

JRC Response to the Ofcom 'Spectrum Management for the 2020s' Consultation

Executive Summary

JRC and its Members welcome the opportunity to respond to this consultation to address the Spectrum Management developments for the 2020s and provide an Energy Network Operators perspective on the proposals. The key themes of our submission are summarised below and we also provide detailed responses to the consultation questions in the body of the document.

- We recognise the emphasis being placed on Business, Public Sector and Industry users and welcome this approach;
- JRC is supportive of increased spectrum access to support innovation and future demands subject to appropriate protection being afforded to incumbent users, in the case of Energy Network Operators existing spectrum access enables critical national services and any disruption is to be avoided;
- Spectrum users depend on long term stability of spectrum access to enable the investments made. The current proposals have the potential to undermine this principle as Ofcom proposes to change the technical parameters against which systems have been designed with the resulting displacement, disruption and unanticipated need for expenditure to comply with such change. We encourage Ofcom to undertake a robust Cost Benefit Analysis (CBA) to establish whether the additional spectrum access that might be enabled via a change warrants the additional cost, risk and disruption to incumbent services;
- We encourage Ofcom to further develop their internal systems as a 'computer says no' response can be an obstacle to innovation. An example would be an inability to accommodate wider channel blocks in the VHF and UHF bands. Ofcom should seek to ensure that their internal systems for licensing and co-ordination continue to reflect changes to industry needs and as such do not stand in the way of spectrum access to address market / industry developments; and
- Whilst there is a major focus within these proposals for increased spectrum sharing we encourage Ofcom to firstly appraise the existing approach to spectrum sharing to better understand why uptake has been so low and address any obstacles identified before further sharing is contemplated.

JRC and its Members welcome the strategic review that is underway to address the spectrum access needs of the Energy Network Operators and to this end emphasise the critical role that spectrum access has to play in the UK Government's 'Net Zero' ambitions.

Background

Joint Radio Company Ltd is a wholly owned joint venture between the UK electricity and gas industries specifically created to manage the radio spectrum allocations for these industries 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 ensure that the electricity and gas industries can maintain monitoring and control of their remote assets and stay in contact with their field engineers. These networks provide



comprehensive geographical coverage to support installation, maintenance 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 industry plant and equipment throughout the country. These networks provide resilient and reliable communications to unmanned sites and plant in remote locations to maintain the integrity of the UK's energy generation, transmission and distribution networks.

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

JRC also manages microwave fixed link and satellite licences on behalf of the utility sector.

JRC works directly with Ofcom, the ENA's Future Energy Networks Group - assessing ICT implications of Smart Networks, Smart Grids & Smart Meters and is an acknowledged knowledge source for cyber-security in respect of radio networks.

JRC's Response to Consultation Questions (Non-Confidential)

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

JRC Response

JRC considers this review to be timely and appropriate given the rapid pace of change in wireless technology developments. JRC is encouraged by the emphasis on global co-ordination which is increasingly important if the UK is to benefit from the economies of scale offered by alignment to a global eco-system of standards, chipsets and devices. In parallel with Ofcom's proposed approach over the next decade, JRC anticipates that the energy sector will simultaneously undergo the most radical operational changes in over a century, as climate change objectives and the net-zero agenda lead Energy Network Operators to significantly re-engineer the way in which their networks function. The near-medium term evolution of the UKs energy sector will increasingly rely on real time secure connectivity with a plethora of new assets including Electric Vehicles (EVs), Distributed Energy Resources (DERs), Grid scale battery storage and appliances enabled for demand side management. JRC expects that wireless based solutions will make up a significant proportion of the enhanced connectivity capability which is required to facilitate the smart grid of the future.

JRC are encouraged to see recognition within this consultation of the increasing importance of the Energy sector's use of radio spectrum. It is appreciated and acknowledged that Ofcom is already undertaking a significant review of future spectrum requirements for the Energy Network Operators – an activity in which JRC and our members are actively participating. Furthermore, Ofcom's ongoing engagement with other regulators (Ofgem) and Government (BEIS) is welcomed. JRC is also pleased to note that there is an ongoing review of spectrum holdings and their efficient and effective use by public sector organisations – this has the potential to identify additional spectrum (especially in UHF) which could be re-allocated for use by the Energy Network Operators and we encourage Ofcom to prioritise this as a band for spectrum access.

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

JRC Response

Yes, the major trends have been captured and JRC wish to emphasise the growing importance of 'Industry Verticals' and the increasing need for Private networks over the next decade. In addition, we provide below specific observations against the guidance proposed;

We note the emphasis on increased spectrum access through sharing and whilst we welcome this principle as a positive development it is important to note that this should be subject to avoiding disruption to incumbent systems, the Energy Network Operators depend on wireless based system for operational integrity of the critical national services they provide. Furthermore, Energy Network Operators acquire and install assets with an expectation that they will remain in service for a minimum 15-20 years i.e. the technology refresh rate is far slower than in the consumer sector and as such it is inherently more challenging to adapt rapidly to accommodate new spectrum sharing arrangements. In addition, we encourage Ofcom to fully assess the impact of introducing new consumer centric solutions into the same spectrum that mission critical systems depend on as co-existence can be challenging. Finally, to ensure that the implementation of increased sharing is proportionate we encourage Ofcom to undertake a Cost Benefit analysis when contemplating changes to the regulatory conditions that apply to uses within a band to consider the costs, risks and disruption associated with a change to incumbent systems against the benefit of increased access.

The move towards adopting globally standardised solutions (exemplified by those developed within 3GPP / IMT 2020, IEEE etc) is well recognised within the energy utility sector. Historically Energy Network Operators have utilised proprietary wireless solutions with modest field deployments. However, as the scale of operational Smart Grid connectivity requirements is anticipated to expand significantly, there is an increasing need for spectrum to accommodate more private networks in order to provide resilient communications solutions which are not currently available through 3rd party networks. Future connectivity solutions (especially device ecosystems) must be supported by multiple vendors with standardised, interoperable interfaces and long-term support. To this end, JRC is heavily involved in the development of concepts surrounding private network design, deployment, ownership and operation. We are also engaged via ECO / CEPT and 5GPPP with other industry verticals such as manufacturing, rail and automotive to investigate areas of common interest and note that the UK must minimise barriers to entry for new technology given our comparatively small market (in global terms) and the new requirements for UKCA approval in addition to RED certification.

It is important to acknowledge that the technology refresh rate within the utility sector is slow and ample notice must be provided. To this end, Ofcom's proposals for improved receiver performance as a method to improve spectrum efficiency is noted but such changes will inevitably have cost implications for incumbent systems – as we have suggested above we encourage Ofcom to undertake a CBA when contemplating such changes to demonstrate the value of such an intervention. Furthermore, when such changes are being imposed on the Energy Network Operators Ofcom should take into account the significant notice period required to secure funding for such changes through the regulatory funding model administered by Ofgem, i.e. alignment with a minimum of two Ofgem settlement periods (RIIO).

JRC is supportive of Ofcom's suggestion to use more realistic parameters in terms of interference protection i.e. inclusion of likely terrain and clutter blocking. Enhanced use of tools such as SEAMCAT (which allows real world interference measurements and performance data to be iteratively analysed) could also further improve efficient use of the electromagnetic spectrum by allowing enhanced coexistence and collocation of wireless systems. There remain significant exclusion zones and guard bands throughout the UK, originating decades ago, which represent under-utilisation of the spectrum asset and in many cases would now be considered to be over-cautious. Nevertheless, as noted above any changes that would detrimentally impact incumbent systems on which the Energy Network Operators depend for the operational integrity of the networks should be subject to a CBA with any material change aligned to appropriate budget approval as part of Ofgem's price control process with ample time for planning and implementation.

Finally, we note the ongoing trend towards many narrow band VHF applications migrating to other forms of technology. This includes both broadcast radio listening and private PMR business radio systems. Potentially these changes could see significant parts of VHF spectrum becoming underutilised in the next decade. Whilst VHF spectrum is unlikely to become attractive for wide area mass market consumer applications it has properties which are ideally suited to Energy Network Operator requirements. Specifically, we encourage Ofcom to review the available channel sizes in VHF (typically only 12.5 kHz today) to explore the potential for additional 50 kHz and 100 kHz channels to be made available. As indicated in the UK Spectrum Policy Forum Document of December 2015¹ and subsequent SPF

¹ <https://www.real-wireless.com/calculating-the-future-uk-spectrum-usage-and-demand/>

document in 2018². Ofcom were envisaging increased use of wider band services, made possible by the expected availability of many contiguous channels following the return to Ofcom of spectrum in the range 143-169 MHz (previously used for blue light services).

Question 3: Could any of the future technologies that we have identified in annex 6, or any others, have a disruptive implications on how spectrum is managed in the future? When might those implications emerge?

JRC Response

JRC anticipates that it is entirely possible that future technology developments could have unintended disruptive consequences to incumbent systems. For instance, future generations of low earth orbit satellite constellations could inadvertently interfere with terrestrial systems. Furthermore, dynamic sharing of spectrum for next generation Wi-Fi, 5G and 6G services coexisting with fixed links also has the potential to cause disruption which will have negative implications for Energy Network Operators. Whilst the pace of change in wireless technology is undoubtedly accelerating, JRC notes that it is essential and feasible for detailed technical analysis to be undertaken to assess the impact of new technology on existing systems on which critical national infrastructure / systems depend.

Energy Networks are becoming more dynamic in terms of supply and demand, e.g. Electric Vehicles and Distributed Energy Resources, are expanding dramatically. To address this more dynamic supply / demand context and to ensure that energy supplies remain robust and predictable over time the Energy Network Operators are investing in 'Smart Grid' capability. Central to the future 'Smart Grid' is enhanced operational communications capability to address increased monitoring and control of the Network Assets which is wholly dependent on additional spectrum access. Such investment is fundamental to addressing the increasing dependence of the UK population to digital services to engage with all aspects of society including education, employment, banking, health and leisure.

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 option for localised spectrum access when authorising new access to spectrum?

JRC Response

From an Energy Network Operators perspective, JRC's focus currently is on gaining access to spectrum for wide area / field area networks in order to facilitate connectivity for a significant number of smart grid assets and devices. However, some very localised spectrum access requirement is anticipated for potential on-site systems which may be needed for remote worker support or augmented reality applications. Whilst the spectrum access requirements for Energy utility wide area networks is well defined, any potential for very localised spectrum access is subject to further development but would inevitably require long term security of access to make such a development relevant to the industry's needs.

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?

² 'UK Spectrum Usage and Demand' Analysys Mason on Behalf of The Spectrum Policy Forum October 2018

JRC Response

JRC is in general agreement with Ofcom's perspective on barriers to innovation. It is challenging to break the perennial problem cycle surrounding spectrum access, vendor support and viable market for solutions once they have been developed. The UK has an enviable capability and track record from an academic and technology development perspective. However, as solution providers seek to address global markets rather than 'UK only' solutions it is increasingly important to make the UK an attractive place to experiment and develop a wide range of new technology – including wireless innovation. Ofcom's proposals to enhance this situation by making innovation licences more readily available is to be welcomed. JRC members are already involved with several innovation trials related to smart grid connectivity solutions – all of which have benefitted from Ofcom's pro-active and flexible approach to innovation through trial licences. We also note the importance of Ofcom's continued engagement and leadership within ITU, ETSI and CEPT.

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?**

JRC Response

JRC acknowledges that Ofcom engage effectively with existing and future spectrum users through a range of consultations, specialist working groups, Tech UK and webinar sessions. JRC believe that a flexible approach to future stakeholder meetings through the combination of physical and online formats to make attendance and engagement more accessible (post pandemic). In addition, there may be merit in holding closed workshops, invitation only, where Ofcom are seeking to address market / regulatory changes that are relevant to an easily identifiable community of stakeholders.

- b. Please explain any specific areas where you believe more or better provision of information could provide value to stakeholders**

JRC Response

Specifically, JRC have encountered discrepancies between information held in two areas of Ofcom's user accessible web portal (Wireless Telegraphy Register and the Spectrum Information Portal Licences Map). This data is frequently consulted prior to submitting applications for n x 12.5 kHz allocations in VHF. If the issue were resolved it would facilitate a more efficient assignment process from the user perspective. Furthermore, experience demonstrates that Ofcom's existing tools are not adaptable to the needs of different users, the Energy Network Operators have been seeking wider channel access in the VHF band but our understanding from Ofcom is that the existing tools are not able to accommodate such flexibility. To this end, we encourage Ofcom to address the 'computer says no' response that is standing in the way of the potential for innovation and in so doing address the spectrum access needs of the Energy Network Operators.

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 long term approach to doing this?

JRC Response

Yes, JRC believes it is essential to make more spectrum available for innovation on a restricted term basis whilst ensuring appropriate protection is afforded to any incumbent use. An excellent example of this approach involved trials of private LTE technology in UHF spectrum which directly impacted the creation of two new 3GPP bands – 87 and 88, which are now in use in Ireland and Poland for Utility Smart Grid networks. Ofcom’s flexibility in issuing the required innovation licences was instrumental in demonstrating the capability of a private LTE system in UHF, the potential requirement for products in that band and ultimately the value of specific standardised bands within 3GPP which have now been incorporated into chipsets available from several global players. Furthermore, Ofcom’s work in Frequency Management Group FM54 has also had a constructive impact on this development. Coupled with initiatives such as the UK’s 5G Innovation scheme, Ofcom’s approach in this area helps to ensure that UKPLC actively contributes to wireless innovation in a Global context.

Question 8: Do you think 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 too –

- a) Increase realism in co-existence analysis and 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 ?

JRC Response

Effective co-existence regimes and the principle of good neighbours is the core underlying principle behind modern Spectrum Management initiatives and we fully endorse the ‘good neighbours’ principle. Nevertheless, it is also worth acknowledging that some technologies, e.g. LTE, are not well suited to sharing with other technologies and as such the opportunity for co-existence may be limited by technology type which would imply that such technologies would be seen as potential innovation blockers and this should be taken into account when consideration is being given to make spectrum available for IMT technologies. To this end, the Energy Network Operators critical SCADA systems deployed in the 450 – 470 MHz band (see response to Question 9 below) are increasingly subject to harmful interference from LTE based systems being deployed in this frequency range across Europe. with resultant disruption to operational control systems. This is a clear example of a real International co-existence challenge that needs to be addressed.

Not all systems are equal in terms of their risk and the potential consequences of disruption from increased interference and as such it is important for Ofcom to acknowledge that the role that spectrum plays varies across sectors and use – Ofcom should not be indiscriminate with its application of policy. To this end, JRC’s Members operate mission critical networks, critical to the safe and reliable operation of the UK’s electricity and gas networks. As such a high degree of protection from interference is required to avoid power blackouts. The need for protection from harmful interference is aligned to other critical sectors where spectrum use is essential to operational integrity and the interests of society as a whole rather than aligned to the generation of profit from the provision of telecommunications services to the consumer.

Parallel sectors would include emergency services, railways, aerospace, and coastguard – all of which have requirements that are vastly different to the ‘reasonable endeavours’ characteristics of consumer based solutions.

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

JRC Response

JRC notes that the specific frequency range 450-470 MHz would benefit from additional attention at a medium – long term strategic level. In its current configuration the band is reverse aligned (TX – RX) and is extremely fragmented. Increasingly the use of the band in the UK is becoming more challenging due to two key factors; i) Mainland Europe using this band for high power wideband (2 x 3MHz) LTE based systems; ii) propagation events (ducting) causing wide area harmful interference for an extended period over the year. JRC Members make extensive use of this band for narrow band systems. It is anticipated that over time the combination of factors (i) and (ii) will likely render the band so unreliable as to be unusable by the Energy Network Operators over the next decade. The use of high power, wide area LTE based systems in mainland Europe is now almost exclusively for mission critical applications (blue light / PPDR and Utilities). The timeframe of the 2020s potentially presents an opportunity to address the issues in the 450-470 MHz band.

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?

JRC Response

JRC agrees that continued use of existing tools will remain important. However, we would also suggest that those technical tools will continue to require refinements and upgrades on an ongoing basis to reflect changes to market requirements. For instance, as the effects of global climate change continue to affect the UK, it will be essential to keep pace with changing propagation modelling methods – especially where perturbations in precipitation and ducting effects begin to occur more frequently. In connection with Ofcom’s proposals to move toward more ‘real world’ interference protection parameters, Ofcom’s tools could evolve to incorporate real performance statistics and metrics in order that spectrum sharing and propagation algorithms are refined on an iterative basis subject to such changes not resulting in costly disruption to incumbent systems.

From a non-technical perspective of spectrum management, existing tools such as auctions, spectrum trading, light licensing techniques, dynamic sharing (white space) and license exempt solutions do not provide a suitable mechanism for the Energy Network Operators to access spectrum resource in the manner required. Alternative access tools e.g. targeted interventions have recently been utilised in Ireland, Germany, Spain and Poland – ensuring access to suitable radio spectrum for the energy utility sector.

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

JRC Response

Coupled with the subject of localised licensing, 4G (LTE), 5G & 6G services for industry verticals and network slicing, JRC believes that additional attention should be given to the subject of policy and management of mobile network codes and numbering. Although not



strictly a spectrum issue, the allocation of Mobile Network Codes (MNCs) is under Ofcom's control and is intrinsically connected to Private Network Operation, spectrum sharing and localised licensing. In common with spectrum resources, number ranges are finite - a long-term strategic approach is therefore essential to afford access to MNCs to organisations / sectors that require them and JRC is committed to working with Ofcom to co-ordinate this aspect on behalf of its Members.

Separately and as already noted in response to Question 6b, we encourage Ofcom to explore system developments that will facilitate access to wider channels in the VHF range where we believe that much of the legacy spectrum allocations are fallow but unavailable due to the existing channel configuration that acts as a constraint.