40%	Taiwan	90%
Hungary	30%	Turkey	12%
India	1%		

Source: World DAB Forum[8].

The law sets out that a single-frequency network of a national scope without breakouts and multi-frequency networks with national coverage will be established by 30 June 2006. At the same time, and without exceeding this date, single-frequency and multi-frequency networks in each autonomous community will also begin. In the final phase, the implementation of DAB in Spain will cover around 95% of the population. This phase could be expanded for a period of 20 years[7].

There are a number of stations in Spain that have been running test DAB broadcasts since late 2000. The first were the stations involved with MF1. Because there are very few receivers in Spain, most of the digital broadcasts can be heard over the Internet, where the majority of the stations have set up websites and created their own portals. Examples include Mundo Radio, Radio 1 and RNE's Radio 5, Radio MARCA Digital and Radio Euskadi, part of the Basque public company EITB.

3. Hopes and Fears for the Digital Start-Up

Digital radio is clearly a technology that is creating new growth opportunities for a technically saturated medium. However, there are obviously difficulties in starting up the technology and there are a number of factors that explain why the digitalisation of radio is proceeding so slowly. On the one hand, broadcasters complain about government requirements to meet the development schedule of the established service, taking into account the almost complete lack of DAB receivers and the high cost involved with it.

Some experts feel that digital radio was born with little strength in the field of regulation. Many mistakes have been made, e.g., thinking that digital radio was a complement of analogue radio. It would have been much better to have had a firm plan with regard to total reconversion or analogue switch-off, as happened with television (which will by law have to broadcast in digital after 1 January 2012).

Digital radio will coexist in its development and evolution with traditional analogue radio, something which will obviously lead to competition - to date the market is controlled by conventional radio, which has a stock of cheaper receivers and much more consolidated content through radio supplies. Digital radio, on the other hand, still has neither complete nor quality programming.

Furthermore, digital radio is a great unknown, because, as it does not maintain the territorial breakouts used to date, it may lose value for local interests and identities and possibly also lose its freshness. Nobody knows very well how audiences will react, although the feeling is they won't be very pleased.

There are few receivers on the market and equipment manufacturers refuse to produce more until there is more demand. The vicious circle that has been created can only be broken when one of the parties involved assumes the risk of launching a product or service without compensation from the other parties involved in the process. To that effect, the private operators that broadcast digital radio in the United Kingdom have said that joint work between manufacturers, broadcasters and distributors is essential to the success of DAB. That is why, when warnings began to be sounded about manufacturer apathy, they began to make chips to bring down the price of receivers. This meant they were able to fix the price at €450 and release 300 receivers for sale in

London while a marketing campaign promoting DAB was being carried out. The receivers sold out immediately. A further 135,000 receivers have since been sold in the UK, 80% of the country has been covered and a total of 35 public and private stations broadcast programmes on 280 channels.

It is also important to see how value-added services are transmitted, as reception requires the availability of data receivers (whether integrated in the audio receiver or not) offered in the set and at an accessible price.

There are two sides to the question of the digitalisation of radio. On the one hand, it has many technical advantages, but on the other nobody is using it because there are no digital receivers, even though there is coverage for 20 million listeners. This thus means it offers few services and has a very small client base, making it hard to make digital reconversion a reality and to get audiences to adopt the new model. It is necessary that listeners find a differentiated quality supply so that users will want to opt for digital content and applications. There was an attempt to implement the digital model too quickly, but it needs time and for the right conditions to prevail. At the end of the day, the difficulties are more commercial than technological.

The DAB model can be broadcast through other technologies, including third-generation mobile phones or the Internet or by using digital television platforms by satellite, cable or land, etc. In Europe, projects for satellite digital radio are being developed, although the main way in which digital radio is supported in Spain is through terrestrial digital radio. The supports are there, now we just need to provide the new radio with content and applications and create a market with a strong demand for receivers.

4. Creative Possibilities

To develop DAB it is necessary for it to become more popular and to carve out a place as a full-service medium. It thus has to focus on content. Radio, like the other media, is beginning to be a multimedia project where diverse types of technology and different types of equipment are integrated in a single piece, and where new languages and services converge. Digital radio must make an effort to offer a new communication model, as well a restructuring of languages and formats.

DAB enables and demands increased programme specialisation, as target audiences are made up of numerous diversified and segmented sectors according to the specialisation of the broadcast content. With this new situation, audiences come out the winners in so far as they can choose the shows that most interest them from among the ones on offer.

The programming we listen to today will be differentiated under digital programming, not just in terms of quality but also with regard to content. It will be necessary to redesign a specialised programming based on new formats. The early experiments with digital radio in Spain basically just offered news, music and sports.

The initial programming of El Mundo Radio is based on continuous music with occasional broadcaster ID breaks, but the final aim is offer news, interviews, specialised programmes, issue-based shows, leisure programmes, etc. It includes useful guides to business services, hotels, restaurants, distance-education courses, facilitates the transmission of maps, graphics and photos and offers up-to-the-minute stock-market and weather information.

The programming schedule of MARCA Radio Digital focuses on sports events, competitions, interviews, opinion programmes, etc. Its promoters define it as a new leisure and entertainment station addressed at sports fans. It broadcasts 24 hours a day and aims to be an alternative to conventional sports programming.

All up, the vast majority of the stations that do digital broadcasts use content from analogue radio, such as in the case of Radio Euskadi, which basically offers music programming, the odd sports show and the talk/interview programme, *Boulevard*.

5. A Future Perspective

The media are very sensitive to changes and progress in the audiovisual sector. Radio is no exception and broadcasters immersed in the digital revolution do not want to miss their chance to occupy a space on the spectrum of opportunities the new technology offers. Research and experimental tests are being done in order to be ready.

Radio journalists have to face new challenges: digital radio has an added value (e.g., written messages, oral messages

and fixed images) and they should therefore have specialist know-how. The new radio system can offer supplementary information on a number of very different topics and for diverse audiences. This is very useful and plural information that can be received at home, in the car, at work, etc.

Work methods in news production, scriptwriting, editing, etc. have changed. Everything seems easier with the computer and the software specific to each area. The leap from the typewriter to the computer; from the tape recorder to DAT; from wire services that used a bell for urgent information to ones that offer various sources with computers in any workstation, at any time and from anywhere; access to agencies and databases without having to leave the newsroom; access to huge amounts of information in a short time; the possibility of easily changing and rewriting different versions thanks to the computer, etc. are giving way to newsrooms with different correspondents' reports that can be called up from a computer; the selection and treatment of music from the Internet; image banks and sound libraries to hand thanks to the computerisation of all departments even within a station, etc. Even internally, integrated service digital networks (ISDN) have made life easier for journalists, letting them send quotes or news reports between different broadcasters without having to use the conventional phone line, and which furthermore offer a better sound quality. Then there is the big revolution offered by mobile telephony technology as a multimedia terminal: in the old days it was necessary to send various mobile teams with a radio-frequency system to cover an event; now, however, one person can send the story directly to the newsroom from their mobile. Furthermore, mobile phones are examples of all the progress that was unimaginable a few years ago, as they have become a personal computer with Internet access, a receiver of data, sound and image, a radio, a digital camera, a transmission support, etc.

Radio journalists have had to refresh their skills over the past decade to get a handle on the progress made, because any professional must have a good knowledge of his or her medium and the tools involved in order to work in it. Older journalists went from editing that involved cutting and sticking tape to directly preparing all the news items from a computer, with a better quality sound and in a much shorter time. Computers make it possible to create a cleaner sound,

free from noise and interference. But younger journalists have had to learn to make radio programmes with new technologies, something that has not involved any great change for them. Even though we should not forget that technology is learnt with a greatly or lesser degree of difficulty, the journalists of any medium must, as a priority, know how to provide radio with content, how to write a column, a report, a feature article, how to make a programme, how to put their creativity to work when creating radio formats, etc.

Technology and the diversification of the media have changed the traditional figure of the journalist. Attitudes and abilities such as flexibility and multi-tasking are concessions to a technological revolution that stems from the use of multimedia systems and languages that have to be learnt. The new crop of young journalists has to meet a huge series of CV requirements: it is not enough for them to hold a degree in journalism or audiovisual communication, they must also have languages, computer skills, infographic and design skills, they must know how to work hard disk-driven digital systems, the Internet, simultaneous conversion of a text into sound or images, online relations, source recognition, etc. The trend is moving towards the overall figure of the journalist with multifaceted training.

On the other hand, the figure of the teleworker and collaborator is also on the rise. These people have the technological equipment (i.e., a modem and portable computer) that enables them to report nearly any event and to travel around the world in a matter of seconds. That does not mean that tele-work is a widespread solution: many people believe it is a lonely and boring way to work, but it is a practice that is taking off in the US and beginning to have supporters in Europe. Many news companies offer this new work formula because it provides them with a strong network of outside collaborators and they only have equip the existing newsroom with the technology needed to transmit or broadcast news over the Internet from any place. Working from home radically changes a company's structure and organisation, as well as the mentality and habits of its employees (never-ending timetables, requirements of the new media, etc.). It is fairly likely that new technologies are making us hyper-communicated. They are certainly making us socially isolated. Journalists have to be aware that the Internet and new technologies

mean access to more information, and cannot forget about the rigour the job demands in choosing the issues that will be of most interest to the audience.

We are in a new era in which digitalisation rules and which features the convergence of supports and media alike. Most of the new media companies being established or modified tend towards the integration of studios and newsrooms. Companies are not just radio, television, print or film organisations but are major multimedia groups that include different media in order to share news and technology resources. These multimedia conglomerations in many cases are formed by economic interests outside the world of journalism. EITB recently opened some very modern facilities in Vitoria-Gasteiz where the radio station looks like a television station and vice versa. The big media groups and many radio stations are squaring up to the future with major investments in an integrated and interconnected model of all their radio and television channels, which involves the complete replacement of production and broadcast systems. Technological investment is the main goal of the big radio and TV channels, as they all attempt to restructure and adapt to the new processes of digitalisation.

This technological reality opens the door to a professional convergence between the different sectors of journalism. This has been called "multimedia journalism" and is transforming the job of the reporter, who has become a content provider for the company where he or she works.

A radio experts' meeting[9] set out the following emerging professional profiles:

• **Format creator:** the job is to think up content and new programme ideas for a changing radio, with added values, a radio in multiple supports that will fragment the audience.

• **Multimedia reporter:** a multi-tasking journalist able to prepare content in the form of texts, images and sound in different supports.

• **Scriptwriter:** a figure that had nearly disappeared and which is returning to the world of radio with force. A creator charged with shaping programmes and preparing a multimedia script.

• **Computer Expert:** a highly qualified professional who monitors inhouse production and communication processes. He or she plans and executes analysis programmes and computer systems.

• **Multisupport Programme Editor:** charged with deve-

loping content and releasing it as an end product. Controls all the production process, new technologies and different languages and is responsible for how the programme is prepared on different supports.

• **Multimedia Documentalist:** Charged with the treatment, classification and cataloguing of texts, images and sound. Works on the integration of sound libraries, video libraries and written documentation (until now independent). In this field it is necessary to agree on a standard format for digitalising archival material.

• **Producer-Operator:** responsible for planning and the creative stage of the programmes.

• **Commissioning Programme Producer:** responsible for preparing products commissioned by broadcasters.

• **Animation and Multimedia Technical Expert:** specialised in the new information technologies applied to graphic design and multimedia creation. Demand for new supports such as websites, DVD, graphics, PDA and NPAD require technical ability.

• **Market Research and Audience Technician:** the job involves developing market surveys on new products and services and analysing programme impacts on audiences.

6. Conclusion

As we have seen, digital radio has many possibilities for combining different technologies and digital networks, but adaptation to the digital standard is occurring slowly and problematically because of the elements that converge in the definitive start-up of the new system of numerical coding (few digital receivers, a scarcity of specific content and a great deal of questionable content, broadcasters not willing to take risks or who do not see medium-term benefits, a certain apathy on the part of equipment manufacturers, etc.).

The digital standard most European countries have adopted is based on Eureka 147 DAB, although there are currently very few countries that have reached a coverage of over 50%. Only the United Kingdom, Germany and Spain are driving forces in the digital system. This inequality among European countries is principally due to economic, technological and political factors. Uncertainty and caution are the adjectives that could classify the process of digital reconversion.

In Europe, the public sector has made the most inroads towards digitalisation, while the private sector is dragging its feet, given the major investments needed in technological restructuring.

Programming addressed at digital radio must be specialised and redesigned and has to be based on new formats, as most countries simply simulcast the same analogue programming and have few specific programmes (generally music shows and information). Broadcasters must also work on one of the newest aspects of the new digital formula, i.e., value-added services that are suffering a certain stagnation and whose possibilities are not being fully used.

In Spain, where 12 DAB licences have been awarded, analogue programming is used on digital channels. The stations that have licences have failed to move forward from a period of experimentation and the other radio stations, both large and small, are waiting to see what will happen in the sector with the announcement about digital radio.

With regard to radio *on* and *over* the Internet, for now Spanish radio companies mainly use the Internet as a complement to their analogue transmissions, as a value-added service to their listeners or as a way of contacting with the audience and thus obtaining information or facilitating participation, but not properly assessing its properties as a valid medium for broadcasting journalistic content. However, the Internet has recently garnered higher prestige, particularly following the terrorist attacks in Madrid (11 March 2004) and the general elections soon after (14 March 2004).

On the other hand, the journalist as a content creator will also have to adapt to the times and develop a good working knowledge of the tools needed to broadcast written, oral and fixed-image messages. The new technology offers a wide range of opportunities that any good broadcaster must know how to use.

Notes

1. DRM stands for Digital Radio Mondiale, a group established in the late 1990s with the idea of providing traditional medium-wave radio with a better sound quality by digitalising the waves modulated in amplitude. RDS (Radio Data System) sends data over the FM band to radio receivers installed in cars to provide complementary station information on the highway situation, traffic, weather, stock-market information, etc. Now, with digital technology, RDS facilitates a high-quality sound reception, making reception problems such as radio broadcasts that drop out in poor weather conditions, etc, a thing of the past. In Spain, a number of radio stations use RDS, including RNE, SER, COPE, Onda Cero and some stations in the autonomous communities.

2. The Forum de la Radio Digital organises different promotional activities, presentations and conferences to promote digital radio in trade fairs and congresses and in activities where radio stations are present.

3. Further information and different approaches towards digital radio can be found in the work by PEÑAFIEL, Carmen and LÓPEZ, Nereida, *Claves para la Era Digital. Evolución hacia nuevos medios, nuevos lenguajes y nuevos servicios.* Bilbao: UPV/EHU, 2002. pp. 125-159.

4. Value-added services are called PAD (Programme Associated Data, i.e., information about the broadcaster and programme, etc.) and N-PAD (data unrelated to either the broadcaster or programme, but which involve different types of information such as programme guides, weather forecasts, emergency services information, etc.), which can be transmitted via an independent channel.

5. The Technical Plan established the existence of three multiplexes with a national coverage: two in multi-frequencies (MF-I and MF-II) with breakouts for the regions, and one a single frequency (FU-E) without breakouts. Each included six programmes. There is a single-frequency multiplex in each autonomous community, without pro-vincial breakouts, and one multi-frequency with a breakout capacity, as well as the local multiplexes that each community decides on. The Government has the mandate for State-wide multiplexes and the autonomous communi-ties have it for local and regional ones.

6. ORTIZ, Miguel A. and CUESTA, Juan (ed.). *La radio digital, nuevos perfiles profesionales*. Department of Work at the Government of the Community of Madrid and RTVE, 2003. p. 23.

7. Official State Gazette, No. 177, of 26 July 1999.

8. ORTIZ, Miguel A. and CUESTA, Juan (ed.), 2003: 20.

9. ORTIZ, Miguel A. Y CUESTA, Juan (ed.). *La radio digital, nuevos perfiles profesionales.* Department of Work at the Government of the Community of Madrid and RTVE, 2003. Pp. 37-41. The author of this article took part in the meetings in the capacity of an expert.

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