



Arqiva submission to Ofcom's consultation Fixed Wireless Spectrum Strategy

About Arqiva

Arqiva is a communications infrastructure and media services company operating at the heart of the mobile and broadcast communications industry. Arqiva provides infrastructure for television, radio, mobile and other wireless communication in the UK.

Arqiva operates shared radio site assets throughout the UK, including masts from under 30 to over 300 metres tall. We have worked with the mobile industry over two decades to deliver mobile services to consumers with a significant presence in suburban and rural areas. Our portfolio includes over 8,600 active, and more than 16,500 marketable sites, including radio and television broadcast sites, BT telephone exchange rooftops and use of National Grid pylons.

Arqiva is building a national Internet of Things ("IoT") network, starting with 10 of the UK's largest cities. Our smart metering service, connecting 10 million homes using long-range radio technology, will be one of the UK's largest machine-to-machine deployments.

Arqiva is a founder member and shareholder of Freeview. We broadcast all eight Freeview multiplexes, are the licensed operator of four of them as well as owning Connect TV - the first company to launch a live IP streaming channel on Freeview. Arqiva is the licensed operator of both national commercial DAB digital radio multiplexes.

Arqiva is a major player in the UK's satellite industry, operating over 80 antennas to geostationary satellites, and providing Telemetry, Tracking and Command support services to some of the leading satellite operators. We are a major provider of permanent satellite services to both Freesat and Sky customers. Arqiva also provides global satellite based services to the broadcast, communications, security, oil & gas and exploration sectors.

Our major customers include EE, H3G/Three, Telefónica/O2, Vodafone, BBC, ITV, Channel 4, Five, Sky, Global Radio and Airwave.

Arqiva is owned by a consortium of long-term investors and has its headquarters in Hampshire, with major UK offices in London, Buckinghamshire and Yorkshire.

Responses to questions

Question 1:

a) Please indicate which user type given in Table 1 best describes your use of fixed wireless links?

The table does not effectively represent Arqiva's role in providing fixed links services to customers as we can provide services to most sectors outlined in the table. This is as a result of our role as an independent provider of infrastructure to support any service reliant on wireless connectivity.

b) If you are a telecom network operator or an organisation providing wireless solutions for different user types, please indicate where possible, a breakdown of the percentage of fixed wireless links used to support the different user types i.e. mobile network operator, emergency services etc.

In practice the focus of our business is currently on our broadcasting interests either as point to point or point to multi-point.

Question 2:

a) Please indicate the applications provided by your use of fixed wireless links and the benefits these provide to citizens and consumers.

Arqiva's use of fixed links underpins the UK free to air broadcasting service, through the digital terrestrial television (DTT) network. We are also a licensed provider of the service itself by operating four of the eight UK multiplexes.

The benefits to UK citizens and consumers of the DTT network are well understood. According to a 2014 report by Communications Chambers, it delivers £3bn of TV sector revenues, £2.2bn of the sector's gross value added and 15,000 of the jobs in broadcasting and independent production. By helping to sustain the performance of the main UK public broadcasters, DTT in turn helps guarantee high levels of investment in original UK content across the sector.

Our infrastructure is also used by our customers to provide fixed links services for other sectors. An example of this would be mobile network operators who will be faced with the challenge of providing link services in an environment where data demand is increasing rapidly and where more rigorous coverage obligations could be established to secure universal broadband access. Clearly there will be a parallel policy challenge to ensure that backhaul link capacity will be made available to ensure that the mobile sector can meet these developments in the market.

b) For each application, please indicate the frequency band used and the rationale for choosing that band, i.e. the application specific characteristics that affect your specific choice of frequency band.

We set out our use of links by frequency below:

Band (GHz)	Number of Links Held
1.4	21
4	30
7.5	251
13	200
15	105
18	41
23	75
25	14
38	16
L6	38
U6	32

The determining factors in our use of frequency are:

- Planning – Keeping dish size to a minimum thus avoiding unnecessary site share fees. In other words, the smaller the dish, the easier it is to gain planning approval;
- Spares – By keeping as many links in the same band, we keep our spares holdings to a minimum; and
- Equipment – We tend to purchase equipment in advance so we aim for channels within that band.

c) For each link, please provide details of the application supported

Please see our answer to question 1 above.

Question 3:

a) How do you envisage the current and future applications provided by your use of fixed wireless links to change in the next 5-10 years?

At present, microwave links account for c30% of our total connectivity. We expect this to increase markedly, with the two key drivers of change for our use of fixed links over the next 5-10 years, namely:

- Increased use of 28 GHz spectrum to deliver 5G services (we expand on this below in our response to question 6); and
- Where services continue to be aggregated and with the consolidation of older generation analogue networks to newer IP based network this drives the demand for more microwave in networks and markets we serve.

b) What market trends and drivers will affect the use of fixed wireless links to deliver the relevant applications in the future?

The principal market trend which will affect the use of fixed links in the future will be the continuing rapid increase in data demand, low latency and high availability wireless services – driven primarily by the demand for video but also by advances in gaming, augmented/virtual reality and self-driving car applications. Much of that peak demand will be in densely populated and urban areas and will require availability of sufficient spectrum above 6 GHz as well as increasing densification of infrastructure. 5G technologies - as we understand it - will be crucial in meeting the expected increases in data demand as consumers expect availability of services which require high throughput levels, low levels of latency and high levels of reliability.

We also believe that the emergence of augmented reality will also be a significant market trend along with other use case like autonomous vehicles, medical service delivered remotely. This will require higher bandwidths as well as super low latency.

c) What bands will be relevant to support the future changes?

All existing bands as set out in Table 1 and Table 2 of the consultation will be required to support future changes. Additionally, there may be requirements for spectrum above 100 GHz to support the significant bandwidth and latency required to deliver future 5G services and applications.

d) Could your use of fixed wireless links be provided by alternative solutions? If so please give details of alternatives.

This would depend very much on the costs of alternatives and the time-to-market pressures for each service. One alternative that could become increasingly viable in future – depending on cost considerations - is dark fibre and we note the strides that Ofcom has taken to promote this alternative through its ongoing Business Connectivity Market Review process.

Dark fibre is required to be able to deliver the needs of the next generation networks and heavy demand for capacity will increase that need. By having dark fibre we are able to be flexible in the way services can be delivered to multiple customers and not be constrained by legacy issues on existing fibre.

However, we fully expect to have a significant ongoing demand for fixed wireless links over the coming years.

Question 4:

a) How will Fixed Service equipment continue to evolve to meet the increasing capacity requirements?

We refer Ofcom to the answers we gave to Question 3.

b) What is the timescale for implementation in equipment?

Implementation of equipment usually takes place over a 6-8 month time horizon.

Question 5:

a) What capacity enhancing techniques are you deploying or intend to deploy?

We have no plans to deploy such techniques at present.

b) How does this affect your future demand for spectrum?

Our future demand for spectrum will likely increase significantly. This is as a result of increased consumer demand for wireless services. As we state above – and as Ofcom reiterates in its broader Mobile Data Strategy – the rate of increase in demand is likely to be high for the foreseeable future and new services (increasingly supported by 5G) emerge and are adopted by end users.

c) Do you see any barriers in the current authorisation approaches preventing use of such technology? If so, please indicate the changes you consider would be required to facilitate this?

We have no comment to make on this question.

Question 6:

a) How do you expect future mobile backhaul network architecture to evolve as part of the 5G ecosystem?

Small cells already play a small but important role in the continued deployment of 4G networks and the increasing data capacity that is vital to mobile connectivity. In order to deliver 5G services to mobile users there will be a need to deploy small cells on a scale not previously seen in the UK. The expectation is that hundreds of thousands of small cells are expected to be rolled out in the Greater London area alone and over a million will likely be required across the country.

Small cell deployment in significant numbers will require the use of buildings or other structures, such as lamp posts and other suitable street furniture. As it stands there are challenges to businesses in getting the planning permission that they need in order to roll out small cells.

We believe that fixed wireless access (FWA) will play an increasingly central role in delivering high speed data services to premises and, with effective implementation, could provide strong competition to copper and/or fibre delivery. In that respect, we note the ongoing development of a FWA solution in the US and Asia using the 28 GHz band. Ofcom may wish to note that this spectrum is already licensed in the UK to Arqiva and others with technical licence conditions which could potentially support such a FWA solution.

However, we also note that the UK is explicitly not supporting an IMT identification for the 28 GHz band at WRC-19 and this position may need to be re-assessed subject to compatibility being established with existing satellite services.

The benefits of developing a 5G FWA solution would be significant from a competition perspective as it would promote genuine infrastructure competition. Infrastructure

competition represents one of the key objectives of the recent Digital Communications Review and we consider FWA could be an effective way of delivering true substitutability between fixed and wireless networks.

We are currently deploying small cells in the UK, using 28 GHz for backhaul. In Hammersmith and Fulham, for example, we have established a point to multipoint solution using our 2x224 MHz spectrum holdings (we are currently using 112 MHz channels of our spectrum to deliver this backhaul). Whilst higher frequencies lead to greater potential for bandwidth availability, this will inevitably be reflected on the range of the backhaul link. In terms, of the 28 GHz solution the distance is 100-500m depending on terrain and conditions.

b) How would this impact on future demand for fixed wireless links as a backhaul solution in the next 5-10 years and beyond? Please explain in terms of specific frequency bands i.e. which bands will be important for macro and small cell backhaul and why.

At a high level, more bands and bandwidth would be required to deliver a fixed wireless solution to customers for it to potentially act as an alternative to a fixed solution. We already note above that 28 GHz would be an example of a suitable frequency to deliver such a service given it offers significant bandwidth and is already licensed to potentially deliver these services.

For a FWA solution to emerge there would need to be equipment manufactured at scale and planning challenges would need to be overcome to enable roll-out of small cells in urban environments and elsewhere. Accordingly, we will continue to work with commercial partners and the relevant planning authorities to enable the optimal outcome to emerge.

c) What is the most appropriate authorisation regime to facilitate this?

In terms of spectrum, the existing licensed regime continues to be the most suitable framework.

Question 7:

For each Fixed Service band currently identified for study for 5G under WRC-15 Agenda Item 1.13 and 3.6–3.8 GHz band, please explain the impact on your backhaul use should the bands be identified and be repurposed for 5G given that the viability of in-band sharing between mobile access and backhaul is currently being studied.

As it stands, there would be little to no impact on our use of fixed links as result of this WRC-19 Agenda item.

Question 8

a) What is the current use in the block assigned bands at 10 GHz, 28 GHz, 32 GHz and 42 GHz bands and how do you expect usage in these bands to evolve given that the 32 GHz and 42 GHz bands are also being considered for study for 5G globally?

We have a full plan to deploy in the 28 GHz band but are not in a position to advise on the other bands listed.

b) For each band, please provide details including geographic location of each fixed wireless link deployed and the application it supports. Where these bands are used for fixed wireless links, please give details in terms of the capacity supported and total numbers of links deployed.

Details of our use of the 28 GHz band are commercially sensitive.

Questions 9-20

As a "neutral host" infrastructure provider, others would be better placed to respond to these questions.