



Arqiva submission to Ofcom's consultation Improving consumer access to mobile services at 3.6 to 3.8 GHz

About Arqiva

Arqiva is a communications infrastructure and media services company operating at the heart of the satellite, mobile and broadcast communications industry. Arqiva provides much of the infrastructure behind television, radio, mobile and other wireless communication in the UK. We are at the forefront of network solutions and services in an increasingly digital world. We provide much of the infrastructure behind television, radio and wireless communications in the UK and have a growing presence in Europe.

Arqiva is a major player in the UK's satellite communications business, operating over 80 antennas to geostationary satellites, 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. We also provide global satellite based services to the broadcast, communications, security, oil/gas, and exploration sectors, using our five UK teleports as well as facilities in the Middle East, Asia and the Americas. Our satellite customers include Turner and NBCU.

We are active in the telecommunications sector, providing access to over 8,000 sites and infrastructure for mobile phone operators. We are building and running a national Internet of Things ("IoT") network which is now live, starting with 10 of the UK's largest cities. In addition, our smart metering communications service, connecting 10 million homes using long-range radio technology, will be one of the UK's largest machine-to-machine deployments. This will require sites across northern England and Scotland.

Arqiva is a founder member and shareholder of Freeview. We broadcast all eight Freeview multiplexes and are the licensed operator of four of them. We own Connect TV, the first company to launch a live IP streaming channel on Freeview. In terms of radio delivery, we are the licensed operator of Digital One – the national commercial DAB multiplex. We are also a member of the Digital Two consortium which launched the second commercial DAB multiplex in 2016.

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 and operational centres in Greater Manchester, West Midlands, and Scotland.

Overview

Arqiva's interest in Ofcom's proposals to introduce mobile services in the 3.6 to 3.8 GHz band are, in the first instance, based on our existing and extensive use of this spectrum for satellite and fixed links services. However, as the largest UK independent provider of infrastructure to the mobile sector, we also recognise the opportunities that releasing this spectrum for 5G may bring to citizens and consumers. With that in mind, we approach this consultation with cautious support for the principle of releasing the entire 3.4 to 3.8 GHz band for mobile, but contingent upon sensible mitigations being agreed with existing users of the band.

Ofcom will be aware from, amongst other sources, responses to its recent consultation on Space Spectrum Strategy that the satellite industry requires very long lead times to build and deploy infrastructure which serves valuable and vital services. These deployments also involve significant investment across the entire satellite value chain. As a result of this, any regulatory changes to the way that satellite services are delivered – such as that being proposed by Ofcom in this consultation – will necessarily need to be introduced over as long a time period as possible. Any resultant incremental costs to the satellite sector should be fully recognised and taken account of.

We recognise the interest in the broader 3.4 to 3.8 GHz band for mobile services, particularly on the back of the identification of this band by the Radio Spectrum Policy Group (RSPG) as a “pioneer band” for 5G and the broader work of the recent EU 5G Action Plan.

At the same time a number of statements made by regulators have given existing users of the band the expectation they would be able to continue delivering services supported by the 3.6 to 3.8 GHz band in the longer term. For example, European Commission Decision 2008/411/EC on harmonising the 3.4 to 3.8 GHz band stated:

*This Decision aims at harmonising, **without prejudice to the protection and continued operation of other existing use in this band** [our emphasis], the conditions for the availability and efficient use of the 3 400-3 800 MHz band for terrestrial systems capable of providing electronic communications services.*

Recital 7 of the same decision also clearly foresaw effective sharing arrangements between future mobile use and existing satellite operations which would allow for successful co-existence between the mobile and satellite service.

This raises important questions as to whether a reorganisation of this spectrum at this time frustrates the UK satellite industry's legitimate expectations to use this band. As a result, government and Ofcom should consider what public support will need to be made available to support any such reorganisation.

There are, in any case, complexities to the mitigations that might be taken to enable any alternative uses of spectrum in these frequencies. Accordingly, we would urge Ofcom to proceed in a conservative manner, recognising the difficulties inherent in changing the way

satellite uses spectrum in this band. Ofcom should seek to avoid undermining an otherwise highly successful UK industry at a time when the UK is focussing on creating an Industrial Strategy which will be fit for purpose in the world after the UK leaves the European Union.

We set out below the specific challenges in our responses to the questions Ofcom raise in its consultation – in particular in our responses to Questions 7 and 8.

In terms of fixed services, our use of these is less widespread than our satellite interests. However, Ofcom should be aware that altering the way we use this spectrum in response to a future roll-out of 5G mobile services presents its own specific challenges. Similarly, we would urge that any decisions in this area should broadly adopt the same principles as we propose for our satellite teleports.

We consider the following principles should underpin any decision to reorganise the 3.6 to 3.8 GHz band:

- Sufficient time needs to be allowed for industry to respond to this policy. The length of time required will depend on the nature of the mitigations;
- Any mitigations that existing users put in place need to be accompanied by long-term regulatory certainty to underpin necessary new investments;
- Decisions on spectrum pricing should avoid undermining investment decisions and reflect that use of spectrum is already changing; and
- Existing users who had a legitimate expectation to use these frequencies should receive funding and other appropriate support to cover legitimately incurred incremental costs related to mitigation measures.

Responses to questions

Question 1: Do you have any comments on the use of the 3.6 to 3.8 GHz band by existing services?

The consultation does not sufficiently recognise the nature of satellite use in the 3.6 to 3.8 GHz band in that there is a global eco-system which has evolved which relies on these frequencies. As a result, there is a very significant use of this spectrum by satellite service providers (and to a lesser extent, fixed links services). This use has rested on large scale investments which are currently being monetised and require an investment horizon of 20 years or more.

According to the 2003 Communications Act, Ofcom has a responsibility to ensure "that a wide range of TV and radio services of high quality and wide appeal are available throughout the UK." In recognition of this, we would specifically ask Ofcom, in this consultation, to consider the indirect impact of, as Ofcom describes it "satellite operators accepting a lower benchmark spectrum quality". We set these out within this consultation response.

We would, in particular, urge Ofcom to consider the broader use of the 3.6-3.8 GHz band for satellite downlinks, by operators such as Arqiva, in providing occasional use contribution, distribution and other international backhaul services to UK broadcasters (such as ITV, Sky, BBC, BT Sport etc.) and sports right holders (such as IMG and PLP).

Question 2: Do you agree with our identification of a trend towards the use of mobile in the 3.6 to 3.8 GHz band?

Yes, we agree with the emerging trend towards mobile interest in this band – both at an industry and regulatory level.

Ofcom cites 2020 as a target date for deployment of services in this band. We think this may be ambitious given the current lack of clarity from regulators and the mobile industry on what will actually be deployed in this band. The year 2020 appears to us to be more of a regulatory and industry ambition as opposed to a timescale which is currently supported by evidence of likely deployment.

For example, in our response to Ofcom's consultation on *Maximising the benefits of the 700 MHz band* we submitted a report by PA consulting which set out the likely date of deployment of mobile downlink services in the 700 MHz duplex gap. We think this may provide interesting readacross to the 3.6 to 3.8 GHz band. PA consulting suggested that there would be a time lag of 5 to 7 years in that case from completion of the standardisation process to a modest handset penetration level of 20% population.

Question 3: Do you agree with our high level proposal to make 116 MHz within the 3.6 to 3.8 GHz band available for mobile and 5G services, bearing in mind our statutory duties and the high level trends we have identified?

While we recognise the momentum behind the mobile use of this band, it is difficult to *firmly* conclude at this stage that the 116 MHz of spectrum should be made available for mobile and 5G services. This is because there is no information on what mitigations will be available for existing uses to enable any necessary reorganisation to take place.

Ofcom also needs to reflect carefully on the value created by the services currently using the 3.6 to 3.8 GHz band as well as the impact and risks to consumers of these services suffering significant disruption as a result of reorganisation the spectrum. In particular, we provide TV and data communications services in the UK using this spectrum. Moving these crucial and valuable services in a way which causes harm to their users would be highly undesirable.

Therefore, and as stated above, Ofcom will need to ensure that measures are put in place which allow for sufficient time for industry to respond to this policy, provide regulatory certainty to underpin any investments that are required to change the use of this spectrum, and address funding for any costs to existing users related to a reorganisation of this spectrum.

Question 4: Do you agree with our general approach regarding spectrum currently licensed to UK Broadband?

We are not best placed to offer a view on this issue.

Question 5: Do you agree with our assumptions, methodology, and conclusions with regards to potential coexistence between mobile and existing fixed links and satellite earth stations?

We broadly agree with the approach used by Ofcom. However, there is clear uncertainty about how the mobile sector will deploy services in this band and about actual consumer take-up. As a result, there is inherent uncertainty attached to Ofcom's modelling and associated assumptions which may not lead to an inaccurate reflection of the reality of co-existence between services.

More specifically, Figure 10 in Annex 5 (output of the Transfinite (BT Tower)) analysis, based on IMT-A suggests that co-existence will be very challenging in densely populated areas. More up-to-date, and so probably more relevant is Ofcom's Table 3 (also in Annex 5) which makes reference to harmful levels of interference at sites including Arqiva Teleports in south Hampshire and north Bedfordshire, due to large scale macro cell mobile deployment in London.

Question 6: Do you have a view on the two options we have identified?

We consider that both options achieve *in reality* the same outcome and can therefore more accurately be described as different mechanisms for changing the way this spectrum is used to enable new mobile services. These changes would either be frequency-based (eg moving services to the 3.8 to 4.2 GHz band, already heavily used by satellite) or geography-based (eg moving services to a rural area where mobile services would be unlikely to be deployed).

To explain further why the two options achieve the same outcome:

- There is no real scope for satellite operators to accept a “lower benchmark spectrum quality” as Ofcom describes. Because the impact of rain fade at C-Band frequencies is small, the satellite industry already operates these services at the lowest possible margins. Any further degradation of “quality” would likely cause a failure in link margin;
- Related to the point above, the resultant requirement for protection would likely lead to an increase in fees that reflects the opportunity cost of the band. Given the wide protection areas which would be required these fee increases would likely be significant; and
- Removing our satellite or fixed link licences is put forward as a further option though we rather view this as an inevitable consequence of adopting either or both of the two approaches set out above.

Therefore, we consider that the outcome of the two options as set out by Ofcom would be for satellite and fixed operators to undergo some form of clearance event. We set out our thoughts on how this could be credibly put into effect in our response to question 8 below.

Question 7: Do you have any quantitative evidence on the costs and benefits associated with the options? This includes costs for existing users and/or consumers of existing services associated with potential changes, and benefits to UK consumers in gaining access to mobile services in this band?

Given our primary interest in this consultation response is the risks and impacts to our satellite interests, we do not offer evidence on the benefits of making this spectrum available for mobile/5G. We do however recognise there are scenarios in which this could be very significant.

The magnitude of costs would depend on the nature of any migration of existing services which would need to take place. In the event that we had to stop using the 3.6 to 3.8 GHz band altogether and all relevant services migrated to the 3.8 to 4.2 GHz band, this would be

disruptive for an industry which has invested for the long-term in the lower band. The following cost categories would be of particular relevance:

- There would be a sharp reduction in C-Band downlink spectrum availability from 575 MHz to 375 MHz (i.e. to the 3.8 to 4.2 MHz band with a bottom-end guard band of 25 MHz). This would mean that demand could outstrip supply of spectrum to a far greater extent than at present and that prices would inevitably rise for satellite capacity as spectrum scarcity increased;
- As a consequence of the previous point, the satellite sector may be able to adopt improved filtering to minimise the effects of out of band emissions at the 3.8 GHz band edge. This *might* make some of the spectrum between 3800-3825 MHz usable but would come with additional and significant costs for the improved filtering with no incremental end-user benefit from the service that being provided; and
- There would be coordination and transactional costs associated with ensuring that remote users adapt to the new arrangements.

In the case of a geographical migration whereby earth station operators moved their operations away from more densely populated areas to areas where mobile services would be perhaps of less value, this would entail a different set of challenges, which would include:

- Significant costs associated with the actual moving of earth stations;
- Securing planning permissions for installing new teleport facilities;
- Ensuring that service disruption is kept to a minimum during any migration; and
- Increased connectivity and backhaul costs likely to be incurred as a result of a move to more rural area.

As a result of these factors and mindful of the inevitable costs and disruption, it would be critical for any migration to be supported by a high level of regulatory certainty to ensure that further pressures to move do not emerge in an unreasonable timescale.

Clearly, these are serious investment scenarios for existing services. On balance, we believe that Ofcom should seek to keep both frequency and geographical migrations as viable options in any reorganisation of this spectrum. We set out in our response to question 8 how this could best be facilitated.

Question 8: Do you have any other suggestions that would allow widespread 5G availability using the 3.6 to 3.8 GHz band across the UK while allowing certainty for at least some existing users to continue to provide the benefits currently provided by use of the 3.6 to 3.8 GHz band?

Our response to question 7 sets out the costs categories associated with the two high level options of

- Migrating satellite use of 3.6 to 3.8 GHz to alternative frequencies higher up C-band between 3.8 to 4.2 GHz; and/or
- Moving earth stations to areas where mobile services are unlikely to emerge in the longer term.

As a general point of principle, we consider that the incremental costs incurred as a result of a future migration should be met (either in whole or in part) by public funding. This is in line with the approach that Ofcom has consistently taken with spectrum clearances where there is no benefit conferred on the existing users. It is also acknowledged by the government who has made funding available to support existing users to facilitate spectrum clearances¹. As discussed, both of the policy interventions that Ofcom has put forward lead to spectrum clearance. Our initial view is that we may have a legitimate expectation to use the 3.6 to 3.8 GHz band in the longer term given the wording of, for example, Decision 2008/411/EC.

Moreover, if Ofcom were to put in place measures to ensure an orderly reorganisation of this spectrum, we would not expect that to be associated with disruptive spectrum pricing proposals. In particular, it would be inappropriate for AIP to be applied in this case as spectrum efficiency benefits would already be secured by a separate regulatory intervention. As Ofcom set out in paragraph 4.332 of its *Strategic Review of Spectrum Pricing* in 2010:

where there is a clear case for re-allocating spectrum quickly from a low value use to a higher value use, because we have a high confidence that the benefits to society of such a change will be high, we would normally look to intervene and clear the band in a planned manner rather than looking to spectrum pricing to effect such a change

Migrating services to 3.8 to 4.2 GHz

This would be a very significant undertaking for what Ofcom has acknowledged is a broad and complex value chain. Satellite operators would have to move away from payloads which were supported by the 3.6 to 3.8 GHz band. The investments and disruption that this would entail, however, would need to be underpinned by certainty of access to the 3.8 to 4.2 GHz band. In particular, industry would need some level of assurance that 3.8 to 4.2 GHz would not be proposed, at an ITU level, as a future band for mobile in the longer term.

¹ Examples being the moving of broadcasting licensees from the 700 MHz band or the moving of PMSE users from Channel 69

In that respect, we note that the 3.8 to 4.2 GHz band is not an agenda item for IMT identification at the 2019 World Radiocommunications conference (WRC-19) and that there are no provisional agenda items proposed for this band at the following conference (WRC-23). However, we are also aware that the UK has previously in international forums promoted the long term prospects of the 3.8 to 4.2 GHz band for IMT. It is unclear to us how further UK support of this kind would be consistent with facilitating long-term migration of existing services from the 3.6 to 3.8 GHz band.

Migrating earth stations to areas of likely low mobile demand

This option would likely involve less cost and disruption to the broader value chain. However it would pose significant challenges to operators of earth stations. As set out in our response to question 7, it is a major undertaking to relocate services from one teleport to another. As a result, in doing so we would expect explicit regulatory certainty that such a move would not be followed by renewed pressure from mobile services in the short or medium term. In other words there would need to be comfort given that mobile services would not be deployed close to the new location for a sufficient period of time to enable necessary new investments. As in the above scenario, we would envisage the necessary period to be no less than ten years.

Such a solution would clearly require careful selection of a suitable site so that the risk of frustrating potential mobile services was kept to an absolute minimum. Ofcom may wish to note that we are unclear whether any of our existing sites would be sufficiently detached from areas of mobile demand to offer a long-term solution. However, we would be happy to enter into a dialogue with Ofcom on this matter.

If such a site was identified, we would assume that increased spectrum pricing associated with the new earth station (in particular, application of AIP) would not apply, given that the site was chosen in an area where mobile deployments were unlikely to take place.

Question 9: Do you have any comments in relation to these proposals?

We have no further comments.