Ofcom Statement & Consultation

Expanding access to the 6 GHz band for commercial mobile and Wi-Fi services

1.0 Executive Summary

JRC and its Members welcome the opportunity to respond to this consultation and as critical system operators JRC Members depend on access to spectrum and as such are concerned with Ofcom's proposals to expand access to commercial mobile and WiFi in the 6GHz band. The focus of JRC's response is summarised below;

Regarding the establishment of a co-existence regime with fixed links, JRC and its Members are keen to work with Ofcom to ensure that the technical coexistence arrangements afford appropriate protection. JRC's Members depend on a number of 6GHz fixed links (46 in total) to provide high capacity backhaul transmission services connecting critical national infrastructure (electricity substation equipment and associated plant) in remote locations throughout the UK. Degradation of the performance of these high availability links will have a detrimental impact on the electricity network operators capability to monitor and control its assets with subsequent impact on operational reliability and restoration times in the event of fault.

JRC is concerned that the proposals to share the 6GHz fixed links band with WiFi / LTE services has not been fully considered or technically assessed from the perspective of likely impact to performance degradation of incumbent fixed links users – including JRC's Members.

JRC encourage Ofcom to consider as a minimum the following two actions before introducing the sharing arrangements;-

i) Completion of the technical study (including on site measurements) of actual impact on upper 6GHz fixed link performance of the proposed WiFi / LTE hardware positioned at a variety of distances and locations from fixed link end points. This could include activity in the lower 6GHz band which is already open for sharing – the findings could be used to qualify the applicability of Lower 6 GHz interference studies to the upper 6GHz range.

ii) Consider the option to include exclusion zones around fixed link end points limiting the ability to deploy 6GHz WiFi hardware in close proximity (to be defined) to fixed links. The specifics of any exclusion zone to be informed by the findings of item (i)

JRC note that significant work has been completed in North America by the Utilities Telecommunications Council who represent the interest of U.S. utilities in spectrum related matters. Utility companies in the USA make very significant use of 6GHz fixed links and have repeatedly raised concerns with the FCC around the introduction of WiFi systems in this band. The studies undertaken in the US have demonstrated the loss of 10 dB or more of fade margin due to a local WiFi device. This represents a significant impact to a high availability link required for CNI operations. We encourage Ofcom to fully review this detailed technical body of work to understand the potential impact to incumbent fixed links within the UK.

Ofcom's proposal to let the industry provide an AFC database for the coordination of Wi-Fi devices will require considerable due diligence to ensure the provider offers a secure, robust and commercially independent engine which ensures adequate protection of the incumbent services. In addition, we request that Ofcom, in creating the sharing scenario, will provide reassurance that any interference events will be swiftly resolved.

Ofcom has focused the provision of spectrum access to Mobile Operators and Wi-Fi providers over the last 20 years. It is important that Ofcom does not lose sight of the spectrum access needs of other platforms / systems, e.g. Energy Network Operators, Broadcasting, Transport, PMSE, etc. To this end we are very supportive of the work underway in Ofcom's 'Spectrum for Utilities' study and our response centres on the importance of ensuring that appropriate spectrum access is afforded to other users in order to support Government policy, i.e. the 'Net Zero' transition. It is interesting that at the same time as Ofcom is continuing its work item assessing the future additional spectrum needs for utilities there is a proposal here to potentially compromise the ongoing operational security and useability of one of the existing fixed link allocations on which the Energy Networks operational integrity depends.

2.0 - Background - The Joint Radio Company (JRC, www.jrc.co.uk)

Joint Radio Company Ltd is a wholly owned joint venture between the UK electricity and gas network operators created to manage the radio spectrum allocations for these networks used to support operational, safety and emergency communications.

JRC manages blocks of VHF and UHF spectrum for Private Business Radio applications, telemetry & telecontrol services and network operations. JRC created and manages a national cellular plan for co-ordinating frequency assignments for several large radio networks in the UK.

The VHF and UHF frequency allocations managed by JRC support telecommunications networks to keep the electricity and gas industries in touch with their field engineers and remote assets. These networks provide comprehensive geographical coverage to support installation, maintenance, operation and repair of plant in all weather conditions on 24 hour/365 days per year basis.

JRC's Scanning Telemetry Service is used by radio based Supervisory Control And Data Acquisition (SCADA) networks which control and monitor safety critical gas and electricity assets throughout the country. These networks provide resilient and reliable communications at all times to unmanned sites and assets in remote locations to maintain the integrity of the UK's energy transmission and distribution. JRC also manages microwave fixed link and satellite licences on behalf of UK energy networks.

JRC supports the European Utility Telecommunications Council's Radio Spectrum Group, and participates in other global utility telecom organisations. JRC participates in European Telecommunications Standards Institute (ETSI) working groups developing new radio standards, and European telecommunications regulatory groups and workshops.

JRC works with the Energy Networks Association's Future Energy Networks Groups assessing ICT implications of Smart Networks, Smart Grids & Smart Meters, is an active member of the Energy Networks Association Strategic Telecoms Group and is an acknowledged knowledge source for cyber-security in respect of radio networks.

Fixed (Microwave) links have been utilised for many decades in order to provide backbone transmission capability to support existing, application specific networks such as SCADA, Scanning Telemetry and push to talk voice. Increasingly, as these multiple applications convene in the IP domain, increases in backhaul bandwidth requirements are essential. So too is the number of links required, as connectivity is required to push further and further towards the periphery of the energy networks. As noted in other dialogue with Ofcom, JRC & ENA-STG are striving to gain access to additional dedicated radio spectrum to allow the deployment of an LTE based smart grid connectivity FAN (Field Area Network)[1]. The eventual deployment of such a network will require the introduction of more fixed links in order to provide backhaul from the RAN back to the core and the 6 GHz Band could be an important connectivity tool in the fixed link area.

[1] Call for Input: Potential spectrum bands to support utilities sector transformation https://www.ofcom.org.uk/consultations-and-statements/category-1/potential-spectrum-bands-to-support-utilities

3.0 Detailed Responses to Questions

Question 1: What interest do you have in deploying outdoor or standard power Wi-Fi or other licence exempt RLANs in the Lower 6 GHz band? Please provide details of the types of expected deployments.

Q 1. JRC Response

Confidential? No.

No comment

Question 2: Are you interested in providing or developing AFC databases for use in the Lower 6 GHz band in the UK?

Q 2. JRC Response

Confidential? No.

No comment

Question 3: Do you have any views on the operational considerations of setting up and running AFC databases?

Q 3. JRC Response

Confidential? No.

Our understanding is that the AFC is proposed to be used in the lower 6GHz band to enable standard power outdoor WiFi to be deployed but where high availability fixed links supporting critical national infrastructure are already in operation. Ofcom have stated in this consultation

> '*we would expect any future AFC system to take into account the protection criteria needed to prevent harmful interference from standard power Wi-Fi into fixed links. We would not expect to clear any fixed links, or to close the band to new links*.'

The work of CEPT WG SE45 has identified the potential for interference between the outdoor WiFi devices and fixed links in the band. Until the complementary work recommended by CEPT WG SE45 has been completed, appropriate protection criteria has not been determined and independent compatibility assessments have not been made, hence any such AFC database solutions cannot be deployed.

Before any AFC database can be deployed, a trial of each new AFC database will be necessary to demonstrate the effectiveness of the AFC database in accurately assessing the frequencies available for use by the WiFi devices to ensure appropriate protection of the licensed fixed link use of the band.

Ofcom propose that multiple AFC systems will be deployed by private organisations and therefore we have concern about how Ofcom will maintain oversight of those databases to ensure correct operation and adequate protection of existing users of the band. During the proposed trial of the AFC databases, Ofcom must demonstrate that the AFC databases will be independent with no commercial bias within the tool to any specific application / technology when identifying available frequencies.

The need for confidentiality around the fixed link data of the Energy Networks is a further area of concern when the AFC database is developed, held and managed by a commercial organisation. What measures will Ofcom put in place to ensure the data will be held in a secure manner when held by a commercial organisation? Do Ofcom have a system in place to ensure the data will be securely disposed of when no longer required?

JRC note that significant work has been completed in North America by the Utilities Telecommunications Council who represent the interests of U.S. utilities in spectrum related matters. Utility companies in the USA make very significant use of 6GHz fixed links and have repeatedly raised concerns with the FCC around the introduction of WiFi systems in this band. The studies undertaken in the US have demonstrated losses of 10 dB or more of fade margin due to a local WiFi device. This represents a significant impact to a high availability link required for CNI operations. Has Ofcom fully reviewed the detailed technical body of work available to fully understand the potential impact to incumbent fixed links within the UK?

Ofcom make reference to the funding by the Department for Science, Innovation and Technology for

> *'several spectrum sharing sandboxes, which will explore new spectrum sharing techniques that could enable hybrid mobile and Wi-Fi spectrum use and test them in real-world environments. The sandboxes will also undertake computer simulation and economic assessment of the potential net benefits of the solution. These sandboxes run from April 2024 to March 2025, and should provide some early insights. The results of these sandbox trials will help inform the development of our approach to shared use of the band.'*

Has this study also considered sharing with incumbent users and what is the outcome?

Finally, with the demand for additional fixed links from the Energy Networks and the removal of other fixed links bands in recent years, Ofcom will require a clear policy and process for the continued licencing of additional fixed links within the 6 GHz band, that will ensure those links are adequately protected from interference from WiFi and mobile devices in operation in the surrounding area.

Question 4: Do you have any views on how we should manage the approval process for AFC databases and, in particular, whether we should rely on parts of the FCC process rather than requiring the whole process to be re-run in the UK?

Q 4. JRC Response

Confidential? No.

The steps Ofcom have proposed for setting up the AFC including public consultation, lab testing and public trials are a sensible approach provided that the UK regulatory environment and the needs to protect the incumbent links of critical national infrastructure are taken into account. Furthermore, it is essential that Ofcom demonstrate that there is no commercial bias in the AFC database in favour of the WiFi or mobile service application. JRC encourage Ofcom to ensure that the outcome of the

lab testing is shared with all interested parties and that the incumbent users are actively involved in any public trials to ensure that existing incumbent services are protected. In addition, independent compatibility assessments should be completed between existing services and the proposed new applications to verify that the AFC database assumptions are correct.

Ofcom propose that multiple AFC systems will be deployed by private organisations and as a result it will be essential for Ofcom to maintain oversight of those databases to endure correct operation and adequate protection of existing users of the band and to ensure the underlying process algorithms are open and transparent so that all users understand how existing services will be protected.

A periodic review of the sharing regime and the operation of the AFC databases should be put in place to ensure it is effective in both managing the shared spectrum and protecting the incumbent systems effectively.

Question 5: Please provide any other comments on our proposals for extending access to standard power Wi-Fi and outdoor use, including the overall approach, any details on technical parameters and the running of the AFC databases in this band.

Q 5. JRC Response

Confidential? No.

JRC Members operate a number of fixed links within the 6 GHz band for the monitoring and control of critical national infrastructure. As the industry moves towards the Clean Power 2030 goals, the need for enhanced operational control will become more critical, and the fixed link network is a fundamental part of that operational control network. It is therefore essential that Ofcom demonstrate how these services will be protected and how interference issues will be addressed promptly to ensure their ongoing safe and secure operation.

The interference caused by the introduction of WiFi and mobile devices sharing this band has the potential to severely impact the availability of the existing fixed links supporting critical national infrastructure. To ensure the assumptions made within the AFC database are correct and applicable to the UK environment, the underlying compatibility assumptions and frequency selection algorithms deployed by the different databases should be open and transparent and subject to rigorous independent testing to ensure existing incumbent services are protected.

The need for confidentiality around the fixed link data of the Energy Networks is a key area of concern when the AFC database is developed, held and managed by a commercial organisation. Ofcom must ensure that appropriate measures are established to protect this information when it is held by a commercial organisation. In addition, consideration must be given to the secure disposal of that data when no longer required?

Ofcom should ensure that the implementation of any sharing regime does not preclude the continued expansion of any one application within the band in favour of another. With the ongoing demand for more fixed links from the Energy Network Operators and the recent withdrawal of other fixed links bands, it is important that the 6 GHz band remains available and viable for the ongoing deployment of additional fixed links once the sharing of the band by WiFi and mobile devices starts. Ofcom will need to have a clear policy and process for the continued licencing of additional fixed links within the 6 GHz band that ensures the band does not become **sterilised** by the operational deployment of WiFi and mobile devices.

The use of fixed links for operational control and monitoring of critical national infrastructure is an essential tool for the energy networks and lower frequency links are a valuable resource to meet this need. Ofcom's drive to re-assign lower frequency fixed links and as a result force the energy networks to rely on higher frequency links has resulted in the Energy Industry relying on links which are more susceptible to rain fade. In a time where the UK is experiencing an increasing number of intense rainstorms, this will result in the energy networks having infrastructure which is less able to operate effectively in these intermittent extreme events, when their operational resilience is increasingly vital.

Ofcom have referenced the work of CEPT WG SE45 who are undertaking compatibility studies with incumbent users of the band and state that interference is unlikely, however we note that the work of CEPT WG SE45 is not yet complete and the currently available data is based on the interaction of lower power indoor WiFi devices in Upper 6 GHz. CEPT WG SE45 has not yet determined the appropriate protection criteria for standard power or outdoor devices. To avoid the potential for interference from outdoor standard power devices in the lower 6GHz band this application should not be enabled until the criteria has been established by CEPT WG SE45 to ensure that the high availability critical national infrastructure links deployed by the Energy Network Operators are afforded adequate protection.

In addition, before any proposal to introduce mobile into the upper 6 GHz band is agreed, it will be necessary to both fully understand the European harmonisation position but also for the CEPT PT1 group to have completed their compatibility studies between mobile and other services.

Significant work has been completed in North America by the Utilities Telecommunications Council who represent the interest of U.S. utilities in spectrum related matters. Utility companies in the USA make very significant use of 6GHz fixed links and a number of technical studies have been completed which demonstrate that interference from WiFi devices has the potential to reduce the fade margin of the fixed link be 10 to 20 dB. This represents a significant impact on the stability and availability of the fixed link, and within the UK the effect of such a large reduction in fade margin could have a significant detrimental impact on the operation of critical national infrastructure. We encourage Ofcom to review this body of work and ensure appropriate protection for incumbent fixed links is assured before sharing arrangements are extended.

Question 6: Do you have any comments on our proposal to use a "phased" approach, or on the alternative to wait for European harmonisation?

Q 6. JRC Response

Confidential? No.

There should be no deployment of outdoor WiFi devices until the required protection criteria have been determined and appropriate independent compatibility assessments have been completed. In addition, the implementation of mobile devices in the band should wait for European harmonisation.

Question 7: Do you have any comments on the above suggestion to manage any "legacy" Wi-Fi devices, or alternative suggestions?

Q 7. JRC Response

Confidential? No.

No comment

Question 8: Do you have a view on the amount of spectrum that should be prioritised for Wi-Fi under the prioritised spectrum split option? Please provide evidence for your view.

Q 8. JRC Response

Confidential? No.

No comment

Question 9: Do you have any comments on our plan for a "phase 1" when Wi-Fi will be introduced?

Q 9. JRC Response

Confidential? No.

There should be no deployment of outdoor or standard power Wi-Fi devices until the CEPT WG SE45 working group have developed the required protection criteria and appropriate independent compatibility assessments have been completed.

Question 10: One variation on "phase 1" would be to only authorise Wi-Fi in client devices to "seed" the market. Would you have any views on this, or suggestions for other variations?

Q 10. JRC Response

Confidential? No.

No comment

Question 11: Do you have any comments on our plan for a "phase 2" when mobile will be introduced?

Q 11. JRC Response

Confidential? No.

We encourage Ofcom to ensure that sufficient compatibility studies have been completed to ensure the protection of incumbent links prior to 'phase 2' being implemented, to understand and assess the full impact of introducing these devices in the presence of incumbent users, in particular the fixed links operated by the Energy Network Operators, and therefore minimise the risk of an unforeseen negative outcome which could be to the operational integrity of UK CNI.

Question 12: Do you have a view on the amount of spectrum that should be prioritised for mobile under the prioritised spectrum split option? Please provide evidence for your view.

Q 12. JRC Response

Confidential? No.

No comment

Question 13: Do you have any evidence or views about the geographical extent of mobile networks' likely deployment in Upper 6 GHz?

Q 13. JRC Response

Confidential? No.

From the consultation Ofcom have indicated that 'MNOs need access to the band to increase capacity on already congested sites.' Ofcom have stated that the demand outside the high density areas is 'relatively low' JRC encourage Ofcom to consider limiting the proposed sharing of the band with WiFi and mobile devices to certain geographical areas, i.e. only High Density Areas, to enhance the protection of incumbent fixed links.

Question 14: Do you have any comments on our proposed phased approach to authorisation of both Wi-Fi and mobile in the Upper 6 GHz band?

Q 14. JRC Response

Confidential? No.

We encourage Ofcom to adopt the more cautious approach of waiting for European harmonisation to be resolved to offer the UK the best opportunity to understand and assess the full impact of introducing these devices in the presence of incumbent users and therefore minimise the risk of an unforeseen negative outcome.

Question 15: Do you have any comments on our proposal to not include very low power portable devices in the Upper 6 GHz band at this stage, but to keep this under review?

Q 15. JRC Response

Confidential? No.

No comment

Question 16: Do you have any comments on our proposal to authorise the use of low-power indoor Wi-Fi access points and client devices to use 6425–7125 MHz?

Q 16. JRC Response

Confidential? No.

Question 17: Do you have any comments on the proposed technical conditions?

Q 17. JRC Response

Confidential? No.

JRC Members have high availability fixed links across the 6 GHz band supporting critical national infrastructure, and we encourage Ofcom to ensure that the new services are not introduced to the band until suitable compatibility studies have been completed. We note that Ofcom reference in the consultation that the work of the CEPT WG SE45 is still on-going and therefore no decision should be made on the introduction of new outdoor WiFi services until the potential impact is fully understood and appropriate co-existence arrangements established.

Question 18: Do you have any comments on the proposed VNS draft?

Q 18. JRC Response

Confidential? No.

No comment

Question 19: Do you have any suggestions for an appropriate mechanism for enhanced sensing, or comments on the proposed solution above?

Q 19. JRC Response

Confidential? No.

No comment

Question 20: Do you agree with our proposal to restrict Wi-Fi from transmitting in the 6650-6675.2 MHz band to protect the radio astronomy service? Please provide any technical evidence to support your view.

Q 20. JRC Response

Confidential? No.

No comment

Question 21: Do you agree with our assessment of Wi-Fi coexistence with existing users of the band? If not, please provide details.

Q 21. JRC Response

Confidential? No.

Ofcom's assessment of the impact on existing users of the band relies on the work of CEPT WG SE45 which is not yet complete and therefore cannot be relied upon to ensure protection of incumbent services. The work to date is based on low power and very low power indoor devices which is not representative of the impact of a standard power outdoor WiFi device.

Significant work has been completed in North America by the Utilities Telecommunications Council who represent the interests of U.S. utilities in spectrum related matters. Utility companies in the USA make very significant use of 6GHz fixed links and a number of technical studies have been completed which demonstrate that interference from WiFi devices has the potential to reduce the fade margin of the fixed link be 10 to 20 dB. This represents a significant impact on the stability and availability of the fixed link, and within the UK the effect of such a large reduction in fade margin could have significant detrimental impact on the operation of critical national infrastructure.

We encourage Ofcom to review this body of work and ensure appropriate protection for the incumbent fixed links is assured before sharing arrangements are extended.

Question 22: Do you have any evidence about the costs to operators of moving fixed links in and around "high density" areas (such as urban centres) to other bands?

Q 22. JRC Response

Confidential? No.

No comment

Question 23: Do you have any comments on our initial assessment of our likely approach to coexistence between future mobile use and current users in the Upper 6 GHz band?

Q 23. JRC Response

Confidential? No.

JRC Members operate a number of fixed links within the 6 GHz band for the monitoring and control of critical national infrastructure. As the industry moves towards the Clean Power 2030 goals, the need for enhanced operational control will become even more critical, and the fixed link network is a fundamental part of that operational control network. JRC consider that any decision on the increased sharing of the 6 GHz band would be premature until all relevant compatibility studies have been completed. In light of the withdrawal of other fixed link bands in recent years, any future proposals to revoke existing licences and / or reduce the availability of relevant bands for the fixed link service will have a detrimental impact on the Energy Network Operators readiness to meet those 2030 goals.

We disagree with Ofcom's initial view that the benefit to citizens and consumers of using Upper 6 GHz for mobile in high density areas is likely to be greater than that of fixed links. There is clear need to ensure the relevant Energy Networks are operational and secure to enable any further deployment of new radio applications within any area since they provide a critical enabling service.

Ofcom have indicated that there are no immediate plans to revoke any existing upper 6 GHz fixed links in high density areas, but that it may be a future option. Any decision to revoke the existing fixed link licences in high density areas will have a negative impact on the Energy Network Operators in those areas. Ofcom's position on the longevity of the fixed links in the Upper 6 GHz band creates a degree of uncertainty within the user community which is unhelpful.

Where Ofcom anticipate that fixed links and mobile devices may coexist in upper 6 GHz band, and that suitable coordination procedures could be implemented to mitigate any risk of interference from mobile use, these coordination procedures must come from a comprehensive series of independent compatibility studies to ensure that no unforeseen interference is experienced.

Question 24: Do you have any other comments on our policy proposals or any of the issues raised in this document?

Q 24. JRC Response

Confidential? No.

No comment