

About Arqiva

Arqiva is at the heart of the broadcast and utilities sectors in the UK and beyond, providing critical communications infrastructure and media services.

Arqiva provides much of the infrastructure behind television, radio, mobile and other wireless communications in the UK and we are at the forefront of network solutions and services in an increasingly digital world.

Arqiva is the only national provider of terrestrial television and radio broadcasting and provides a machine-to-machine connectivity network for smart metering within the utilities sector.

Arqiva's history can be traced back to 1922 when it broadcast the world's first national radio service. In 1936 it carried the BBC's first television broadcast. In 1978 it enabled Europe's first satellite TV test. By the 1990s Arqiva was working with the UK's mobile operators to bring mobile telecommunications to UK businesses and consumers. In the 2000s, it launched the UK's national DAB radio and Digital Terrestrial Television networks. Most recently, Arqiva has played a pioneering role in the roll-out of the national smart energy and water metering networks.

Our teams are, behind the scenes, delivering millions of vital connections every day for our customers, the major UK and international broadcasters, independent radio groups as well as major utility companies and networks.

Arqiva is owned by a consortium of infrastructure investors and has its headquarters in Hampshire, with major UK offices in London, Buckinghamshire and Yorkshire and operational centres in the West Midlands and Scotland.

Question 1: Do you have comments on the overall approach to the review?

Arqiva supports the need for a periodic review of spectrum management and usage. However, any review must take into consideration the need to provide the regulatory stability necessary to allow businesses to successfully invest with certainty of an acceptable return and to continue to innovate within spectrum currently allocated.

It is vital that Ofcom's approach to spectrum is joined up with wider policy objectives that Government and Ofcom has in relation to the sectors it covers. It is not sufficient to take decisions on spectrum in isolation, the views and impacts of any changes on society, existing users and the costs of any changes or transitions should be fully taken into account. For example, in a different part of Ofcom in its 2020 Future of Public Service Media consultation¹ it is stated in relation to Digital Terrestrial Television (DTT) that: *"Even as viewing behaviour changes, with increasing numbers watching on a variety of different devices, around 85% of people continue to watch broadcast content every week and we expect digital terrestrial broadcasting to continue to play a significant role for at least the next decade"*. We expect Ofcom's approach to spectrum to be joined up, demonstrate an understanding of the long-term requirements of spectrum use and to continue to support the Government and Ofcom's wider ongoing policy objectives around DTT.

We understand why it is appropriate to have sector specific reviews if there are issues within a spectrum band. However, the approach deemed necessary, in the use of one spectrum band, may not be applicable across all bands. Different bands are best suited to different uses and Ofcom,

¹ Ofcom, Small Screen: Big Debate Consultation 'The Future of Public Service Media', 2020, (para 3.18)

notwithstanding its commitment to 'technology neutrality', needs to recognise this in its management of spectrum.

Whilst we recognise the importance of optimising spectrum use at a national level, we welcome Ofcom's reference to engagement with International bodies. It is important that Ofcom continue to work within the European and International communities (CEPT & ITU) to ensure national objectives are realised, particularly as national policy decisions will often have to align internationally.

Question 2: Have we captured the major trends that are likely to impact spectrum management over the next ten years?

We believe that Ofcom's work in identifying the major trends is well founded and that the "Technology Futures" report is a useful insight into possible future trends and spectrum requirements.

It is however very important to be mindful of all existing spectrum use and its importance to existing users. Focussing solely on new technologies can risk overlooking the dependency of the UK population on existing services and their likely continued use in the future. It would be wrong to only focus on early stage trends in relation to new technologies as these can be misleading and relate primarily to early adopters, more affluent or technologically savvy consumers or be weighted to specific age groups or demographics and sometimes skewed towards those in urban areas. Spectrum management needs to adopt a balanced approach where the views, usage habits and perspectives of citizens across the UK, of all age and socio-demographics, are taken into consideration.

Question 3: Could any of the future technologies we have identified in Annex 6, or any others, have disruptive implications for how spectrum is managed in the future?

When might those implications emerge?

Artificial intelligence (AI) and Machine Learning (ML) will have value in automated spectrum management, but this will most likely to be within individual networks and systems, where it can be integrated with other technology functionality such as adaptive antennas and modulation. In their consideration of spectrum management technologies Ofcom must consider not only the frequency domain but also the time domain. Many networks that use a single frequency only do so for short periods of time, advances in technology may enable opportunist use of this spectrum during these 'off' periods.

We anticipate that it will be very difficult for a regulator such as Ofcom to design a system which can efficiently allocate licences to individual spectrum users for short periods of time. It may become important that the impact of AI and ML are accounted for in compatibility calculations.

Ofcom has invested significantly in the TV Whitespace framework using automated spectrum management though this has not been widely used or applied? Ofcom must review this before applying similar approaches elsewhere.

Regardless of any 'good neighbour' ambitions, implementation of any self-optimising network and the use of dynamic spectrum allocation will need to protect any use of the relevant spectrum by existing services and ensure that these are not impaired.

Question 4: Do you agree that there is likely to be greater demand for local access to spectrum in the future?

Do you agree with our proposal to consider further options for localised spectrum access when authorising new access to spectrum?

Arqiva recognise that at higher frequencies developments in 4G and 5G will enable new local spectrum possibilities and there is likely to be demand in some areas and by some use cases. There are many applications where the mobility supported by national licencing is unnecessary.

It is, however, important to note that localised spectrum access is well established in applications such as PMSE, local broadcasting and professional mobile radio, using existing spectrum management approaches. Local spectrum access at shorter ranges can be managed by technologies which allow sharing, such as Wi-Fi.

Whilst there is a clear demand for local access this must not come at the price of compromising national services, such as TV and Radio, which deliver essential services to the UK population.

In para 4.6 of the consultation Ofcom state there is an expectation that certain services such as Public Service Media (PSM) TV are available to everyone wherever they are.

Around 35 million TV sets have access to DTT in over 17 million homes² equal to 67% of all working TV sets in the UK. Over the last 10 years despite the exponential growth in competition, the platform has experienced primary household growth of over one million households with the biggest growth experienced over the last 5 years³. Importantly, more vulnerable consumers access DTT services than any other platform. C2, D & E socio-economic groups represent 55% of DTT only households compared to an average of 41% across all TV households. Those aged 65+ alone represent 47% of all DTT only households.

These individuals are far less likely to adopt new technologies or have a willingness or ability to pay for services including Pay-TV or Broadband, even if it is available to them. No other video service or TV platform could act as a direct replacement to DTT, nor do they have the universal coverage or uptake to replace the service DTT provides to audiences. Ofcom have stated "*It is clear many of the key societal benefits of PSB derive from the fact that essentially all citizens are able to receive PSB via commonly available technology*"⁴

Whilst it is generally thought that fixed TV access to audio-visual (AV) content will move slowly over time towards IP delivery for more households, this will be a slow ongoing process with no obvious end date. The UK's Broadband network is expected to be faster and more robust over time however there is no evidence that it will have offered the universal coverage and uptake required to be a credible alternative to DTT even by the mid-2030s. Consequently, to ensure that TV is available to everyone wherever they are, it is important that DTT has continued access to spectrum and long-term regulatory stability. This will also allow the platform to migrate over time to more advanced distribution technologies allowing higher resolution more interactive services⁵ to UK citizens as well as, potentially, access to mobile (car mounted) and handheld devices.

In terms of making spectrum available, broadcasting has played its part. Over the past decade Ofcom, Arqiva and other industry stakeholders have worked collaboratively to deliver significant spectrum

² BARB, 2020 – Establishment Survey, Q1 2021

³ BARB, 2020 – Establishment Survey, Q1 2021

⁴ Ofcom, Small Screen: Big Debate Consultation 'The Future of Public Service Media', 2020 (para 3.27)

⁵ The average size of TV monitors is increasing as well as the number of Smart TV installations.

efficiencies. This has enabled wholesale spectrum clearance for mobile use which now occupies one third of the spectrum previously occupied by broadcasting.

In contrast mobile operators in the UK currently collectively hold over 600 MHz of spectrum. These considerable holdings cover a range of networks and frequencies and there is scope for re-farming of existing spectrum bands many of which are under-utilised or not used efficiently. On top of existing holdings, following WRC-19, over 12 GHz of spectrum has been identified for use by mobile applications. In terms of sharing and local access, Ofcom need to look at mobile spectrum access and how it is used. Hence, notwithstanding the impending auctions, we do not understand why Ofcom's proposals specifically exclude the 700 MHz and 3.6-3.8 GHz bands.

Question 5: Do you agree with the actual and perceived barriers identified for innovation in new wireless technologies, and our proposed ways of tackling those?

We agree that technology and service neutral approaches are good aims for spectrum usage conditions and these, if implemented correctly, provide the flexibility necessary to allow innovation whilst providing a known protection to existing services. Ofcom have a difficult balance to strike between making usage conditions too wide ranging and hence making coexistence difficult or specifying narrow conditions that limit scope for innovation. The balance between these two positions, being related to the 'good neighbour' concept, arguably leans towards more relaxed conditions and difficult co-existence.

We recognise the focus on "short range" devices but it will be necessary to address the impact on all devices as the result of any proposed innovation. It will not be possible to pre-determine the location of mobile devices and any impact of a short-range device on existing services will still need to be addressed when developing new spectrum use cases and the related standards.

Question 6: Do you agree with Ofcom's proposals to improve our outreach and reporting activities, and spectrum information tools?

- a) Are there additional ways that Ofcom could better engage with existing and future users and providers of wireless communications?
- b) Please explain any specific areas where you believe more or better provision of information could provide value to stakeholders

We appreciate the balance that Ofcom must strike between providing access to information collected or provided to Ofcom and the need to maintain, in some cases, commercial confidentiality and security.

Where information is made available it is important that it is up to date and relevant. Any action that Ofcom take to improve the quality of data and its accessibility, within recognised constraints, is welcome and encouraged.

Question 7: Do you agree that it is important to make more spectrum available for innovation before its long-term use is certain?
Do you have any comments about our proposed approach to doing this?

We support making spectrum available to allow innovation. The implications of any impact on existing use and related services must be examined and considered carefully in such cases.

The proposed pioneer licences allowing access when future use is uncertain may be useful in some bands but may prove to be unattractive because investment will be difficult to justify without long term assurance of spectrum availability.

Question 8: Do you agree that it is important to encourage spectrum users to be 'good neighbours' to ensure more efficient use of the spectrum?

Do you agree with our proposals to:

- a) increase realism in coexistence analysis at a national and international level?
- b) encourage spectrum users to be more resilient to interference?
- c) ensure an efficient balance between the level of interference protection given to one service and the flexibility for others to transmit?

Do you have any comments on which of these will be the most important?

Arqiva agrees that efficient use of spectrum is important though we have concerns over the proposals made in this consultation.

With spectrum being a finite resource, its efficient use should be in everyone's interest. However, efficient use isn't simply about being a 'good neighbour', it is also about careful allocation of bands and maximising the use of those bands through use of the most spectrally efficient technology.

Too much spectrum is wasted through band fragmentation, excessive guard bands and use of end-of-life and underused technology. It is the initial planning (spectrum management) that will drive 'good neighbour' behaviour – the regulatory and technical framework.

Whilst the aim of the 'good neighbour' is improved spectrum efficiency, there are a number of issues with its application:

- Its purpose exploits the fact that whilst certain equipment standards are lax in terms of filtering (to ease production and minimise cost), equipment made to those standards generally perform better⁶.
- It will not encourage manufacturers to improve equipment specifications (filtering) but rather may have the opposite effect. Concerns about certain aspects of the use of actual equipment performance in determining compatibility between different systems have previously been raised⁷.
- As compatibility between systems and definition of technical parameters is normally determined before equipment is brought into operation, how can a representative sample of actual equipment be tested, and the results used? A definition of representative equipment is required.
- Technology changes – if compatibility is determined on a set of results from a piece of equipment, how will a change in manufacture and hence performance be policed. For example, in a receiver a

⁶ Much of the basis of the 'good neighbour' proposal is encapsulated in ECC Report 249.

⁷ During the public consultation on ECC Report 249

change from discrete component filtering to a software-based approach, or in a transmitter, a change to equalisation algorithms to improve efficiency that change the out of band component.

- The 'good neighbour' approach could be interpreted as the 'dirty neighbour' approach. It may be that the affected system can tolerate some interference as it is able to adapt. In such a case a 'dirty neighbour' may reduce throughput but may not materially impact the affected service. However, in the case of a service that cannot adapt, such as broadcasting, the additional interference may not be acceptable. It is unclear how Ofcom will apply the 'good neighbour' proposal with respect to different existing services.

Whilst the aims of Ofcom's 'good neighbour' proposal are well founded there is much about how it would be applied that needs to be clarified before Ofcom implements any of its proposals.

Ofcom's proposal of paying for protection are also unclear. If this means providing additional guard bands this would not be an efficient use of spectrum.

Whilst Ofcom's aims of improving spectrum usage are laudable, Arqiva have a number of concerns about Ofcom's proposals and the behaviours they may drive. We would ask that there is further consideration and discussion with industry before these are taken any further.

Question 9: Are there any other issues or potential future challenges that should be considered as part of this strategy?

In making spectrum available for innovation Ofcom need to recognise that certain bands are best suited to certain applications. Ofcom needs to ensure that spectrum for innovation is available in all bands and for new and existing users.

Whilst use of the spectrum is a tool for driving growth and development, Ofcom's licensing regime needs to recognise the social as well as the economic benefits of access to spectrum

Question 10: Do you agree that continued use of our existing spectrum management tools (as set out in sections 4-7) will be relevant and important for promoting our objectives in the future, in light of future trends?

With the focus moving on to sharing as a means of increasing spectrum utilisation, tools for managing such sharing will need to be developed. As spectrum usage and sharing increases more sophisticated, automated, tools will be required. With advances in technology, Ofcom should consider sharing in both the frequency and time domains.

Question 11: Is there anything else we should be considering doing, or doing differently, to promote our objectives?

It is important that moving forward Ofcom's Spectrum Management Strategy considers the whole picture, balancing changes in technology with social and economic factors and the wider policy objectives of the Government and Ofcom. The radio frequency spectrum is an important national asset that should be used for the benefit of all the UK's citizens.

Ofcom needs to ensure that citizens are not socially or economically disadvantaged by changes to access of services that use the radio frequency spectrum, and, at the same time, they need to make sure that the UK is at the forefront of technological development and innovation. Ofcom need to ensure that citizens have access to services that are trustworthy, cost effective and secure.

To give UK citizens best value, competition must be allowed, but at the same time Ofcom need to provide suppliers of services with the certainty necessary to invest in systems coupled with a return to justify such investment.

In setting its agenda, Ofcom need to recognise that though we are an island access to radio spectrum cannot be decoupled from our neighbours or the international community. It is hence important that Ofcom manage any international restrictions on its ambitions.