

Ofcom Consultation – Spectrum for the Police Service of Northern Ireland

Executive Summary

The Joint Radio Company (JRC) welcome the opportunity to provide input to the Ofcom Consultation: Spectrum for the Police Service of Northern Ireland and the emphasis that Ofcom is placing on enabling dedicated spectrum access to the PPDR community of Northern Ireland. However, we encourage Ofcom to broaden their perspective on Critical System Operators beyond just the PPDR community to ensure that all needs are addressed. In particular, we encourage Ofcom to include the needs of the Energy Network Operators in this discussion and in so doing align this initiative with the existing Strategic Review of the Utility Operators' spectrum requirements underway with Ofcom. To this end we see a potential win-win with the spectrum allocation being aligned to a broader community of Critical System Operators which would drive scale economies for device procurement and afford greater long-term security to the investment. In addition, the enhanced operational performance of the energy networks that would result will afford greater resilience and availability to the PPDR community and Public Communications more generally. It is interesting to note that the global PPDR community (via TCCA) is increasingly recognising that the cause of major incidents are often coupled with more frequent extreme weather events – flood, fire, storm damage. These incidents are placing significant additional burden on blue light services and the severity of these incidents is being exacerbated by loss of power for extended periods to wide areas impacting large numbers of the population.

Broader Context

The transition to net zero is driving many changes in the architecture and implementation of the UK's energy supply system. There are multiple issues to consider with this change including the implications of building and operating a more distributed energy system that has greater complexity when balancing supply and demand and ensuring stability. Coupled with this there are increasing demands being placed on the energy system through developments like electric vehicles. Successfully operating the smart grid that is required to deliver on the policy put in place by Government, requires a significant enhancement in real time communication capability in energy networks, a key part of which will be delivered by wireless networks.

Ofcom has accepted the important role that radio spectrum will play in the 'Net Zero' transition through its ongoing Strategic Review of the Utility Operators' spectrum requirements. While good progress has been made with this review, we note that other communities, in this case the PPDR community, are being prioritised ahead of other Critical Communications Systems Operators, e.g. Energy Utilities, and as such we encourage Ofcom to ensure that this does not lead to a regulatory failure. The convergence of several mission critical sectors (namely energy utilities, blue light and transport) is perhaps best illustrated by the recently published joint E3C / BEIS report¹ on the impact of storm Arwen (winter 2021 – 2022) and associated recommendations for enhanced, resilient communications in the energy sector.

To this end, we encourage Ofcom to reflect on the perspective that UK economic and social prosperity is predicated on robust and resilient energy supplies. As mentioned above, operational communications will have a crucial role in balancing supply and demand and ensuring the stability of an increasingly dynamic energy supply system. This functionality will be enabled by the widespread deployment of active, resilient control systems with enhanced and resilient data communications key to managing energy flows. To this end, secure and expanded access to dedicated radio spectrum for energy networks as 'Critical System Operators' at an appropriate cost is a critical component of the

¹ [Storm Arwen review: final report \(publishing.service.gov.uk\)](https://publishing.service.gov.uk), see recommendation R4.



UK's future energy supply model and the enablement of the 'Smart Grid' that is central to the UK Government's ambitions for a 'Net Zero' future.

Background

Joint Radio Company Ltd (JRC) 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 coordinating 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. 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 at all times to unmanned sites and plant in remote locations to maintain the integrity of the UK's energy generation, transmission and distribution.

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

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

The Broader Context:

The ‘Net Zero’ Transition and the need for enhanced visibility and control of Energy Network Assets

Introduction

UK Energy Networks are undertaking a transition from centralised energy generation to a model where energy generation is distributed via a larger and more diverse range of generation sources resulting in a shift from a passive to an active or “Smart Grid” where energy flows in two directions. This shift to an active and distributed grid demands a greater level of intelligence and interconnectivity (sensors, communications and control) and automation across the entire distribution network, in order to ensure co-ordination, efficiency, responsiveness, safety, security and resilience of supply.

Figure: A vision of the new Smart Grid infrastructure with greater diversity and interconnectivity



Source: European Commission

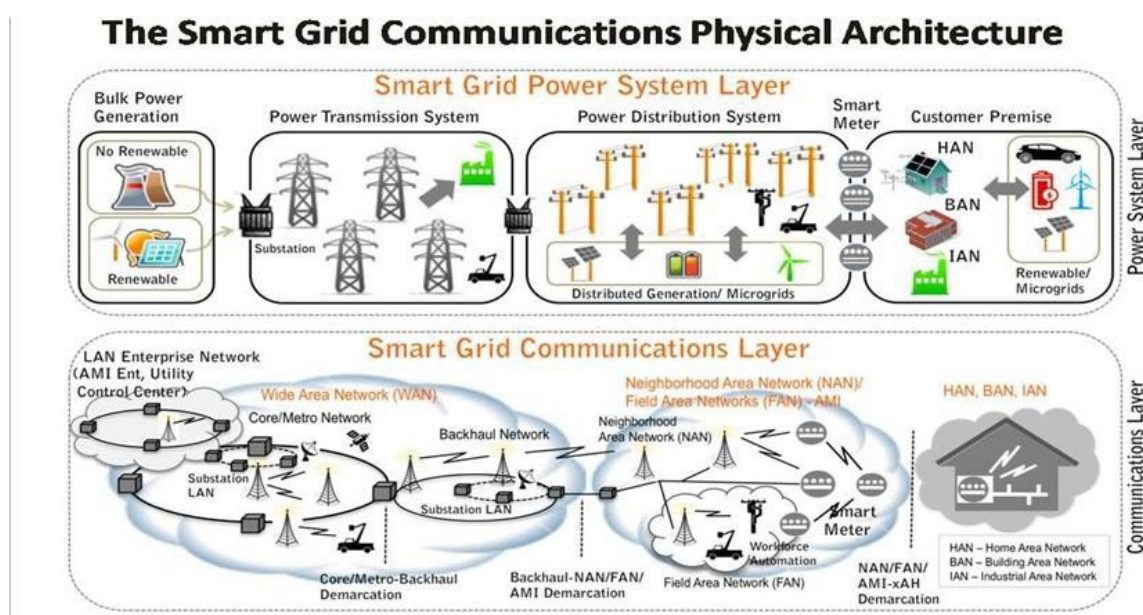
The need for Enhanced Operational Control is a product of the Change in the Supply and Demand Context

Historically, energy networks have largely been passive composed of only a small number of active control components at the High Voltage layer (i.e. above 33,000 volts). The operational telecommunications systems used in these systems have typically been narrowband, employing a mixture of wired and wireless connectivity solutions. In the case of wireless connectivity, a relatively limited amount of radio spectrum has been utilised to date to support these legacy needs. The centralised or ‘top down’ approach of energy supply required no visibility for control purposes of what was happening at the edges of the network (Low Voltage - LV) and relatively limited visibility at Medium Voltage (MV). However, as the UK’s energy networks have become more dynamic both from a supply and demand perspective – incorporating distributed generation and storage alongside the adoption of high energy-consumption but low carbon emitting technologies like electric vehicles and heat pumps – there is an increased need for active control. For electricity this will require control components within the medium and low voltage layers – effectively turning the monitoring and

control (and connectivity) hierarchy upside down. I.e. rather than requiring connectivity at low data rate to a small number of very large, centralised, critical assets, the future scenario will require higher bandwidth connections to a much larger number (100 x) of distributed assets each of which will play a critical part in the future network (individually & collectively) with the number of wireless connections expected to grow significantly leveraging their cost effectiveness and flexibility. Within the Gas networks additional capability is required as hydrogen and other green gases are added to the mix of the energy system.

This significant increase in the number of connected assets will result in a dramatic increase in data flows necessary to operate the energy system in real time, requiring a corresponding expansion in the need for connectivity including use of radio spectrum-based solutions.

Figure: IEEE graphic of the Smart Grid Power Layer overlaid on the telecoms layer



Source: IEEE

Enabling a Dynamic Energy Supply Solution through enhanced Operational Telecommunications Capability

Wireless based communication systems have always been a critical component of the operational Command and Control systems of the Energy Networks. The need for enhanced operational communications solutions has been under review for the past 5 years or more and work has been taking place with Ofcom through its Strategic Review of Utility Operators Spectrum Requirements project which has been contributed to by Joint Radio Company² and ENA-STG³. Ofcom's study is exploring the spectrum access needs of the utility operators and considering what regulatory interventions may be required to enable efficient energy networks that meet the government's future policy objectives. It is also important to note that Government departments, DCMS and BEIS, are actively engaged in responding to the developing needs of the Energy Network Operators through the 'Net Zero' transition. One common theme that regularly needs to be addressed when exploring the

² Joint Radio Company a joint venture between National Grid and the Energy Networks Association

³ ENA-STG, Energy Networks Association Strategic Telecommunications Group

needs of the Energy Network Operators with policy makers is the limitations⁴ of publicly available communications services to address the critical operational needs of the sector, i.e. resilience to mains power failure, reach, guaranteed QoS and availability, etc. To this end JRC commissioned research by Gemserv⁵ to establish the potential benefits and costs of an enhanced operational control solution via three different approaches: fibre, public cellular and private wireless. The Gemserv analysis clearly demonstrates the private wireless solution to be the most cost effective and capable option at a cost one twelfth of the benefit that would be realised – an annual net saving of £25 on every household’s energy bills. JRC and the ENA-STG are committed to working closely with Policy Makers to ensure that the appropriate Policy Interventions are enabled, e.g. dedicated spectrum access to facilitate the ‘Net Zero’ transition. It is noteworthy that this study did not include analysis of the avoided costs of the ‘do nothing’ scenario – i.e. simply building a much larger passive or ‘dumb’ network. It is anticipated that if those costs were factored in then the saving per household would be many times greater than the £25 indicated. Separately, It has been estimated that without a smarter solution, the UK could need to invest between £10 Billion and 15 Billion per year reinforcing the passive network <https://eandt.theiet.org/content/articles/2022/09/analysis-is-the-electricity-network-ready-for-an-ev-revolution/>

⁴ ‘Operational Control of Mission Critical Networks and the Service Limitations of Public Mobile Networks (JRC White Paper)’ <https://www.jrc.co.uk/Plugin/Publications/assets/pdf/ICT-Operational-Control-of-Mission.pdf>

⁵ ‘Economic rationale for enabling Smart Grid functionality of the UK energy system via a Private Radio Frequencybased enhanced Operational Communications Solution,’ Gemserv, 19 November 2021. <https://www.jrc.co.uk/Plugin/Publications/assets/pdf/ICT-Economic-rationale-for-enabling-Smart.pdf>

JRC's Detailed Response to Questions

Q 1. Do you agree with our provisional view that the spectrum 733 to 736 MHz paired with 788 to 791 MHz should be made available to and authorised for use by the PSNI in Northern Ireland? If you disagree with our view and consider there is a higher value use, please provide details of this alternative use, particularly considering the issue of the risk of interference from SDL

Q1. JRC Response

Confidential? No.

JRC is Supportive of a dedicated spectrum allocation for PSNI. Ofcom has noted some important criteria for allocation of spectrum to 'blue light' services (and mission critical services more generally) which are equally applicable to Critical System Operators such as the Energy Network Operators –

- a) That for reasons of coverage capability and potential to re-use existing vertical estate, it makes sense to utilise a frequency range in the sub 1GHz region*
- b) That an LTE standards-based frequency band i.e. 3GPP standardised be used*
- c) That migration from legacy narrow band (TETRA) technology towards broadband LTE based solutions is essential in allowing PSNI to be able to deliver its obligations*

We note that whilst standards may exist there is not currently a mature eco-system for the type of robust hand-held and vehicle mounted devices that PSNI may require. We would recommend that Ofcom take careful consideration of international developments in other territories (The Critical Communications Association www.tcca.info) which specifically deals with matters on behalf of blue light services internationally at 3GPP, ITU and GCF (Global Certification)). If PSNI did end up with a requirement which is specific to Northern Ireland then the volume of devices (circa 20,000) may not command sufficient interest from large 3GPP equipment vendors. To this end there may be merit in aligning the award of spectrum access particularly in the 700 MHz frequency band to the broader requirements of Critical Systems Operators including the Utility Network Operators (Electricity, Gas & Water) in Northern Ireland to drive the relevant device numbers into the millions if Smart Metering is included. In addition, if the spectrum under consideration here were given over to the Critical System Operators in the remainder of the UK to address their enhanced Operational control needs to facilitate the 'Net Zero' transition then the addressable market for devices would be expanded further. We therefore encourage Ofcom to consider whether the allocation of the spectrum should be expanded to accommodate the enhanced Operational Control requirements of Critical System Operators across the whole of the UK rather than limited narrowly to the requirements of PSNI in Northern Ireland.

We anticipate that in terms of interference with SDL systems, through the correct design and deployment of any proposed network, this should be able to be managed very effectively and should not necessarily exclude this spectrum from being considered as an option to address the enhanced Operational Telecommunications needs of Critical System Operators such as the Energy Network Operators.

Q 2. Do you agree with our provisional view that the spectrum 876 to 880 MHz paired with 921 to 925 MHz should be made available to and authorised for use by the PSNI in Northern Ireland? If you disagree and consider there is a higher value use, please provide details of this alternative use, particularly considering the small market potential of this spectrum

Q 2. JRC Response

Confidential? No.

As per answer to question 1 – JRC would advise Ofcom to consider when (and if) an ecosystem of devices will exist for the 876-880 and 921 – 925 MHz band. If the band is to be primarily used

throughout the EU for rail solutions (FRMCS) then it may be challenging to find availability of handsets and vehicle mounted units with the specific ruggedised form factor and features which are necessary for blue light services. A user base of 20,000 will probably not stimulate the market to provide a cost effective solution and any 'economy of scale' benefits could be lost.

Additionally, JRC would be interested to have visibility of any studies conducted by Ofcom which indicate a need for 2 x 3 MHz in the 700 MHz band AND 2 x 4 MHz in the 900 MHz band. We would expect that some detailed study around user numbers, anticipated data traffic rate and user density would be a pre-requisite for two parallel allocations. Additionally, combining two specific frequency bands into one network (and one product range of devices) may add further complexity and deter vendor engagement. We note that other countries are implementing private LTE PPDR networks in 2 x 5 MHz (Spanish Ministry of Interior & Russia (Tele 2 / Ericsson)) and have far larger populations than NI and greater user density.

Q 3. Do you have any other comments on the proposals?

Q 3. JRC Response

Confidential? No

JRC is striving to secure dedicated spectrum access for the energy utility sector in the UK. Many of the same arguments used to justify a dedicated allocation for PPDR use have parallels with the energy sector requirement to migrate away from legacy narrow band solutions to future proof broadband connectivity based on 3GPP / LTE. The areas of security, ubiquitous coverage (including indoor), ecosystem support and power autonomy are common to both Utilities and PPDR – the requirement of both sectors is mission critical. The requirement for mission critical communication with resources / assets in the PPDR sector is with people, whereas in the Utility requirement it is (predominantly) machines and equipment.

Ofcom are aware of an initiative in Northern Ireland (led by NI Electricity) to gain access to a dedicated LTE spectrum allocation to enable an enhanced Operational Control system based on a private LTE based network that would be shared by Electricity, Gas and Water Utilities and which in the case of the spectrum at 700 MHz could be designed and shared with PSNI to optimise the efficiency of spectrum use and the benefit to Northern Ireland. In this regard and as noted in response to Question 1 we see merit in broadening the scope of this proposed allocation to include Critical System Operators both in NI and GB to leverage the scale of devices and in so doing make the proposition more attractive to the 3GPP vendor community driving device cost down and ultimately the cost to UK Plc. JRC and its Members would welcome further engagement with Ofcom on this matter.