BBC response to Ofcom consultation on Evolution of the Shared Access Licence Framework

25 May 2023

Introduction

The BBC is grateful for the opportunity to comment on Ofcom's review of the Shared Access (SA) licence frame work to better support users of mobile technology, specifically across four bands (3.8-4.2 GHz; 1781.7-1785 MHz paired with 1876.7-1880 MHz; 2390-2400 MHz) and the lower 26GHz indoors. The BBC has been very active in securing SA licences to support a number of new and innovative applications spanning both research and operational deployments. This consultation is particularly welcome showing Ofcom's commitment to build on the success of the current SA licence framework.

As noted by Ofcom the 3.8-4.2GHz band has shown the greatest area of demand and growth. It is also the dominant band for which the BBC has been applying for SA licences and informs our comments and observations.

Reflecting on recent experience the BBC believes that there are a number of areas where Ofcom can better support users of SA licences to make more efficient use of the spectrum and further foster innovation. These relate to more rapid spectrum access, operation at higher powers than currently permissible and a more dynamic assignment process that maximises spectrum availability and reduces the likelihood for spectrum sterilisation.

The dominant use case for which the BBC has employed SA licences is for research into and operational deployments of 5G Private Networks. These support wireless Content Production which has been significantly explored by the BBC and partners across Europe in recent years – for example at last year's Commonwealth Games in Birmingham, for live coverage of the late Queen's live procession through Edinburgh Airport, and most recently, at the Coronation. The call for input doesn't accurately reflect this application. There could be some confusion in highlighting a '5G broadcasting' licence use case which instead suggests distribution of content to domestic consumer devices. While this is additionally being explored by others including the BBC, SA licences in 3.8-4.2GHz have been secured by the BBC for a very different application, namely Content Production within a closed private network.

Content Production underpins the UK's leading creative industries, which contributed £103.8bn to the economy in 2020 – over 5% of UK GVA.[1] The creative industries have the highest performance requirements for Content Production, to deliver flawless, high-quality, real-time audio – including for events of the highest national significance. While these objectives continue to be

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[1] DCMS Sectors Economic Estimates (2020).

met, this is becoming harder to achieve as demand increases. Against this backdrop, updating the SA licence framework to support further research into and use of 5G Private Networks for Content Production would be valuable, to support the BBC and others to develop reliable, high-quality solutions going forward.

5G Private Networks in exclusive and co-ordinated spectrum allow robust, high quality, low latency bi-directional links for wireless cameras and their supporting ancillary signals which include production talkback, tally, camera control and autocue. They have a particular advantage over use of public networks which to date have only been best effort and can fail, particularly when heavily congested. Experience of major events in particular confirmed that public 4G networks, on which news organisations routinely rely for live news coverage, were insufficient and unsuitable for such occasions. To meet unprecedented demand from multiple news organisations for robust live uplinks for wireless cameras at the recent Coronation in London, BBC Research and Development in conjunction with Neutral Wireless and BBC News therefore deployed an extensive 5G Private Network at Canada Gate and along the Mall[1]. The network was able to support over thirty national and international news organisations providing robust, low latency live wireless cameras links and enhancing their coverage of the event. More conventional means of supporting these wireless links would not have been possible within limited conventional PMSE spectrum available for COFDM wireless cameras which was already fully committed to the main event coverage.

SA licences were secured from Ofcom for the 5G Private Network in the Mall but the application process was long, involved and not suited to this type of short-term deployment. Much of the learning over how the SA application and licensing regime might be improved is informed by this example.

The BBC also has an interest in operating C band satellite links in the 3.8-4.2 GHz band, and acknowledges the work already done by Ofcom to ensure protection of these earth stations in the presence of other terrestrial networks in the band. Increasing the flexibility of Shared Access licences, as discussed in the rest of this response, should be entirely achievable without compromise to the level of protection given to these services.

More widely the BBC continues to participate in the Ofcom Sandbox on 3.8-4.2GHz and notes that many other attendees across all licence use cases, rural and urban broadband, satellite services included, also seek a more swift, flexible and spectrally efficient process.

[1] https://www.bbc.co.uk/rd/blog/2023-05-5g-non-public-network-coronation

1. How do you think demand for Shared Access is likely to change in future and why; Which use cases do you think are likely to emerge or grow, and which decline? Please provide a view on the bandwidth you would consider the minimum and optimal requirement for growth use cases, and timelines you would expect for their development

Overall demand for spectrum including these very versatile Shared Access bands is growing as Ofcom note from licence statistics. For Content Production there is substantial pent up demand for more flexible access to 3.8-4.2 GHz in the sector. The BBC and industry colleagues have seen the operational deployments of 5G Private Networks last year at the Commonwealth Games in Birmingham, for live coverage of the late Queen's procession through Edinburgh Airport and now at the Coronation.

These are relatively low power assignments in wide bandwidths, 50 to 100MHz with low antenna heights to serve small areas typically with a radius less than 1km. They are typically required at relatively short notice of only a few days compared to other more long duration applications and the requirement for Content Production is generally for only for short periods of fewer than five days.

Whilst there is hardware which is becoming suitable for operational deployment the uncertainty and long timescales gaining access to spectrum are preventing the growth that is possible and the UK risks falling behind other countries in this important area of Content Production.

2. Are there elements of the current framework that complicate the use of Shared Access licences for specific use cases? If so, please provide specific examples and indicate the changes that would be required to facilitate this and how this might co-exist with other use cases.

The BBC recognises that there are particular legislative requirements for data that needs to be supplied to Ofcom for licensing but the current system is not suited to the Content Production sector with its short notice and short duration requirements. Application times of 42 days, a minimum licensing period of a month and no means of applying ahead of time for a future start date are anachronistic and spectrally inefficient. For example the Coronation licences could only be issued to run for an additional three weeks beyond the Coronation itself which was not required. Earlier in the year a speculative application for the

Eurovision Song Contest made in good time was required to be licensed continuously from February until the required fortnight in May to secure the spectrum. The simple 'first come, first served' principle does not always result in a spectrally efficient outcome.

Given the Content Production sector is already familiar with Ofcom's PMSE licensing regime where spectrum can be licensed instantaneously online or manually within 72 hours, a similar approach for SA licences would be particularly welcome. It would need to be coupled with a more rigorous and automated compatibility analysis more closely taking account of low power, low antenna height and short durations to maximise coexistence with other licensees. Attendees at the Sandbox event have already expressed their wish for a similar approach to benefit their different applications in the same manner.

3. Do you have any comments on the power restrictions currently in place, particularly in urban/high density areas, under the Shared Access licence? Please explain what benefits could be delivered using a higher operating power (e.g. medium power in urban areas), or any concerns you sharing with such operations).

It has been difficult to understand how Ofcom are considering compatibility when considering new applications for Content Production using 5G Private Networks. The Ofcom Spectrum Portal details existing SA licensees and their locations but apparent spectrum availability can still be denied. We would be grateful if Ofcom were able to share their 'workings' and more of their co-ordination criteria. Applicants should be permitted to supply more defined transmission parameters including antenna patterns to assist Ofcom in their judgement and maximise spectrum availability. Sandbox participants have already expressed a desire to focus on this area of work.

4. Do you have any comments on the exceptions process, and how some of its benefits could be maintained within more standardised and automated assessments?

The 5G Private Network on the Mall was licensed as eight Medium Power SA licences for which the BBC is grateful though this was clearly an exception given the intention of Ofcom not to permit Medium Power licences in built up areas.

We would value Ofcom explaining more detail of the exception process to help applicants understand how and when it is applied.

By way of example last minute changes were made by Ofcom to the Coronation 5G Private Network licence parameters which caused us extra work to protect an additional satellite downlink. Moving from 2 x 50MHz blocks at 3860 and 3910MHz to 2 x 40MHz blocks at 3835MHz and 3915MHz reduced the frequency separation from higher power public networks operating in 3760-3800MHz. Mitigation was also hampered in identifying the nearest base stations given Ofcom discontinuing the Sitefinder service. As a result it is quite possible that user terminals connecting within the vicinity of our network could have encountered downlink interference into the public networks as a consequence of the different TDD parameters. Similarly the public networks may have also impacted on the performance of the private network.

Another factor which held up resolution of the licensing on the Mall was missed communications on both sides. This was partly due to no single point of contact in Ofcom for SA licensing given just the generic 'spectrum licensing' email address. It would be helpful for Ofcom to assign and notify applicants of a dedicated contact for SA applications in future to facilitate communication in a more timely manner.

5. Do you have any views whether and how the coordination approach should be modified? If yes, please provide comments in light of the issues set out above.

As already noted it isn't clear how co-ordination is carried out and we are concerned that an overcautious approach is taken. Reliance on rural vs urban locations appears a crude distinction given the availability of detailed terrain and urban clutter data to use instead when analysing compatibility. There is the opportunity now, perhaps within the Sandbox, to drill down into how best to achieve co-ordination whilst maximising spectrum utilisation for all applicants. For Content Production and its particular characteristics of low power, low antenna heights and small coverage areas improved sharing should be achievable.

6. Do you have views on whether newer or emerging technologies can support coexistence between additional users in the band, and if so, how?

The BBC has followed developments in emerging technologies and approaches to enhance coexistence between radio services. A more agile spectrum licensing approach would be beneficial with clarity on the choice of propagation models used for sharing. This should ideally be engineered through automated systems and databases, building on knowledge from TVWS work. The BBC would be happy to participate in further investigations into this area coupled with future automated licensing. Together these can contribute to more dynamic spectrum access closely aligned to how Content Production operates at short notice and for short durations.

7. Please outline any comments on the current licensing process (e.g. ease of application, time taken, the information we require). If relevant, please note aspects you are currently content with and areas which could be improved.

Currently the application process is slow and complex, not suited to the short application times and durations that characterise Content Production. Every individual application requires company and multiple contact information every time. With a customer reference number established this information should be implicit. Technical details do not currently give the opportunity to include an antenna pattern which would be useful in assessing directional compatibility. For example panel antennas used for 5G Private Networks have substantial rejection to rear which can greatly enhance compatibility.

8. Do you have any comments on the suitability of available spectrum for your use cases? Please consider the relevance of the additional bands we are proposing for the framework, and the impact of any limitations on existing bands.

The suitability of 3.8-4.2GHz for 5G Private Networks is very clear given it falls within the 5G NR Operating Bands and the equipment availability that follows. The BBC would be very interested in discussing access to the MoD range 2300-2350MHz for Content Production particularly given other long and mutually beneficial spectrum sharing arrangements that exist between the military and PMSE.

9. Do you have any comments on equipment availability limiting deployment options in 3.8-4.2 GHz? Please comment on the impact of any experiences you have had, and where relevant, your expectations for when more equipment will be broadly available across the band.

The equipment used for 5G Private Networks is based on Software Defined Radio technology and is therefore agile across the entire band. There have been some limitations with base station elements only operating to a maximum 4100MHz but current equipment can now tune across the entire 3800-4200MHz. Typical bonded SIM User Equipment is also capable of operating over the entire 3.8-4.2GHz with suitable 5G modems.

10. Do you have any other general comments on the Shared Access framework? Please consider any areas where future innovations could further support Ofcom's policy objectives for this spectrum, and/or improve the experience for users.

The specific characteristics of low power 5G Private Networks and their similarly low power User Equipment operating over short paths lend themselves to more intensive sharing than other services in the band. Frame structures are configured to accommodate heavier upload than download for Content Production where the uplink from the camera is the most critical element. Low power 5G Private Networks are therefore more vulnerable to higher power SA licensees operating more conventional networks biased towards more download timeslots compared to upload. Compatibility and assignment criteria should therefore take account of the lesser outgoing interference potential from 5G Private Networks and further improve spectrum availability.

For TDD SLA assignments in close proximity, it will probably be necessary to coordinate the choice of TDD ratio to manage interference between adjacent networks. Synchronisation of TDD timing using GPS may also be necessary. This will ensure optimum re-use of the spectrum and greater efficiency, but is dependent on the BS and UE ACLR of the deployed network. The protection of incumbent C band satellite receive sites needs to be maintained and further technical investigation to understand the required criteria in relation to compatibility with low power networks may be beneficial. The BBC operates C band downlink earth stations in the UK, and would be happy to assist Ofcom in this activity.

Further work within the Sandbox and with its participants provides the opportunity to further characterise the impact on coexistence of frequency separation between licensees and the degree of synchronisation and protection that these factors provide.

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