**Opinion: The Future of AM Radio**

**England, Scotland, Wales and Northern Ireland**

**Summary**

AM radio in England, Scotland, Wales and Northern Ireland is now in terminal decline and may be discontinued completely during the mid-to-late 2020s. With the BBC subject to budget cuts and commercial stations vulnerable to a potential advertising recession, all broadcasters will be looking to reduce their AM transmission costs. Inevitably, those stations with a relatively small proportion of their listening via AM are likely to close their AM transmitters before those stations with much larger AM audiences. This article explores how this process could be managed smoothly so that AM transmission costs are gradually reduced in proportion to the number of listeners continuing to use AM.

For high-power transmitters, substantial cost savings can be made by simply reducing the transmission power. A 50% power reduction would have minimal impact on audience size. For low-power transmitters, there are two issues to consider: the size of the audience for each transmitter and the number of transmitters operating at that site. The more low-power transmitters that share a site, the lower the operating cost per transmitter. Thus, closure decisions should be based on cost per AM listener and coordination between different broadcasters is needed. With 26 AM transmitters closing during the first half of 2018, this process has now begun.

**Background**

AM was the dominant listening medium for radio in the British Isles until the mid 1980s, when it was overtaken by FM. In the early 1990s, with improvements in FM coverage and wide access to FM radios, it was decided to mostly abandon simulcasting in the UK and launch a host of new stations on AM. In general, the most popular stations have broadcast on FM since the 1990s, while AM has been used for more specialist services. Five Live, Talk Sport and many of the minority stations have remained successful. However most of the music stations have lost more than half of their audience as more commercial stations have launched on higher quality FM and Radio 2 has broadened its appeal.

With the widespread adoption of digital radio in the UK, the decline in listening to ‘AM’ stations has halted and their audience has stabilised. However, the proportion of that audience that is still using AM is declining. In 2017, about 49% of listening to Talksport and 43% of listening to BBC Five Live was on AM. However, only about 12% of listening to Absolute Radio was via AM, noting that Absolute is far more popular in the London area, where it is available on FM. AM radio listening is now substantially less than that via DAB and FM and has now been overtaken by listening via internet protocol. Many new radios cannot receive AM. With DAB now standard in the majority of new cars, AM listenership is likely to halve between 2018 and 2025.

AM transmitters are more expensive to run than FM and DAB transmitters (though hilly areas can be served by fewer transmitters on AM). There are two reasons for this. Firstly, the electricity costs are around ten times higher than FM and DAB because high-gain transmit antennas are not practical at the wavelengths AM radio operates on. Secondly, AM radio generally uses separate transmission sites, whereas FM and DAB radio share transmission masts with each other, with television and with mobile communications services. Even where AM does share a site with FM and DAB, a separate mast is required. AM transmitter sites also require more land as discussed in Appendix B.

Many European countries, such as Germany, Austria, Sweden and Switzerland, have closed AM radio completely. Many other countries have substantially reduced the number of transmitters in use.

**The Problem**

Clearly, AM radio is in decline and audiences will continue to drop. If nothing is done, the transmission cost per AM listener will likely double over the next five years and double again over the following five years. Thus, in the long term, AM transmission will cease to become economically viable. In practice, different stations will reach the limit of economic viability at different times. Particular problems can occur when investment in new transmission equipment is needed or a site lease has expired, requiring relocation of the transmitter in order to continue broadcasting. The highest transmission costs per listener are borne by Absolute Radio and some of the Smooth stations, while Five Live and Talksport have the lowest cost per listener.
At some point, stations will have to close down AM and expect the remaining AM listeners to switch to digital radio. DAB coverage is now sufficient for many commercial stations, though not for the BBC, which is obliged to provide close to universal coverage. For home listening, switching from AM to digital platforms is relatively straightforward, with television and internet listening providing an alternative to DAB. Outdoor listening using DAB is possible in most places. Battery life can be poor, but this is likely to improve with the next generation of receivers. The problem is in-car listening, where it is difficult to replace the radio. In the early 1990s when many stations became FM only, car radios conformed to a standard fit and were easy to exchange. Now, the radio is integrated into the car dashboard. One possibility is a stand-alone DAB radio that either connects to the car using the jack connection provided for MP3 players or incorporates a low-power FM transmitter. However, providing an adequate aerial for the DAB receiver can be problematic. Many listeners will simply switch to another station instead. Norway has kindly volunteered to act as a test-bed for in-car DAB installation through its decision to switch off its national FM transmitters in 2017. A few months after the FM transmitters were switched off, only a third of drivers of cars without DAB before the switch off had installed DAB receivers with the result that nearly half of Norwegian cars were unable to receive national radio.

The fundamental problem that stations in the UK face is that if they switch off AM early, they will lose a significant proportion of their audience, whereas if they keep it going for several more years, they will be spending money broadcasting to a shrinking audience.

The Solution

The best approach for the next 5-10 years is therefore to follow the example of many other countries by reducing the cost of AM transmission, whilst trying to minimise the number of listeners lost as a result. If coverage is reduced gradually, sudden drops in the overall audience (i.e., across all platforms) will be avoided. A good strategy could be to try to keep the transmission cost proportional to the number of AM listening hours as the latter declines.

For high-power AM transmitters, electricity costs form a large proportion of the operating costs. Therefore, simply halving the power of these transmitters would significantly reduce transmission costs without completely cutting off any listeners. Some would simply experience more background noise. Arqiva revenue would not be affected by this as electricity costs are “passed through” from the electricity suppliers to the broadcasters.

For low-power transmitters, the cost of distributing the audio to the transmission site is significant. For national FM networks, distribution costs are minimized by using the high-power transmitters to feed the low-power transmitters. This works because good reception of at least one high-power transmitter is usually available on top of a relay station tower with a good aerial. This doesn’t work for AM because reception of other AM transmitters carrying the same programme is generally poor at transmission sites. Some of the Absolute Radio transmitters have been fed by satellite since they were commissioned in the 1990s as this was cheaper than installing new line feeds. Now, all BBC AM transmitters, together with Absolute Radio and Talksport’s transmitters are satellite fed. This could be extended to other stations. Arqiva is also replacing its audio line feeds with an internet protocol (IP)-based system, which will enable services using a given transmission site to share a distribution feed, reducing the operating cost. Another option to consider is feeding AM transmitters from the corresponding DAB transmissions to minimise costs.

Transmission costs can also be reduced by closing transmitters. In general, those transmitters with the smallest audiences should be closed first, noting that audiences do not necessarily correspond to coverage areas. For example, Absolute Radio audiences will generally be lower where there is a rock music station on FM. However, transmitters typically cost less to operate where the transmission site is shared with other broadcasters, particularly other AM transmitters, but also FM, DAB and TV transmitters. The high-power AM transmission sites could also potentially be used to transmit low-frequency timing and navigation signals. Thus, it can be more cost effective to shut down solo transmission sites even if the affected audience is slightly larger. Sites that require extensive maintenance work are also likely to be closed earlier. Appendix A lists commercial radio and Radio 5 Live AM transmitters (or groups thereof) by cost per listener. Another issue is land value; some AM transmission sites have substantial redevelopment value and it is no longer cost effective to relocate the transmitter(s). This is explored in Appendix B.

Clearly, a plan for gradual reduction of AM coverage will require cooperation between the broadcasters, Arqiva and Ofcom. Absolute Radio and Talksport would need their AM broadcast licenses amended to allow reduced coverage. This also applies to local stations with more than one transmitter. Operators of local station networks will also want to avoid any AM broadcast licenses that they surrender being re-advertised. However, this is unlikely in practice as if an AM service is not commercially viable for the current operator (who will typically be operating
FM and DAB stations in the same area), it is unlikely to be viable for a newcomer. Arqiva would also wish to
coordinate the closure of different transmitters at the same site where possible.

A further option is for the national stations to close their high-power AM transmitters between midnight and 6AM
(as Radio 1 did between 1991 and 1994). This would save electricity costs, though it would be less than 25% as
electricity is available more cheaply overnight. To make efficient use of transmitter operating staff, it may be
necessary for all three national medium wave stations to introduce this measure at the same time. Absolute and
Talksport would also need permission from Ofcom to so this.

**BBC Local and Regional Radio**

In 2012, the BBC announced plans to close down most of its remaining local radio AM transmitters in England,
noting that many were closed down in the 1990s to make way for commercial radio expansion. Only Radios
Cumbria, Derby, Gloucestershire, Guernsey and Jersey were to remain on AM, noting that the two Channel Islands
stations have opt-out programming on AM. Several transmitters were temporarily closed to determine how many
listeners relied on them. The BBC’s AM radio transmission contract with Arqiva runs until 2020, but its terms
allow local radio transmitters in England to be switched off before then. With the improvements in local DAB
coverage and the rollout of BBC local radio onto the terrestrial TV platform during 2015-16, most people have an
alternative to AM for indoor listening. However, most cars still rely on AM for areas where the FM transmissions
cannot be received.

Radio Nan Gaidheal’s AM transmitter in Aberdeen was closed in November 2015 and Radio Bristol’s AM
transmitter in February 2016, the latter to enable redevelopment of the transmission site. The following transmitters
were then switched off in January 2018:

- Radio Devon – Torbay
- BBC Essex – Southend
- Radio Humberside
- Radio Kent – East
- R Kent – Tunbridge Wells
- Radio Lancashire – Lancaster
- Radio Lincolnshire
- Radio Nottingham (leaving Southwell unserved on DAB or FM)
- BBC Surrey
- Radio Sussex – Brighton
- BBC Sussex – East Sussex
- Radio Wiltshire – Swindon
- R Wiltshire – West Wiltshire

No firm switch-off dates have been set for the remaining local transmitters, which may be divided into three
groups. The first group have sufficient FM and DAB coverage for the AM transmitters to be switched off at any
time:

- Radio Cambridgeshire
- Radio Cornwall – West
- Radio Cumbria – Whitehaven (No DAB)
- Radio Merseyside
- Radio Newcastle
- Three Counties Radio – Bedford

The second group serve areas with a few gaps in FM coverage that affect relatively few people. Some of the gaps
are served by DAB; some are not. These transmitters might be switched off when improvements to DAB or FM
coverage are made. Alternatively, some may be switched off without FM/DAB coverage improvements if the BBC
does not consider the affected populations to be large enough:

- Radio Cornwall – Mid Cornwall
- Radio Cumbria – North (No DAB coverage)
- Radio Cumbria – South (No DAB coverage)
- BBC Essex – North East
- BBC Hereford and Worcester – North (Poor DAB coverage)
- BBC Hereford and Worcester – Worcester
- Radio Lancashire – Main
- Radio Leeds
- Radio Norfolk – East
- Radio Norfolk – West (No DAB coverage)
- Radio Sheffield
- Radio Solent – Bournemouth
- BBC Somerset
- Three Counties Radio – Main
- Radio York – Main
- Radio York – Scarborough

The third group of transmitters serve areas with significant gaps in FM coverage, some of which are served by
DAB and some not. These transmitters might be retained until the BBC ceases AM broadcasting completely unless
improvements to FM coverage are made:

- Radio Derby
- Radio Devon – Barnstaple
- Radio Devon – East Devon
- BBC Essex – Main
- Radio Gloucestershire – East
- Radio Gloucestershire - West
- Radio Solent – Hampshire
- Radio Stoke-on-Trent
Appendix C lists the areas where improvements to BBC local radio FM or DAB coverage would be needed to minimise the impact of switching off AM transmitters. The position of Radios Guernsey and Jersey is unclear due to the opt-out programming on AM.

Moving on to the regional services, Arqiva is contracted to transmit Radios Scotland, Ulster and Wales on AM until 2020. Radios Scotland and Ulster have good FM coverage with only a few gaps. If these gaps were to be filled with new FM or DAB transmitters (see Appendix C), the AM transmitters could then close without loss of service, noting that Radio Scotland’s AM-only sports programming would have to move to FM or cease. The Londonderry, Dumfries and Redmoss (Aberdeen) transmitters could potentially close without the need for FM/DAB enhancements.

FM coverage of Radio Wales was improved in 2018, but remains poorer than that of the other regional services, so some AM transmitters will have to be retained unless a significant number of further FM or DAB transmitters are added. The Forden and Wrexham AM transmitters can potentially close. The Washford, transmitter would have to continue, while the need for the Penmon, Tywyn and Llandrindod MF transmitters is unclear. See Appendix C for further details.

Local Commercial Radio

Most AM broadcast licences for local commercial radio expire between the end of 2019 and the end of 2021. Many of the associated transmission contracts will expire at the same time. At this point, some stations may decide to discontinue AM broadcasting, while others are likely to continue. Closures are more likely to occur where site leases expire and/or new transmission equipment is needed. This is difficult to predict without access to proprietary information. Arqiva may also offer early termination when other transmitters at the same site close. The stations that continue will be offered a 4-5 year automatic AM licence extension, provided they also broadcast on DAB. Their AM audiences are likely to halve over this period and also grow older, making them less attractive to advertisers. Thus, further AM transmitter closures are likely to occur between 2023 and 2026. In general, those stations with a lower transmission cost per listener (see Appendix A) are likely to continue on AM for longer

The closure of a number of BBC local radio and Absolute Radio transmitters will impact local commercial radio in two main ways. It will increase the transmission costs for those services remaining at sites where another service has closed. However, it will also open opportunities for other services to take over abandoned transmitters at shared sites and close their existing solo sites, reducing transmission costs. In some cases, the ex-BBC frequency would have to be used to avoid interfering with other services. The main opportunities are as follows:

- Radio City Talk could move from Bebington to Wallasey when Absolute Radio leaves AM;
- Metro Radio 2 could move from Greenside to Wrekenton if Radio Newcastle leaves AM there;
- Viking 2 could move from Goxhill to Hull now Radio Humberside has left AM;
- Smooth East Anglia could move from Brundall to Postwick if Radio Norfolk leaves AM;
- Smooth Solent could move from Farlington Marshes and Veals Farm to Fareham if R Solent leaves AM.

Sunshine Radio in Ludlow currently broadcasts on both AM and FM. However, improvements in FM coverage are planned for 2018, after which the AM transmitter is likely to close.

Absolute Radio

Absolute Radio has the highest transmission cost per listener of any major AM radio station and also the highest proportion of digital listening. Absolute is available on FM in the London area and in the West Midlands (from 7/9/15). Other rock or rock-led music stations are available on FM in Central Southern England, Bristol, Swindon, Oxford and Manchester, with a new service due to launch in Glasgow. Thus, AM listening to Absolute will be highest in those areas without a rock music station on FM.

From a purely commercial perspective, it would thus make sense to close AM in areas where Absolute or another rock station is available on FM and retain AM elsewhere for the time being. This could halve the transmission cost per AM listening hour. However, Ofcom would be unlikely to permit this because there is a legal requirement to provide national coverage and a transmission network that excluded London and several other major cities would not meet this definition. Absolute closed its Reading transmitter in 2015 when the site was sold and closed a transmitter at Gatwick several years before. Under the terms of its 2011-18 broadcasting licence, Absolute was also permitted to close transmitters at Dundee, Sheffield, Stoke, Boston, Manningtree, Hoo, Lydd, Guildford, Swindon, Gloucester and Redruth.
Absolute Radio's AM broadcast licence has been renewed until 30 April 2022 and Ofcom have provisionally approved closure of 12 transmitters from 1 May, together with power reductions at a further 5 transmitters. The transmitters scheduled for closure are Redmoss (Aberdeen), Dundee, Wallasey (Merseyside and North Wales), Sheffield, Hull, Cambridge, Hoo (Kent and Essex), Guildford, Swindon, Torbay, Plymouth and Redruth (Cornwall). Aberdeen, Plymouth and Cornwall will lose AM coverage altogether, while Dundee, Hull & Grimsby, Mid Kent, Torbay and the North West Coast will receive only a weak signal. The remaining areas will experience severely degraded night-time reception.

Power reductions of 50% will take place at the five high power sites: Westerglen, serving Central Scotland will reduce to 50 kW. Moorside Edge, serving Northern England, will reduce to 100 kW. Droitwich, serving the Midlands, will reduce to 53 kW. Washford serving South Wales, Avon, Somerset and Wiltshire will reduce to 50 kW. Finally, Brookmans Park, serving London and the surrounding counties, will reduce to 63 kW. Daytime reception will be slightly weakened along the edges of each transmitter's coverage area, while night-time reception could be slightly improved in parts of North East England, Northern Ireland, Hampshire and Norfolk where lower power transmitters operate on the same frequency.

The coverage reductions were motivated by Arqiva quoting a much higher price for continuing operation of Absolute’s AM network in the pre-2018 configuration beyond April 2018. This was due to the need to replace much of the transmission equipment. Closing some sites thus reduces the amount of new equipment needed and, together with the power reductions, offsets the cost of procuring the remaining new equipment. These changes reduce the daytime population coverage from 90.5% to 85.4%. However, the additional loss of night-time coverage impacts the evening commute and parts of the morning commute during winter. Furthermore, most of the coverage lost is in areas without a rock music service on FM, where most of the AM listening will take place. Therefore AM listening is likely to drop by 10-15% because of the changes.

Between 2018 and 2022, AM listening to Absolute Radio is likely to drop by about a third as more cars and commercial vehicles become equipped with DAB. Absolute predicts that the new AM network configuration will cease to be profitable at that point. To maintain viability after that, it would be necessary to close AM transmitters in areas where Absolute or another rock music service is available on FM, namely Brookmans Park, Droitwich, Oxford, Fareham and Bournemouth. However, it is unclear whether or not Ofcom would permit this. A complete closure of the AM network on 1 May 2022 is thus likely.

**Talksport**

Talksport’s AM broadcasting licence expires at the end of 2018 and will almost certainly be renewed for another four years. AM listenership will be similar in different parts of the country. Therefore, a reduction in transmitter powers and the closure of some low-power transmitters should be a viable way of reducing the transmission cost per AM listener and/or offset any capital investment cost. Ofcom is likely to allow a similar reduction in coverage to that implemented by Absolute Radio. However, as Talksport’s AM audience is much larger, it is likely to want to retain more coverage. Power reductions at Brookmans Park, Droitwich and Moorside Edge would be likely. Reductions at Washford and Westerglen are also possible.

Five low-power sites are now used only by Talksport, following closures of several Absolute Radio and BBC local radio transmitters in 2018. If Talksport wishes to continue broadcasting from these sites, the cost is likely to increase. Most of these transmitters improve night-time coverage in areas that can also receive one of the high-power transmitters. Duxhurst, Hull and Rusthall serve areas where one or two other transmitters can be heard as background echoes at night behind the signal from the relevant high-power transmitter (Brookmans Park or Moorside edge). Many listeners will tolerate this, so these sites may well close when Talksport’s AM broadcasting licence is renewed. Alternatively, Hull could also be served from the Goxhill site, used for Viking 2. Clipstone serves an area where there is night-time interference between the ground wave and sky wave from the strongest high-power transmitter, which results in intermittent distortion that few listeners will tolerate. Talksport will therefore need to make a commercial decision as to whether to retain this. The final transmitter, at Torbay, transmitter serves an area where daytime reception from the high-power transmitters is poor, so will probably be retained unless the power of the neighbouring Exeter transmitter is substantially increased. Moving the transmitter from its current site at Occombe to the Beacon Hill FM/DAB/TV site would potentially save money. In addition, the Dumfries, Londonderry, Redruth and Rosemarkie transmitters could close due to the small populations they serve. The Dundee, Exeter and Wallasey transmitters also improve night-time coverage in areas that can also receive one of the high-power transmitters, though Wallasey serves a large population. The other Talksport transmitters are likely to continue for the duration of the new broadcasting licence.
It is likely that Talksport will want to continue on AM beyond 2022. However, the high-power transmission sites will only be viable if the BBC continues to use them. Otherwise, Talksport will have to switch to alternative sites, which will only support lower-power transmitters and thus provide less coverage. These would be a mixture of sites used by continuing local AM services and high-power FM/DAB/TV sites which have tall enough masts to support an AM antenna. For example, the Crystal Palace site in London already hosts 3 AM transmitters.

**BBC Radio 4 Long Wave**

The BBC currently proposes to close Radio 4 Long Wave in 2020, provided the current transmitter at Droitwich can be maintained. This date is determined by the contract to provide the Radio Teleswitch Service until 31 March 2020, whereby phase information in the long wave transmissions is used to switch ‘Economy 7’ electricity meters between day and night modes. This is likely to be extended by a year or so due to delays in smart meter installation. However, there is scope to reduce the power of the long wave transmissions before closure, particularly at times when Radio 4 FM programmes are carried.

The long wave transmitter at Burghead, serving Northern Scotland, and the associated medium wave transmitters could potentially be closed early; this is permitted under the BBC’s contract with Arqiva. The MW transmitters in London, Plymouth and Cornwall supplement weaker LW reception, which is more important after dark. However, as separate programmes (from FM) are rarely broadcast in the evenings, there is arguably no need for them. In Northern Ireland, North East England and Aberdeen, multiple LW transmitters can be received. These cause mutual interference in cars, which use a whip antenna. However, other radios, which use a ferrite rod antenna, can be rotated to select one transmitter or the other. Audiences for the Enniskillen and Londonderry transmitters are likely to be very low. The LW transmitters are also synchronized to minimize interference effects in Newcastle and Aberdeen. The Carlisle MW transmitter may have to be maintained as the two LW transmitters receivable there are ~180° apart.

**BBC Radio Five Live**

The BBC’s current AM transmission contract with Arqiva runs until 2020. If it continues with its present format, Radio Five Live is likely to continue broadcasting on AM beyond this, serving areas with inadequate DAB reception and cars and commercial vehicles without DAB. Final closure is likely to happen at some point during the mid 2020s. However, if the BBC change the format of the station, potentially due to budget cuts, it may choose to make it digital only from that point.

If the BBC decides to maintain Five Live’s AM service beyond 2020, there is considerable scope to reduce costs with minimal reduction in coverage, noting that the BBC is a public service broadcaster. Any capital expenditure required to maintain the BBC’s AM and FM services will need to be offset by cuts, most likely to AM provision, as the BBC is unlikely to accept any increase in its overall analogue radio transmission bill.

The powers of the high-power transmitters could be halved as indoor coverage is less important than outdoor now that Five Live is widely available on DAB and via digital TV. The network could also be reconfigured so that all transmission sites are shared with other services. Four transmission sites are currently used by Five Live alone: Folkestone, Start Point, Stagshaw and Clevendon. Folkestone is a low power site serving South East Kent. In Kent, Five Live could move to the Littlebourne site, formerly used by Radio Kent, which is shared with Smooth Radio, potentially using the old Radio Kent frequency to avoid causing interference to Postwick reception in North East Essex. Alternatively, Folkestone could simply be closed as daytime coverage is available from Brookmans Park.

Start Point is a high-power transmitter serving Devon, Cornwall and West Dorset. Talk Sport uses low-power transmitters at Torbay and Plympton instead and this configuration was used in 1978 and 1979 when the network was first set up (for Radio 2). Thus, Five Live could potentially take over transmitters at Torbay and Plympton transmitter relinquished by other services, closing Start Point. The Radio Cornwall transmitter at Bodmin might also be used, subject to improvements in Radio Cornwall’s FM or DAB coverage. However, this change would degrade reception in parts of central Devon where DAB reception is poor. Alternatively, if Start Point is retained, it should be possible to close the Exeter transmitter as there is no longer interference from Germany on 693 kHz. Closure of the Bournemouth and Redruth transmitters may also be possible, however the signal strength from Start Point is lower in these areas. The fate of the Redruth site may depend on whether other broadcasters, such as Talksport, continue to use it.

The Stagshaw high-power transmitter serves North East England and could potentially be replaced by low-power transmitters at Newcastle Wrekenton and Carlisle. When Radio 4 Long Wave closes, Five Live could take over its transmitters at these sites and close Stagshaw. Absolute and Talk Sport also serve Teeside from a transmitter at
Stockton. However, Wrekenton may provide adequate coverage of Teesside on 603 or 693 kHz as signals travel further on these frequencies than on the higher frequencies used by Absolute and Talksport. This change would however degrade reception in parts of North West Northumberland where DAB reception is poor.

The Clevedon high-power transmitter serves Bristol, Somerset, Wiltshire and South Wales. Absolute and Talksport serve this area from the Washford site. However, Washford cannot be used on 909 kHz because of the Radio Wales transmitter on 882. In principle, 720 kHz, once relinquished by Radio 4 LW, could be used instead at up to 10 kW, while a number of other frequencies in the low frequency part of the medium wave band could be used at up to 2 kW. However, the costs of installing an additional transmitter at Washford could wipe-out the savings from closing the Clevedon site. Instead, it may be cheaper to wait until Absolute eventually closes its AM service and then use its transmitter and frequency at Washford. Closing Start Point or moving it to 909 kHz would also improve reception of the Droitwich transmitter within Clevedon’s coverage area.

Finally, the BBC should also consider whether Five Live’s audience in Northern Scotland is sufficiently large to justify continuation of the high-power transmitter at Burghead, a site also used by Radio Scotland. The same potentially applies to the Londonderry and Enniskillen sites in Northern Ireland and the Tywyn site in Wales. The Whitehaven and Barrow transmitters could also be potentially be closed if daytime reception from the main transmitters is sufficient there.

**AM Only Stations**

A few stations still broadcast on AM only. BBC Radio Wales FM coverage is to be expanded during 2018, but 9% of the Welsh population will still have poor or no FM coverage and most of these also have no DAB coverage. There are also a few areas where BBC local radio, Radio Scotland or Radio Ulster are only available on AM with no current plans to introduce DAB coverage. These areas should be served on either DAB or FM as soon as possible. FM frequencies are available in nearly all of the affected areas. A low-cost solution would be to redeploy a number of Radio 3 FM transmitters. This is already planned for a few parts of Wales. Low-powered Radio 3 FM transmitters could be closed in areas where there is good DAB coverage and a high-power FM transmitter provides outdoor coverage. Indoor coverage would be provided by DAB. This could be justified on the basis that Radio 3 has a much lower audience than any other national FM station and much better audio quality on DAB than any other major UK station. Coverage of BBC local and regional radio could then be provided using a mixture of in-situ former Radio 3 transmitters and transmitters relocated from other areas.

Another group of stations stuck on AM are those on low-power AM (LPAM) restricted service licences (RSLs), including many hospital radio stations. These stations broadcast over a much smaller area than community radio stations, so are not suited to the new small-scale DAB multiplexes. However, their small coverage area means that they could be allocated FM frequencies that are unsuitable for community radio. Thus, these stations should be moved to FM as soon as possible.

*Paul Groves. August 2015*

*Last updated: October 2018.*
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<th>Capital Cost (£)</th>
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Transmitter costs comprise antenna, transmitter, and distribution. Estimated antenna costs are shared across all users of a particular antenna and account for the number of masts and their height, which vary between £3,000 and £15,000 per year. Taller masts are assumed to have larger ground mats. Costs will be higher than estimated here where antenna systems need rebuilding as these will be amortised over 4-10 years.

Transmitter costs include electricity, maintenance, and capital expenditure (assuming a 25 year replacement cycle). £9,000 per year is assumed for transmitters up to 1 kW and £10,000 per year up to 2 kW. Up to 20 kW, £8,000 plus £1,200 per kW is assumed. Above that, £1.60 per kW is assumed. Power estimates are based on transmitter output, not the broadcast power in the direction of maximum antenna gain.

The highest power stations typically use multiple 50 kW transmitters, thus it is reasonable to assume that maintenance and capital costs will be proportional to transmitter power. Costs will be higher than estimated here where capital costs are amortised over less than 25 years.

Transmitters marked with an asterisk (*) could reduce the cost per listener by reducing power.

Transmitters marked with a cross (†) provide night-time reception in areas where clear daytime-only reception is available from a high-power transmitter.
Appendix B: Land Value

An issue that is beginning to effect the viability of some AM transmission stations is land value. Medium-wave antennas normally incorporate a conductive ground mat of at least 40m in diameter per mast, which must be kept clear. Directional antenna systems require two or more masts. Consequently, they require substantially more land than FM and DAB transmitters. Most AM transmitters are located in rural areas or on flood plains so the sites have limited alternative use. However, some sites are within towns and cities and could be sold for development for housing, retail units or light industrial units, which would be considerably more profitable for the land owner than maintaining them as transmission sites. This has already happened for three sites. Reading Manor Farm, which carried Absolute Radio and Smooth, closed in May 2015; Bristol Mangotsfield, which carried BBC Radio Bristol and Smooth, closed in February 2016; and Aberdeen Nigg, which carried Northsound 2 closed in April 2018. Where a site is also used for FM and/or DAB, the part of the site used for the AM antenna could be sold while the transmitter building and FM/DAB mast is retained.

The following AM transmission sites have high potential for redevelopment:

- Lewsey Farm, Luton, carrying BBC Three Counties Radio and Smooth;
- Kempston, Bedford, carrying BBC Three Counties Radio and Smooth;
- Hadfield Road, Cardiff, carrying Smooth;
- North Looe near Epsom, carrying Premier;
- Bebington, Merseyside, carrying Radio City Talk;
- Colinswell, near Edinburgh, carrying Forth 2;
- Tywyn, Wales, carrying Radio Wales and Radio Five Live;
- Ashton Moss, Manchester, carrying Asian Sound and Key Radio.
- Ashton Moss (NGW), Manchester, carrying Gold.

The following AM transmission sites have some potential for redevelopment:

- Little Shurdington, Gloucestershire, carrying Smooth;
- Hoo St Werburgh, Kent, carrying Smooth;
- Clipstone, Nottinghamshire, carrying Talksport;
- Folkestone, carrying Radio Five Live;
- Farnley, West Yorkshire, carrying Radio Leeds;
- Whitehaven, Cumbria, carrying Radio Five Live and Radio Cumbria;
- West Lynn, Norfolk, carrying Radio Norfolk;
- Fulford, York, carrying Radio York;
- Sheffield MF, carrying Radio Sheffield;
- Bexhill, carrying Radio Five Live and Smooth;
- Trowell, carrying Absolute Radio and Gold;
- Perth Friarton Road, carrying Radio Tay 2;
- Bow, London, carrying Premier;
- Gunthorpe, Peterborough, carrying Smooth and BBC Asian Network;
- Crimpsal, Doncaster, carrying Hallam 2;
- Rohais, Guernsey, carrying Radio Guernsey;
- Southwick, Brighton, carrying Radio Five Live, Talksport, Absolute Radio and Smooth;
- Fareham, carrying Radio Five Live, Talksport, Absolute Radio and R Solent;
- Fern Barrow, Bournemouth, carrying Radio Five Live, Talksport, Absolute Radio, Smooth and R Solent;
- Redmoss, Aberdeen, carrying R Five Live, Talksport, R4 LW and R Scotland;
- Wallasey, Merseyside, carrying Talksport and Radio Merseyside;
- Hull, carrying Talksport;
- Stockton, carrying Talksport, Absolute Radio and TFM 2;
- Wrekenton, Tyneside, carrying Talksport, Absolute Radio, Radio 4 LW and Radio Newcastle;
- Brookmans Park, Hertfordshire, carrying Radio Five Live, Talksport, Absolute Radio and Lyca Radio;
- Droitwich, Worcestershire, carrying Radio Five Live, Talksport, Absolute Radio and Radio 4 LW;
- Lisnagarvey, Northern Ireland, carrying Radio Five Live, Talksport, Absolute, R4 LW and Radio Ulster.
Appendix C: FM/DAB Coverage Improvements Needed to Enable BBC Local and Regional Radio AM Switch-Off

Improvements to either FM or DAB coverage at the following locations are needed to enable most remaining BBC Local and Regional AM transmitters to be switched off without loss of coverage for the relevant service. More than a hundred FM or DAB transmitters would be needed; this number includes the new Radio Wales FM transmitters planned for 2018. In practice, the BBC may decide that coverage of smaller populations is not financially justifiable, particularly in England.

Radio Cornwall (Mid Cornwall, 657): Boscastle area (technically outside the MW coverage area) and possibly Port Isaac (both small populations). Other areas of poor FM coverage could be served by reallocating Radio 3’s Penalligon Down transmitter, noting that this already broadcasts Radio Cornwall on DAB.

Radio Cumbria (North, 756): Alston, Kirkby Stephen and Lorton (all small populations).

Radio Cumbria (South, 837): Coniston, Gosforth, Grasmere, Penny Bridge, Sedbergh and Tebay (all small populations).

Radio Derby (1116): Ashbourne and Dove Valley (small population served by Grange Farm site).

Radio Devon (Barnstaple, 801): Serving all of this area on FM or DAB would require a large number of transmitters serving small populations. Providing coverage along the north coast requires additional DAB or FM transmitters at Woolacombe, Berrynarbour, Combe Martin, Beacon Castle (for Parracombe) and Countisbury (for Lynston). (If an FM solution is adopted, a transmitter would also be needed at Ilfracombe, which has DAB.) Inland, coverage improvements are needed at Great Torrington, Johnstone Moor (serving South Molton), Stickelpath, Swinbridge and Wind Lane (serving Brayford). However, some of these areas could potentially be served by increasing the power of the Huntshaw Cross FM transmitter.

Radio Devon (Exeter, 990): Beer and parts of Cullompton, which could potentially be served by reallocating Radio 3’s Axe Valley and Gogwell FM transmitters, respectively, to Radio Devon. This would also improve FM reception in Axminster and Tiverton, where DAB reception is available. Radio 3’s Holcombe Down FM transmitter could also transfer to improve coverage in Dawlish and Exmouth, which also have DAB reception.

BBC Essex (Main, 765): FM and DAB reception in western Essex is very poor. New transmitters are needed at Alsa Wood (Serving the Stanstead area), Brentwood, Grays/Tilbury and Swards End (serving Saffron Walden). Finding suitable FM frequencies will be difficult. Saffron Walden could potentially be served by adding BBC Essex to the Cambridge DAB multiplex while Brentwood, Grays and Tilbury could be served by adding BBC Essex to one of the London multiplexes.

BBC Essex (North East, 729): An FM transmitter for Harwich and Walton-on-the-Naze or a DAB transmitter serving these areas from Felixstowe Walton Avenue is needed.

Radio Gloucestershire (East, 1413): Andoversford (small population, but major traffic route) and Winchcombe.

Radio Gloucestershire (West, 1413): Chalford, Cinderford, Coleford, Dursley and Nailsworth.

BBC Hereford and Worcester (North, 1584): An FM or DAB transmitter at Titterstone Clee Hill or an FM transmitter at Woofferton is needed.

BBC Hereford and Worcester (Worcester, 738): An FM or DAB transmitter at Titterstone Clee Hill would also improve coverage through much of Worcestershire. A further transmitter at Wood Norton, serving the Evesham area may also be needed.

Radio Lancashire (855): Transmitters at Barnoldswick, Whalley and possibly Haslingden are needed. The Radio 3 FM transmitters at Haslingden and Whalley could potentially be reallocated to Radio Lancashire.

Radio Leeds (774): Transmitters at Hebden Bridge and Todmorden are needed. The Radio 3 FM transmitters at these sites and also Idle (serving North Bradford) could potentially be reallocated to Radio Leeds.

Radio Norfolk (East, 855): A new transmitter serving Wells-next-the-sea is needed to enable both AM transmitters to be switched off. FM coverage of Thetford is also very poor, though this area receives a good DAB service.

Radio Norfolk (West, 873): North West Norfolk, including Burnham, Hunstanton and Wells-next-the-sea. It may be possible to serve this area with a single FM transmitter at Burnham.
Radio Scotland (Central, 810): Abington (and the A74 gap, South Lanarkshire), Arrochar (Argyll), Crianlarich (Stirlingshire) (all small populations). Further coverage along the A82, A84 and A85 in West Stirlingshire, North Argyll and SE Highland may also be needed.

Radio Scotland (North, 810): Balintuin (Aberdeenshire), Ballochbuie Forest (Aberdeenshire), Balblair Wood (Highland), Ben Tongue (NW Highland), Braemar (Aberdeenshire), Craigellachie (Moray), Durness (NW Highland), Lairg (Highland), Melvich (NW Highland), The Cairnwell (Aberdeenshire) and Tomintoul (Moray) (all small populations).

Radio Sheffield (1035): Transmitters serving the Tinsley area and the Beighton, Eckington and Waterthorpe areas are needed.

Radio Solent (S Hampshire, 999): A new transmitter for Petersfield is needed. A transmitter at Burgate Manor Farm, serving Fordingbridge, is also needed to enable both AM transmitters to be switched off. The Radio 3 FM transmitter at Ventor could also be reallocated to Radio Solent; both services are available on DAB there.

Radio Solent (E Dorset and SW Hampshire, 1359): Burgate Manor Farm, serving Fordingbridge, is needed to enable both AM transmitters to be switched off. FM coverage of Poole is also very poor, though this area receives a good DAB service.

BBC Somerset (1566): Washford (serving the Vale of Taunton) and Fry’s Hill (serving Cheddar).

Radio Stoke-on-Trent (1503): A new transmitter is needed for Cheadle. FM coverage of Congleton is also very poor, though this area receives a good DAB service.

Three Counties Radio (Main, 630): Chesham and Great Missenden.

Radio Ulster (Main, 1341): Bellair (Antrim), Cushendall (Antrim), Glenariff (Antrim) and Glenelly Valley (Tyrone) (all small populations).

Radio Ulster (Enniskillen, 873): Belcoo (Fermanagh, small population) and Castlederg (Tyrone).

Radio Wales (South, 882): Abercynon, Abergwynfi, Blackmill Blaina, Cwm, Foel Fynyddau DAB (or Crynant and Pontardawe FM), Maesteg, Monmouth, Sennybridge and potential coverage of gaps along the A40 and A470 (noting that national FM is not available here). Transmitters at Knighton, Presteigne and maybe New Radnor would also be needed if the Mid Powys transmitter is closed.

Radio Wales (West, 882): Morfa Nefyn and potential coverage of gaps along the A470 (noting that national FM is not available here).

Radio Wales (North, 882): Potential coverage of gaps along the A5 and A470, noting that national FM is not available here.

Radio Wales (Wrexham, 657): Holywell (Trefynnon FM or Brynford Hill DAB).

Radio Wales (Mid Powys, 1125): Knighton, Presteigne and maybe also New Radnor. However, some reception from the Washford AM transmitter is available in these areas and would improve if the Forden transmitter on the same frequency closed.

Radio York (Main, 666): Heyshaw, serving the Pateley Bridge area (small population).

Radio York (Scarborough, 1260): Ravenscar, also serving Flylingthorpe and Robin Hood’s Bay (small population).