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Version: Accepted Version

Book Section:
Lax, SE (2012) Radio in the UK: Technology and Policy for an Industry in Transition. In: Hendricks, JA, (ed.) The Palgrave Handbook of Global Radio. Palgrave Macmillan, Basingstoke, pp. 477-498. ISBN: 9780230293076.

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Chapter 29

Radio in the UK: Technology and Policy for an Industry in Transition

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Radio listening in the United Kingdom (U.K.) is dominated by two sectors: a small number of nationally-broadcast public service stations provided by the BBC, and a large number of regional or local commercial stations, mostly owned by three or four large radio companies. There are some nuances to this bald statement: the BBC also runs 46 local and regional radio stations, which account for one-tenth of all listening, while there are three national commercial stations accounting for a further tenth. In addition there is a small amount of listening to stations available only on digital radio platforms (around 6%) and a smaller percentage still (as yet unmeasured) of listening to newly emerging community radio stations. Yet the overall picture remains that around three-quarters of listening is to one or other of the two dominant forms, and in this respect, radio has changed little over recent decades from its traditional mode of reception.

Yet radio, perhaps more than other media, has also embraced new digital technologies. Digital terrestrial radio broadcasts began some three years before television. Radio can now be listened to on a range of digital platforms – digital television, the Internet, mobile phones – and it has also been quicker than television to adopt new modes of delivery, based on the Internet. For example, programs have long been available for streaming over the Internet (live or later, 'on demand'), for downloading as, usually, mp3 files, or as archive material. In addition, non-broadcast 'radio' programs, podcasts, abound on the Internet, and all of these can be carried

around on an mp3 player for mobile listening. Radio is thus also an innovative medium: in television, the equivalents of these audio options emerged much later.

For some, then, radio is poised at a decisive moment in its history, the beginnings of its digital age, when conventional listening to linear programming made and scheduled by others may no longer be its only or foremost form. This chapter explores how U.K. radio has evolved to reach this point, an evolution of technology, institutions and regulatory approach, and considers the alternative directions radio might take in the future. To begin with, however, the resilience of radio should be recorded. Concerns within the industry about radio's future are not unprecedented: in the 1930s, and again in the 1950s, television was expected to replace radio entirely. Yet radio listening figures in the U.K. have been remarkably steady at about 22 hours per week over the past decade, comparing closely with the 25 hours of television watched each week over the same period; and radio continues to be listened to by nine out of ten of the population each and every week, as it has for many years (Ofcom, 2004, p. 35; Ofcom, 2010, pp. 214-6). So radio remains a vital medium, an important part of daily life for the vast majority of the population, more than eight decades after first becoming celebrated as a mass medium

Institutionalization

The establishment of radio broadcasting in the U.K. was begun in 1922 when the Post Office brought together a number of radio equipment manufacturers to create the British Broadcasting Company (becoming the British Broadcasting Corporation, or BBC, in 1927). Radio had begun as a wireless alternative to the electric telegraph, its dots and dashes of Morse code being transmitted as pulses of electromagnetic waves, but by the end of the first decade of the 20th century experiments in carrying the human voice on radio waves (prototypes of the wireless telephone) were bearing fruit. In this pre-broadcasting era, radio transmission and

reception became something of a hobby and, as a relatively cheap medium, large numbers of people began to transmit over the airwaves. This comprised a mix of the two-way nature of the wireless telephone and the one-to-many nature of the fully-fledged broadcasting that was yet to come. Some enthusiasts shared their thoughts on air with other like-minded individuals and would anticipate equivalent responses (in a similar way that amateur radio enthusiasts, the "hams," operate today). Others, including a number of businesses sensing a novel advertising opportunity, saw the radio rather differently and transmitted over the airwaves for anyone to receive but with little concern about return signals. Most hobbyists, however, were content simply to receive: they scanned the airwaves on a cheap crystal receiver and got to know who might transmit at a particular time, and tuned into their favorites. "Listening in" was a hobby that became a craze, particularly in the U.S., and the rapid growth in both transmitters and receivers meant that there was frequent interference as multiple broadcasters used the same frequencies.

With this frequent chaos in the U.S., governments in almost all other countries sought to regulate radio in order to avoid a similar free-for-all. Since the Post Office already licensed all telegraph and telephone systems in the U.K. and, under the 1904 Wireless Telegraphy Act, also the wireless telegraph and telephone systems, it was a relatively straightforward step to stipulate who could and who could not transmit over the airwaves (Briggs & Burke, 2009, p. 153). Bringing together the radio manufacturers to form the BBC established a monopoly in transmission and determined that "radio" would be one-way, from broadcaster to receiver (although some frequencies were set aside for the use of amateur enthusiasts). The evident point of the BBC was to ensure that there was programming available for listeners to receive, and thus to sell more receivers. It was expected to begin broadcasting national programs which in the classic public service formulation, noted earlier by David Sarnoff would "inform, educate and

entertain" its listeners (Briggs, 1961, p.59). At a time when there was political unrest in a number of European countries, such as Germany and Italy, following the 1917 revolution in Russia, the desire to establish radio as a national institution bureaucratically, at least, linked to the government had an ideological dimension as well (Scannell & Cardiff, 1991).

Even so, the earliest BBC broadcasts were regional rather than national. Constrained by limited transmission range, the first broadcasts were London-based, followed by eight regional centers across Britain. Additional relay transmitters were built to fill some of the holes in the areas reached by the regional transmitters, but these relayed London rather than regional programming, reflecting a view that radio should be primarily a national medium (Briggs, 1961, pp. 217-19). Nevertheless, this transmission arrangement left some 35% of the population unable to receive any signals, so in 1925 a new high power transmitter (connected by wire to London) was opened at Daventry in the Midlands, at the time the biggest transmitter in the world, and 85% of the population could now receive BBC broadcasts from a single source. The BBC was thus established as a national broadcaster (although it also continued its regional broadcasts) and certainly by the time television broadcasting began, and resumed after being suspended during the Second World War, national programming was the norm.

Public Service and Universal Service

A radio service based purely on commercial criteria would rarely reach the whole population. It is relatively easy, and therefore cheap, to install sufficient transmitters to cover most of the population in a country like the U.K. A few, moderately powered transmitters centered on urban populations would suffice, and a few more in terrains uninterrupted by difficult geographical features could readily serve dispersed rural communities. However, adding relays to serve the remotest communities or where there are hills and valleys does not make

commercial sense: there is no reason why a transmitter serving 1,000 listeners should cost less to build and maintain than one serving 100,000; but a commercial broadcaster might confidently anticipate receiving far greater advertising revenues on the basis of adding 100,000 listeners compared with 1,000. A commercial broadcaster would therefore be unlikely to pursue a target of universal coverage (though might be obliged to meet some minimum coverage under the terms of its license).

However, the public service ethos of the BBC implies that its broadcasts should be universally available and, in striving to achieve this, it installed a large number of transmitters. The consequences of its universal service aspiration became particularly acute on the introduction of frequency modulation (FM) services in the 1960s. Offering better sound quality than amplitude modulation (AM), FM required the allocation of more spectrum to radio, and was transmitted on the very high frequency (VHF) waveband. Unlike AM transmissions, which curve and refract around the Earth's surface and so can reach some distance, VHF signals do not reach very far before being blocked either by obstructions or the Earth's curvature at the horizon. Thus to cover the whole of a country like the U.K. requires a far greater number of VHF/FM transmitters than is needed for AM: the BBC uses more than 200 transmitters to relay its national services across the country. While this does indeed provide near universal service, it does so at a cost: a large number of frequency channels can be used up simply in order to carry the content of a single radio station to all parts of the country (Lax, 2009a, pp. 44-5). Furthermore, when FM was first introduced, the existing AM transmissions also had to remain in place because FM was not available everywhere and also because most listeners were not equipped with FM-compatible receivers. Consequently, from the 1960s until the 1990s, national BBC stations occupied a large number of AM and FM frequencies in the quest for universal coverage. This consumed most of

the spectrum available for radio, and so constrained (but did not actually eliminate) the possibility of organizations other than the BBC running radio stations (Lewis & Booth, 1989, p. 23).

Despite its monopoly, faced with declining audiences in the 1960s as television became a mass medium, the BBC had to consider new forms of radio. The Pilkington broadcasting committee had already recommended that it begin local radio broadcasts and in a 1966 pamphlet "Local Radio in the Public Interest" the BBC outlined plans for a large number of local services with a considerable level of community participation (Smith, 1974, pp. 151-2). The first local BBC station began in Leicester in 1967. Again, while these stations were broadcast on the VHF waveband, the low ownership of VHF/FM radio sets meant that they also transmitted on medium wave and the scarcity of radio frequencies was again exacerbated by the BBC's dominance of broadcasting. At a time of widespread political radicalization, this dominance was challenged as small pirate radio stations arose across the U.K. following student protests across Europe, notably in Paris in May 1968 and in America, prompting wider debate elsewhere on access and control of broadcasting (Barbrook, 1985; Downing, 2001). Campaigns to open up the airwaves to unheard voices arose in many countries, successfully establishing the right to broadcast (often after broadcasting illegally for some time) in a significant number of cases. Many of these emerging broadcasters were "community radio" stations which eschewed commercial motives and sought to encourage participation from local organizations. However, campaigns in the U.K. were not as successful: the political priority of the incoming Conservative administration at the beginning of the 1970s was to encourage *commercial* radio as competition for public service radio, and community radio campaigners instead turned their attention to the nascent cable television networks. However, cable networks were slow to develop in the U.K. and by the

1980s community radio campaigners, such as COMCOM (for "community communications") and later the Community Radio Association, turned their attention once more to terrestrial transmission and successfully persuaded the government to allow a limited number of pilot stations to begin. Nevertheless, intense lobbying by commercial radio broadcasters resulted in the government abandoning its plans in 1986 (Gray & Lewis, 1992, p. 165). Only at the beginning of the 21st century did a process finally begin of licensing community radio stations in significant numbers: in early 2008 the hundredth such station went on air, while by mid-2010 there were 176 on air with a further 52 licensed (Ofcom, 2010, p. 208).

The Rise of Commercial Radio

The BBC's monopoly of British radio persisted until 1973. As noted above, it was commercial rather than community radio that was to provide competition. The new VHF waveband offered a number of unused frequencies within certain geographic localities and, following the logic of the beginnings of Independent Television (ITV) 18 years earlier, this capacity was to be populated with commercial stations, known as independent local radio (ILR) and paid for by attracting advertising. The BBC had faced competition before: from its earliest days, in the 1920s, stations broadcasting from France and the Netherlands began to acquire a loyal and sizeable audience (Street, 2006) and the rise of pirate radio in the 1960s and 1970s added further to the BBC's problems, but much of this competition was transient, either because of its dubious legal status or the poor reception from distant, overseas stations.

The use of VHF meant the ILR stations would be heard in high quality sound like the best of the BBC but, given that ownership of VHF/FM-compatible receivers remained low, most were also allocated capacity on medium wave. Thus, like the BBC stations, ILR stations were obliged to simulcast their programs so that all listeners, those with and those without FM

receivers, were able to hear. Other public service obligations were imposed on ILR stations, as they had been with ITV: no program sponsorship was allowed and programming was to be a varied and balanced mix of speech, drama, arts and classical music as well as the staple radio fare of pop music. Tony Stoller, who was involved in ILR from the outset and from 1995, as Chief Executive of the Radio Authority, was its senior regulator, recalls its origins: 'The shape of ILR as a tightly regulated, locally-based public radio service was being set from the very start' (2010, p.36). This was a tall order – radio guided by commercial criteria alone would tend to avoid expensive drama and documentary production in favor of mainstream music output – but not so daunting that commercial companies were not willing to embark upon this new venture. The first, beginning in October 1973, were a speech based station, LBC, and music station Capital Radio, both in London. By 1983 there were 43 commercial stations on air and 80% of the population was within range of at least one of them (Crisell, 2002, p. 196). Few were immediately profitable: their 1973 launch coincided with the beginnings of a sharp economic recession which curtailed advertising spending in general and thus ILR revenues in particular; further, the growing popularity of competing audio platforms, such as audio cassette players meant radio was no longer the only source of music on the move, and new technologies such as teletext meant radio's key feature, regular breaking news bulletins, was no longer unique to it. These factors, combined with ILR's public service obligations, created a curious paradox. On the one hand, the new stations tended towards rather conservative programming. Street suggests that "far from the free-style mavericks who had fought so hard in the 1930s and 1960s for this moment, the first era of Independent Local Radio was a curiously Reithian affair" (Street, 2002, p. 118). At the same time, however, the uncertain economics of ILR encouraged stations to share programming to fulfill their public service obligations. The Programme Sharing Scheme enabled

drama, documentary and arts programs to be made on the basis that they would air on stations across the land rather than on a single, local station. This period thus saw some cultural developments we would not now associate with commercial radio: Capital Radio, for example, ran its own orchestra and also recorded concerts by the Berlin Philharmonic Orchestra at the Royal Festival Hall; Radio Liverpool produced drama by Alan Bleasdale; and several stations produced ground breaking documentaries (Street, 2002, p. 121). The public service obligations imposed on ILR may have tended to constrain the potential for innovative programming, but were also responsible for the production of radio programs far more varied and bold than we find in British commercial radio today.

This period did not last long however. ILR remained in a precarious financial state: by February 1983, two thirds of all stations were losing money (Street, 2002, p. 122). Yet they were not the only economic casualties of the time as, for example, newspapers merged or were taken over while new cable television channels also failed to survive. Thus the ILR industry's argument that public service obligations were simply incompatible with profitability was a selective one; nevertheless the economic conditions at the time were real enough. Some fierce lobbying by the Association of Independent Radio Companies over the next years, which, as noted above, persuaded the government to drop its experiments in community radio, also persuaded the regulator, the IBA, to relax its regulation of ILR, allowing more companies to merge as stations increasingly sought to satisfy public service requirements such as speech programming, for example, by broadcasting interviews within pop music programs (Crisell, 2002, p. 197). At the end of the 1980s, on the basis that the number of FM-compatible receivers was growing, frequency splitting was allowed: commercial stations could now broadcast different programs on their medium wave and VHF frequencies. In most cases, this allowed them

to target two audience markets; medium wave was given over to “golden oldies” while chart music was played on VHF (an implicit assumption that younger audiences were more likely to have acquired receivers with the new technology). Finally, in this favorable political climate (the Conservative government under Margaret Thatcher was elected for the third time running in 1987) the fortunes of ILR began to look up and as mergers and takeovers proceeded, a number of expanding station groups began to emerge. Financial success began to accrue: between 1983 and 1988 commercial radio revenues doubled from £69m to £139m (Street, 2002, p. 126).

A 1987 government Green Paper set out new plans for radio broadcasting, to be enacted in the 1990 Broadcasting Act. This centered on a dramatic expansion of commercial radio, with an increase in the number of independent local stations but also, for the first time in Britain, the introduction of independent national radio. This was to be made possible by accelerating the end of simulcasting: the BBC was to migrate its national networks onto VHF/FM only, and commercial radio would take over the vacated frequency channels. The IBA was to be replaced by a new body, the Radio Authority, which would be charged with licensing the new stations and regulating content, but regulation would be minimal. Any remaining public service obligations were dropped, and the rules governing station ownership were relaxed further (Crisell, 2002, pp. 225-6). Consequently, consolidation within the industry became more extensive, with the majority of stations, including the national commercial stations, being owned by one or other of the giant radio corporations. Despite most stations still being local, and thus only having a limited audience, this consolidation allowed the big groups to pitch themselves to potential advertisers as, in effect, national broadcasters and, in the ten years from 1992, the proportion of radio advertising revenue that came from national rather than local advertising increased from

less than 50% to over 70% (Indepen, 2004, pp. 13-14). After a number of uncertain years, commercial radio now appeared to be in good health.

The expansion of commercial radio that followed the 1990 Broadcasting Act continued throughout the decade. In the mid-1980s, there were only 50 ILR stations. By the mid-1990s the number had tripled, and by the end of 2004 there were 275 commercial radio stations (Hendy, 2000, p. 25; Ofcom, 2004, p. 26). These varied greatly in size in comparison with the earlier ILR stations: the Act had allowed for the licensing both of large, regional stations with potential audiences of several million, and of smaller, local stations which could count audiences in just a few tens of thousands. Most listeners now had a choice of commercial stations as well as the BBC stations; in urban areas, where the economics of commercial radio meant more stations could operate, listeners might typically be served by as many commercial stations as BBC. Unsurprisingly, commercial radio's share of the total audience grew during this period of expansion, and in 1995 its share of the audience was larger than the BBC's for the first time, although in recent years it has slipped back, standing at 43% in 2010 (Rajar, 2010).

As expansion and consolidation continued, further relaxation of ownership rules was introduced in the 2003 Communications Act and by the end of the following year half of the 275 licensed stations had been bought by six radio groups; further mergers and takeovers during 2008 and 2009 reduced this number to just four groups. By concentrating on acquisition of the larger stations, at the end of this period two groups alone (Global Radio and Bauer) accounted for two thirds of commercial radio listening, consequently taking the lion's share of advertising revenue (Ofcom, 2009, pp. 163-4). Consolidation has clear advantages for radio groups: firstly, as noted earlier, they are able to centralize their advertising selling operations and attract the more lucrative national advertising buyers; secondly, by networking content, that is by sharing

programming across stations within the group, economies of scale mean that substantial costs can be saved on production. Clearly this is at the expense of the "localness" of a station. The migration to national rather than local advertising is one matter, but when programs are made with the intention that they be networked to stations across the country, then there can be little that is local in its content and, as Richard Rudin notes elsewhere in this volume, the tendency has been towards replication of standardized, generic content based upon mainstream formats such as adult contemporary, golden oldies or chart music. In 2008 these formats alone accounted for around three quarters of commercial radio revenue (Ofcom, 2009, pp. 160-1).

Consolidation and expansion of commercial radio until recently enabled it to take an increasing share of all display advertising, increasing from 2.8% to 6.8% between 1992 and 2004; since then its share has fallen slightly, to 5.8% by the end of 2010 (RAB, 2010). This pace of mergers and takeovers in radio is not unique to the U.K.: in the U.S., following deregulation in the 1996 Telecommunications Act, 4,000 stations changed hands in the first year alone (Berry & Waldfogel, 1999, p. 6).

Meanwhile, despite the expansion of commercial radio inevitably taking away some of its share of the audience, the BBC has continued to prove popular with listeners. With the imminent ending of simulcasting, signaled in advance of the 1990 Broadcasting Act, the BBC trailed heavily the value to listeners of its FM services on VHF, but even so in April of that year it launched Radio 5 on two medium wave frequencies. This new station, a speech-based service concentrating on news, current affairs and sports, tended to polarize critics: some appreciated its lighter take on news compared with the BBC's Radio 4, with its appeal to a younger audience, intermingled with some novel programming such as focusing on European news; at the same time, others generally believed its launch had been intended primarily to hold on to these two

AM frequencies lest they too be passed on to commercial competitors (Crisell, 2002, p. 226). Starved of funds in comparison with its "rival" FM BBC networks, over the years Radio 5 concentrated more on phone-ins and sports than on some of the more novel output of its earlier days. Meanwhile, always seeking to cater more for younger audiences, Radio 4 introduced more new comedy, pioneering a number of series that later transferred successfully to television, including *Goodness Gracious Me*, *The League of Gentlemen* and *Little Britain* (Hendy, 2007, pp. 309-11). The other networks hired celebrity presenters, such as Jonathon Ross on Radio 2, while Radio 3 angered some of its listeners who perceived it to be focusing more on popular classical music than the more serious. Finally, in a reminder that FM services are still not quite universal (and an indication perhaps of the demography of BBC radio's audience) Radio 4 continues to air on long wave alongside VHF, following highly vocal protests from listeners in remote corners of the U.K. and overseas on the various occasions the BBC has announced its intention to end the service. As noted earlier, these various changes within BBC radio have enabled it not only to retain but actually to increase its share of the audience at the same time that commercial radio has witnessed unprecedented levels of expansion.

Digital Radio in Britain

While these developments were taking place in both public service and in commercial radio, in the background new digital broadcasting technologies were being spoken of as the biggest change to occur in radio since the introduction of FM. In many ways, digital broadcasting presented more opportunities for radical change in radio than in television, where public and academic attention has focused. The 1980s and 1990s saw huge changes in television in the U.K., with the launch of satellite and cable systems bringing typically ten-fold increases in the number of channels available, strong channel segmentation (dedicated channels for film,

sports, arts and so on) and, significantly, the introduction of subscription television for premium services. This all took place within the *analog* television system, and thus digital television technology offered rather less that was truly novel but, instead, simply more of it. Radio, however, had seen little dramatic change during this same period: commercial radio concentrated more and more on mainstream formats while the changes in BBC radio could be described as evolutionary rather than revolutionary. The technology of digital radio, however, offered the potential for two to three times as many stations, all at high audio quality at least as good as FM, together with a host of novel features like on-demand news or traffic bulletins, scrolling text on radio screens and even images such as presenters' portraits and CD covers (Hoeg, Lauterbach, Meier-Engelen & Schulze, 2001, pp. 2-5). The increased number of stations was the attribute of digital radio that, at the outset, was of greatest significance for existing radio broadcasters. By means of data reduction (or "compression") techniques, a radio station could be transmitted using less frequency space than an equivalent analog FM station, but at comparable or better quality. Coupled with the allocation by the International Telecommunication Union of additional frequencies in the upper VHF band, suddenly the spectrum constraints that had featured so decisively in the development of analog radio were alleviated. Crisell (2002) predicted, perhaps incautiously, that "the digital era will probably mark the first time in broadcasting that there will be more channels available than content to fill them" (p. 279). We shall see that he has proved to be both right and wrong.

Digital radio's origins go back to the mid-1980s when consumer electronics manufacturers and broadcasters worked together on a project funded by the European Union Eureka research and development program. The intention was to develop a digital radio broadcasting system that would become a world standard and, in so doing, would help rejuvenate the European electronics

industry which had been declining in the face of competition from South East Asia. Although other systems were in development, principally in Japan and the U.S., none was particularly well advanced and so there was a real prospect of the European system, known as DAB (for Digital Audio Broadcasting) becoming the leading standard. Broadcasters from a number of European countries were involved from an early stage, all of them public service broadcasters, and the project was backed by the European Broadcasting Union. Thus, as developments in television were also proceeding with a view to establishing Europe as a world leader in digital broadcasting, DAB was finding ready support amongst broadcasters who foresaw a new era for radio. In Britain, limited transmissions began at the end of September 1995, although of course the only listeners were to be radio industry staff and associated journalists. By December, however, when the government published its proposals for the organization and regulation of digital broadcasting, the BBC's DAB service was up and running. Enacted in the 1996 Broadcasting Act, broadly similar arrangements were made for radio and television (Lax, 2009a, pp. 128-36). There was an implicit acknowledgement of the importance of public service broadcasting, but there was an enhancement of the role of commercial radio broadcasters. While commercial television had already grown dramatically with the emergence of satellite and cable platforms, analog radio remained dominated, particularly at the national level, by the BBC, and so the coming of digital broadcasting proposed to replicate in radio the commercial expansion already seen in television.

Two aspects of the digital radio arrangements emphasized an enhanced role for commercial radio, both dependent on the particular way in which digital radio operated. Like FM radio, which, in time, DAB was expected to replace, digital radio transmissions can broadcast over a limited geographical area, for local broadcasting, or can be networked to transmit national

broadcasts. However, in contrast with analog radio, where each station transmits on a single, unique frequency (to which we tune the radio to listen), digital radio transmissions consist of a single, broad frequency channel (known as a multiplex) which carries the digital audio data for a number of stations simultaneously. A digital receiver "tunes" to the whole assembly and simply decodes the data for the particular station selected by the listener. Since a multiplex could carry anything from six to ten stations it was no longer the case that a single radio station could be in charge of its own transmissions; the multiplex would have to be operated on behalf of all stations carried within it. Since the BBC already had five analog networks, it was a straightforward decision to allocate a whole nationally networked multiplex to the BBC, which could then organize its own transmissions. For commercial broadcasters, though, there needed to be a new role in radio broadcasting: in each locale, a multiplex operator would need to be established to carry commercial stations (and local BBC stations) broadcasting in the area. The Broadcasting Act made it clear that in the U.K. the multiplex operators would be private organizations operating on a commercial basis. They would be licensed by the Radio Authority through a competitive bidding process, and the winning operators would then contract with radio companies, charging them to carry their stations. This contrasted with some other countries, where the multiplex operation was to be carried out by a statutory organization, but the U.K. government also adopted a similar commercial basis for the operation of the emerging digital television service, reflecting the political leanings of the time.

A second feature of the Act established commercial radio on an equal footing with the BBC at the national level. In addition to the BBC's national multiplex (which would carry simulcasts of its five networks) there was to be another nationally networked multiplex, and thus capacity for an equivalent number of national commercial stations. The three existing analog

national stations, Classic FM, Talk Sport and Virgin, were guaranteed a place on the new multiplex but capacity for another five or so stations would be available. Again, this multiplex was to be operated by a commercial organization, and the bidding process began in 1998. In the event there was only one bid, from a consortium known as Digital One, and DAB transmissions began the following year, joining those of the BBC which were by then available to around 60% of the U.K. population. The majority partner in Digital One was GWR, one of the existing large commercial radio groups and owners of Classic FM. When Digital One began broadcasting in 1999, it added six new, digital-only services to the three analog simulcasts on its multiplex including some specialist services such as a rock music station, a speech-only station focusing on book readings and serializations, a rolling news service provided by ITN (which also made news for ITV and Channel 4 television) and a business news service from Bloomberg. Despite this substantial increase in capacity, however, these new stations received a mixed reception and DAB radio sales proved to be steady but slow, slower than broadcasters had expected and certainly slower than electronics manufacturers had hoped. By the end of 2000 it was estimated that in total there were around 15,000 DAB receivers in Britain and, in comparison with the estimated 100 million analog receivers, it was clear that at that time DAB was mainly an enthusiast's pursuit (Daniel, 2000).

In 2002, the BBC launched new digital-only services. Its multiplex was now filled with ten stations alongside Digital One's nine, increasing substantially the number of stations available in comparison with analog radio. Thus, in contrast with Crisell's (2002) assertion, there certainly did appear to be enough content to fill the DAB capacity and as more people became familiar with DAB, an increasingly vocal minority argued that multiplex operators (including the BBC) were squeezing too many stations into the multiplex capacity at the expense of sound quality.

Subsequently the BBC conceded that, with this number of stations, DAB sound quality could be compromised, even inferior to that received on a good quality, analog FM receiver ("What Hi Fi," 2002). By this time, however, both the BBC and commercial broadcasters were marketing DAB heavily, focusing on the additional stations that DAB offered rather than sound quality. The new BBC stations proved relatively popular and, as DAB radios became cheaper, both audience awareness and sales of receivers began to increase, but still the numbers of households with DAB sets remained in single percentage figures; two years after the new stations launched, the industry reported that cumulative sales of DAB receivers had finally reached one million, a presence in just under 4% of households. Since then the growth has been steady, with just over one third of households now owning one or more DAB sets (Rajar, 2010).

This relatively slow growth created more problems for commercial radio than for the BBC. In common with most other countries which had begun DAB services, the BBC, as a public service broadcaster, had embraced DAB as part of its mission to develop radio in the new digital age. Even so, some insiders began to doubt whether DAB had a certain future. One former Director of BBC Radio described how his initial optimism had turned to cynicism, while a former BBC Chairman told a House of Commons Select Committee that, in hindsight, the Corporation had committed itself to digital radio far too early (Bannister, 2001; Bland, 2004). Beyond transmission and marketing costs, however, the commitment was relatively small: programming on the new, digital-only stations consisted of repeats (or "archives") of comedy series typically aired previously on Radio 4 and its predecessor, the "Home" program, and music programs, albeit of a specialist nature. For commercial broadcasters, the costs of simulcasting, that is the additional costs of their digital transmissions, were more significant: sums paid to the multiplex operators were typically equal to or greater than the costs of analog transmission. It

was difficult for commercial broadcasters to justify spending much on new programming for digital-only stations when the audiences were measured in just thousands (in fact the industry body, Rajar, was unable to measure such small audiences). Consequently, the commercial radio content on DAB was dominated by simulcasts of existing analog services. Of 149 different commercial radio stations on DAB in mid-2010, for example, 109 were simulcasts. In fact, the ITN news and Bloomberg business stations were removed from Digital One's national multiplex as early as 2002, within two years of their launch, while other early digital-only stations either closed down, or migrated to alternative platforms such as digital television.

With the economic uncertainty resulting from the slow growth of the DAB audience, early expectations that the additional capacity of digital radio might lead to a flourishing diversity of new radio formats failed to transpire. As with analog radio, digital radio became, and remains, dominated by the same big three or four radio companies. For, while commercial radio had clearly been brought to the forefront in the original plans for implementing DAB, it was by no means a universally shared belief amongst commercial radio companies that DAB was, in general, a good thing. For small commercial stations in particular, the coverage areas of the local DAB multiplex often exceeded their existing, analog coverage, and so they were faced with paying the multiplex operator for carriage in areas not relevant to them. Consequently, more than half of existing analog stations, mostly smaller, owned independently or part of the small radio groups, are not present on DAB. So the mix of DAB stations, their formats and operations have tended to reflect those of the larger analog radio groups, with a high degree of content sharing or networking between the many local multiplex areas.

Local Radio and Digitalization

The tendency for ever more consolidation within commercial radio ownership, and the consequent increasing networking of content evident within analog radio, has been exacerbated as digital radio has developed. The dominance of digital radio by the big radio groups is exemplified by the results of the multiplex licensing process. In 2003, at the end of the first licensing round, 47 commercial multiplex operators had been licensed: all were licensed to consortia in which the dominant partners were one or more of the existing largest five commercial radio groups; subsequent mergers and acquisitions means that the two largest radio groups, Global and Bauer, own a significant or controlling stake in almost all. Of 13 licenses awarded in a second round from 2007, six were awarded to the big groups. While, of itself, this does not result in further entrenchment of dominant companies, in practice the commercial nature of the multiplex operations means that, typically, the stations carried on these multiplexes are predominantly simulcasts of those analog stations already owned by a multiplex operator. One consequence was the emergence of "quasi national" stations, as "local" analog stations were simulcast on multiple DAB multiplexes across the country. For example, Xfm was for many years a well-established analog station (then owned by Capital, now Global) broadcasting in London only. As the local DAB multiplexes were awarded around the country, those won by Capital (or one of its consortia) carried Xfm, thus extending its national reach. Similarly, LBC, previously known as the London Broadcasting Company, which (as its name suggests) is heard only in London on analog radio, is networked across the local digital multiplexes operated by Global, its parent company. DAB listeners in northern England, therefore, can hear advertisements, travel bulletins and announcements of events intended for an audience 300 km away. With less content regulation applying to digital radio in favor of commercial viability, the tendency has been for there to be less specifically local content on DAB (Lax, 2009b). As noted

above, following the pattern in digital radio, deregulation of analog radio has enabled quasi national, or networked stations to emerge, further diminishing the degree of localness in commercial radio.

In some respects, the state of commercial radio in the digital realm is reminiscent of its early analog period, when stations struggled to generate sufficient revenues in order to remain profitable, resulting in the high degree of consolidation eventually allowed by regulators. One difference however is that the *starting point* of digital radio regulation has been to allow a high degree of consolidation and minimal content regulation, yet still commercial radio struggles to make economic sense on DAB. Ironically, it is commercial radio's involvement in DAB, encouraged from the outset, that is often assumed to explain why DAB has been relatively successful overall in the U.K. in comparison with most other countries (Jauert, Lax, Shaw, & Ala-Fossi, 2010). The difficulties were illustrated in late 2007 by the establishment by the government of a Digital Radio Working Group (DRWG) made up of broadcasters, manufacturers, regulators and policymakers to consider how adoption of DAB could be increased. The challenges of their task were emphasized in 2008 by two notable events: firstly, the decision in February of GCap, then the biggest player in U.K. DAB, to pull out of all of its digital commitments, including closing all its DAB-only stations and selling off its stake in the national multiplex operator Digital One; this was followed in October that year by Channel 4 Radio's withdrawal of plans to run the newly-awarded second national multiplex. With stations disappearing off several multiplexes across the country during 2007 and 2008 (being replaced, in one instance, with a looped recording of birdsong which some suggested could be more popular than some of the DAB stations) it may be that Crisell's (2002) prophecy, that there would be

insufficient content to use the full capacity of DAB, in fact is accurate, although the explanations for this are primarily economic rather than technological.

The uncertain economics of DAB, exacerbated by the global financial collapse of 2008, resulted in the commercial radio companies urging the government to name a date for switching off analog radio, mimicking the process in digital television. However, there is no obvious comparability between switchover from analog television and analog radio: in simple numbers alone, there are perhaps three times as many radio receivers than television sets in U.K. homes, as well as some 34 million in vehicles. Hence, the government had proved unwilling to commit to a switchover date. Nevertheless, in 2010, following the DRWG's recommendations, it worked with the radio industry to draw up a Digital Radio Action Plan, which sought to set in place a process of digital migration that, it anticipated, could result in a switchover of all BBC and larger commercial stations to digital-only transmission by 2015. For the time being, community and some commercial stations would remain on analog. This plan included two criteria to be achieved before this transition could be announced: that 50% of all radio listening be to digital platforms (at the time of the plan's publication, it stood at around 25%), and that coverage of DAB transmissions be extended to match FM coverage. The strategy for achieving such targets included urging the BBC to build or convert more transmitters, encouraging more niche radio services and other digital-only content, and reducing the cost of receivers. The announcement of a date, which followed commercial radio industry lobbying after publication of interim proposals, was clearly an aspiration dependent on many uncertain variables. The report's suggestion that most existing analog radio stations might cease those broadcasts in 2015 caused a short lived wave of negative press coverage, in most cases based on a sense that digital broadcasting was being imposed on an unwilling public, but subsequent commentary or public

debate has been minimal, concern expressed only in a small number of commissioned reports (Lax, 2011).

Digital Alternatives

The poor performance (in economic if not technical terms) of DAB has brought to the forefront consideration of alternative platforms for digital radio. In some cases, alternative terrestrial systems have been suggested, while a few observers have claimed that non-traditional radio platforms such as digital television and the Internet might prove more compelling to listeners. Certainly, in environments where no DAB system has begun, the emergence of alternative terrestrial formats has prompted declarations that DAB is outdated. Thus Digital Radio Mondiale (DRM and DRM+) or Digital Video Broadcasting Handheld (DVBH) emerged as two newer alternatives for delivering digital, terrestrial radio, like DAB, but offering particular advantages; meanwhile, HD Radio was developed in the U.S. The World DAB consortium has itself developed enhanced versions of DAB: DAB+ and DMB (Digital Multimedia Broadcasting) use coding systems which, respectively, offer more capacity at better audio quality and the possibility of mobile multimedia content such as television pictures. In one sense, these are simply alternative mechanisms for delivering familiar terrestrial radio but, like the difference between DAB and analog radio, some such as DRM imply different ways of organizing the radio industry (Lax, 2009a, pp. 140-3).

Alternatively, digital radio stations can be transmitted on other platforms, such as all of the existing digital television systems (terrestrial services are provided on Freeview, alongside radio on satellite and cable television systems) and via the Internet. However, these systems lack the significant attribute of conventional, terrestrial radio (both analog and digital) which is its mobility: by and large, radio on digital television and the Internet must be listened to in a fixed

location; listening on a mobile phone through mobile Internet services (such as "3G") is possible but suffers limitations in capacity and can prove expensive for listeners, and so does not form a significant part of radio listening. Terrestrial reception then remains the most common means by which radio is heard, and so the development of digital terrestrial platforms such as DAB or its alternatives is important to broadcasters. Even so, listening to Internet radio, though not mobile, does suit radio's role as a secondary activity: it is commonplace to listen to the radio while engaged in some other activity. Listening to the radio via the Internet is indeed increasingly common, particularly following the widespread adoption of broadband Internet connections, with around one in ten U.K. adults listening to some form of Internet radio in a typical week (Rajar, 2010). The existing broadcast radio industry faces challenges from Internet radio in a number of ways: the availability of a vast number of stations increases competition, some of it produced very cheaply using automation software; new practices such as downloading programs for time-shifted listening confounds scheduling assumptions; podcasts, individual "radio-like" programs often not intended to be part of a broadcast schedule, can be downloaded automatically to a computer for later listening. Existing radio stations have readily embraced the possibilities of the Web, streaming live content and offering "catch up" streams, downloads and podcasts for listening to missed programs; station websites invite a degree of participation in the radio station via electronic forums and games. Some of these have proved popular: the BBC claimed that in January 2007, 7.1 million hours of time-shifted listening had been streamed, while the two most popular podcasts, a daily "news pod" and highlights of music presenter Chris Moyles's show, recorded 1 million and 740,000 downloads respectively (BBC, 2007). The immediate assumption might be that content such as time-shifted streaming or podcasts would reduce the audience's live radio listening, but clear evidence is hard to find with such new developments, though one

study at least suggests the opposite: that listening to time-shifted radio and podcasts can present greater exposure to radio programs and actually increase the amount of live listening (Rajar, 2008). Certainly, the development of computer-based audio production has allowed far easier access to the making of radio-like programs, and the vast range of sources and subjects of podcasts demonstrate this clearly. However, Internet radio stations, seeking to emulate traditional, linear broadcast radio stations, face rather different economic obstacles from those of terrestrial broadcasters: the latter must make a huge investment up front in studios and transmitter networks, but once these are established a station can add new listeners at a near-zero cost. In contrast, the reverse is true for an Internet radio station: it faces relatively low start up costs, but "transmission" costs can be high. The capacity of the Internet to deliver data is finite, and as an Internet station begins to succeed in attracting listeners, it must pay for additional bandwidth and costs increase accordingly. The costs of adding listeners increase proportionately and in comparison with start up costs, the annual running costs of Internet radio stations can be around four times as much as broadcast radio (Ting & Wildman, 2002). Internet-only radio stations are thus more likely to seek to attract a smaller, niche audience (which can then be pitched to specialist advertisers) rather than aiming at a mass audience like a terrestrial radio station and, despite the plethora of Internet radio stations available, together with streaming of regular broadcast stations online listening adds up to just 2.8% of all radio listening in the U.K., rising only steadily from 2.2% a year earlier (Rajar, 2010). Thus Internet radio and broadcast radio tend to complement rather than compete with each other.

Radio's Digital Future

The end of analog transmission is already anticipated by television broadcasters: after 2012, all U.K. terrestrial television will be digital. Similar scenarios were also aired in the early

days of digital radio, but few consider it likely that the U.K. aspiration of a 2015 switchover will be achieved. Even so, the assumption amongst many broadcasters is that the complete ending of analog transmission is as logical for radio as for television, and thus it is merely a matter of time before radio is also delivered by digital means only. Terrestrial transmission is expected to remain an important, even the predominant, platform for digital radio, with alternatives such as Internet or satellite radio being uneconomic or otherwise impractical in the U.K., and indeed elsewhere in Europe (Ala-Fossi, 2010). However, there remain some clear obstacles to the ending of analog radio transmissions. When the Eureka DAB system was planned in the 1980s, commercial radio in many European countries (particularly those involved in the Eureka project) was much less significant than today, both in numbers of stations and in audience share, and in Britain in particular the smaller commercial stations did not exist. Most commercial stations at that time were of a size which suited the geographical coverage areas of DAB, as were the local BBC stations. DAB could readily be seen as a replacement for FM in such circumstances and it remains populated with simulcasts of the larger commercial stations; meanwhile the smaller stations, unable to gain a suitable place on DAB, continue to reach their audiences via analog FM. Similarly, the new tranche of community stations, restricted under legislation to geographical areas around 5 km in radius, are also quite unsuited to the coverage areas of "local" DAB multiplexes. Given the relatively rapid, if belated, growth in the community radio sector in Britain, it could readily be argued that at present analog radio actually offers listeners rather more novelty and diversity of programming than DAB (and since most community and small commercial radio is on FM, its sound quality is comparable with DAB). So the arguments for listeners switching to DAB-only reception are not compelling – and most DAB receivers on the market also include FM reception capabilities. For small stations, whether commercial or

community based, there is no obvious appropriate digital platform (DRM or DRM+ appear to be the most likely, but in these early days of development, suitable receivers are not in domestic production).

There is actually no reason why FM and DAB cannot continue to operate in parallel in the long term, rather than the short term envisaged by the government. The technical reasons for encouraging analog television's cessation do not apply to radio (DAB and FM use separate sections of the radio spectrum and therefore ending one confers no spectrum advantage on the other; furthermore, existing FM frequencies are less valuable than analog television's to the telecommunications industry). For listeners, there may also be little reason to favor either. If DAB remains primarily an audio medium (and for all the promise of its multimedia capabilities, at present a DAB receiver's screen displays no more than basic program information) it offers little that FM cannot provide and so there is no reason why stations remaining on FM should become perceived as inferior to those on DAB (in the way that AM stations are often less favored than FM).

However, if the more dominant sectors of British radio, the large commercial groups and the BBC, succeed in migrating their stations off analog radio, then the futures of the smaller commercial, independent and community stations are threatened. The regulator, Ofcom, although avowedly platform neutral, under the Digital Radio Action Plan has prepared for migration to digital transmission and the expansion of DAB, and is renewing analog FM licenses only for a limited period. Even if this does not prefigure an imminent end to analog radio, it does suggest that FM might become a more marginal platform in comparison with DAB. It is conceivable then that new digital receivers will not forever also include FM reception, just as for several years

now many analog sets have not been capable of receiving the long wave frequencies still used in Britain and a few other countries.

For radio to develop in the future as a more diverse medium (which, logically, it must to attract and retain listeners who have so many other audio options) it seems ironic that the principal digital platform, DAB, does not appear to present a ready solution. The technical constraints on DAB are not insurmountable however, and it could be reconfigured to serve alternative uses such as smaller community stations; alternative digital platforms might prove equally suitable, though as yet are unproven. Meanwhile, analog FM has long been proven, and suitable, yet if a digital future becomes regarded as at least logical, if not inevitable, FM may increasingly come to be perceived as somehow outmoded and inferior. While the fortunes of the powerful commercial radio sector are currently economically challenged, which for now perhaps creates some doubt over how radio will develop its digital future, few would suggest that radio is under long term threat in the ways that might have been imagined in the 1950s. Radio evolved into something new at that time, and it continues to change and adapt as digital media technologies emerge, such as the Internet and portable media players. Indeed, in many ways radio seems to co-exist readily with these new audio and visual technologies. For all the uncertainty about the results of these changes, radio remains a strong medium and looks certain to retain its role as a key part of the media landscape. Whatever the possibilities, what is notable is one contrast with television: few television viewers would claim to know nothing about digital television and the imminent switch off of the analog system. However, in the absence of a public debate, the silence about the future of radio has been deafening.

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