THE CONVERSATION

ROUNDTABLE

In association with: UtilityWeek jrc NOKIA

The smart energy blind spot

Current operational telecoms systems are not fit for a DSO future. Jane Gray reports on the key outcomes of a Network debate hosted in association with Nokia and Joint Radio Company (JRC).

Let's cut a long story short. If we care about mitigating Climate Change, we need to release radio spectrum to enable the emergence of a smart, flexible, decentralised power grid. This was the clear-cut message from a meeting of senior industry experts and regulators in the House of Commons.

The creation of a smart, decentralised power system is a central cog in the UK's response to the ultimate threat of climate change. A grid which can embrace a diverse range of renewable generation technologies along with energy storage, which can support dynamic electric vehicle charging, low carbon heating technologies and facilitate energy flexibility markets, is essential in order to unlock a new phase of emissions reduction in the UK.

There is an urgent need to access this seam of low carbon potential. In early May the Committee on Climate Change (CCC) published a report emphasising the need to set a national net-zero emissions target for greenhouse gasses by 2050 in order to honour the commitments made by the UK in the Paris Agreement.

The report came on the back of fresh warnings from the International Panel on Climate Change about the imminent potential for irreversible global biodiversity damage due to global warming, and amid a swell in public demand for climate action, demonstrated via the Extinction Rebellion and the Youth Strike 4 Climate groups.

The UK's energy networks are ready and willing to rise to the challenge laid down by the CCC and, at a transmission level, National Grid has already demonstrated it is capable of operating a dynamic system which can utilise distributed low carbon resources. As Network's House of Commons event took place, National Grid was celebrating its first full week operating the grid without the use of coal-fired generation since 1882. The ability to buy balancing services from distributed system participants was core to this achievement.

But the full potential of a low carbon electricity grid will not be realised until distribution operators can also facilitate dynamic system balancing at a local level. Plans to transition distribution network operation to local system operation are well underway. But, as participants in Network's debate made clear, they will not be possible without significant changes to existing operational telecommunications infrastructure, which was only designed to support remote operation of network-owned assets.

Future distribution system operators (DSOs) will need to support fast and resilient communication with millions of connected smart energy devices and distributed energy resources at the grid-edge, as well as an increasingly intelligent "final mile" of distribution infrastructure . This volume and diversity of connectivity cannot be delivered using the bandwidth provided by legacy telemetry networks.

Instead, a new suite of smart telecommunications options will be needed and, debate participants were adamant, this must include access to dedicated radio spectrum – ideally in a "sweet-spot" bandwidth of around 400MHz which offers both technical and economic benefits.

Securing this frequency range for utilities usage is eminently possible – but requires clearance from the telecommunications regulator Ofcom which must prioritise spectrum demands from a number of competing interest groups.

Encouragingly, Ofcom has already signalled that it recognises the need to enable smart grids and is in the early stages of a joint project with Ofgem to review available and practical options for dedicated smart utilities spectrum. However, the timeline and scope for this project is currently unclear and there is industry concern that it will not deliver the

No smart grid without smart telecoms

There is an immediate priority for the UK's energy networks to secure long term access to additional radio spectrum and enable the data-rich operational telecommunications systems needed for smart grid functionality.

This is essential to enable the transition from distribution network operation to distribution system operation at a local level and support the growth of a smart, low carbon power system. In addition, it could bring even greater decarbonisation benefits to the UK by allowing more granular monitoring and control of the gas network, which will also encounter operational telecommunications challenges as the number of injection points and the range of gas products (with varying thermal properties) increase over time.

To deliver the many benefits associated with the creation of smart energy networks, operators must work closely with government and relevant regulators to ensure the appropriate policy frameworks and investment regimes are in place to enable the deployment of this enhanced operational telecoms capability. Without the appropriate policy interventions, the much-anticipated benefits of a thriving low carbon economy will not be realised.

This close working between industry, government and policy makers must establish a clear understanding of the specific requirements that smart energy utilities will have of their future operational telecoms solutions. For example, the wide geographic distribution of the energy networks' assets, alongside the need to access remote fixed assets reliably and consistently – typically using low power equipment – means that spectrum allocation in the Ultra High Frequency (UHF) band [300 MHz to 3 GHz] is preferable.

Furthermore, spectrum in this UHF band would be the most cost-effective choice for smart grid applications, since today's network operators already have existing assets making use of this frequency range.

Alongside the efforts of government and regulators to deliver the spectrum access smart utilities need, it is also important that energy network operators play their part by working together to establish a standardised approach to technology deployment and operations which can allow the benefits of enhanced telecommunications capabilities to be applied to the whole UK energy system in an efficient and cost effective manner.

Fundamentally you can't have smart networks without enhanced communications capability.

Peter Couch, chief executive, JRC

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required spectrum allocation in time to enable DSO strategies to move forward in RIIO2. A hamstrung DSO agenda has clear and worrying implications for the UK's ability to deliver its 2050 net-zero emissions ambition.

To accelerate a decision on utilities spectrum allocation, industry representatives encouraged regulators and policy makers to take note of international examples where this path has already been trod. A key case study was pointed to in Ireland where the telecoms regulator ComReg recently responded to requests for allocation of (a nationally underutilised) 400MHz spectrum band for smart metering and smart grids innovation.

With such examples to look to, there is a tangible opportunity for the UK to nimbly deliver the policy and regulatory interventions needed for a thriving low carbon future. As Network's House of Commons debate closed, industry participants looked with hope to the conclusions of the Science and Technology Select Committee's inquiry into the technologies for meeting clean growth emissions reduction targets for a demonstration of government understanding and support on this key enabling issue for smart, decarbonised utilities.

FURTHER READING:
Key resources for more information on smart telecommunications for smart power grids:

ENA position paper: Need for Increased Spectrum Allocation and Investment in Operational Telecommunications to Support Electricity Networks http://bit.ly/ENA_spectrum

Plum Consulting report for ComReg: Potential use of the 400 MHz band in Ireland http://bit.ly/Plum_ComReg

JRC white paper: Cutting Through the Hype: 5G and Its Potential Impacts on Electric Utilities http://bit.ly/5Gpaper

IET conference paper: The future of Operational Telecommunications associated with a power distribution network http://bit.ly/IET_futuretelecoms

Western Power Distribution study: Next Generation Networks: smart grid telecommunications Analysis http://bit.ly/WPDstudy

Smart grid telecoms and 5G

There has recently been a flurry of national interest and controversy around the impending rollout of 5G communications in the UK. This development is clearly relevant and important for the UK's smart energy future. However, it's important to understand that the arrival of 5G will not be a panacea to the current obstacles with operational telecommunications modernisation. Indeed, most of the communications capability inherent in 5G technology exists today and will develop as a continuum.

This is important in the light of current industry debate around the immediate need for spectrum allocation for smart grid operations. Releasing spectrum today in the UHF band would not be an interim measure only to be ripped and replaced once 5G enablement arrives. Spectrum enablement with suitable UHF alignment in systems such as 4G LTE will be embraced and enhanced by 5G, not displaced.

Consider, for example, the following five important and urgent smart network operation requirements – all of which would be immediately enabled by release of suitable spectrum for smart grid applications and enhanced in the 5G aspirations.

Security: UHF spectrum allocation would support growth of private mobile (LTE) networks which can support pervasive and predictable connectivity to secondary substations. This is essential for resilient day to day smart network operations but is also a core requirement for a reliable black start scenario. 5G would incorporate existing 4G capabilities here and provide enhanced monitoring.

Flexibility and diversity: Advanced 4G technology can already support higher levels of secure, encrypted grid automation with reliance on "grid edge" system participants – i.e. high levels of participation from distributed energy resources. We do not need to wait for 5G to enable this.

Operational efficiency: Smart networks will increasingly need to leverage new operational technologies to deliver new, innovative services at least cost to the consumer. Spectrum allocation would enable greater use of SD-WAN services within the foundations of network operational technology systems. These services will be key to unlocking the potential of the Internet of Things for energy networks, supporting network virtualisation and optimising the use of smart field technologies.

New business models: Spectrum allocation would accelerate to market the potential of the advanced analytics and artificial intelligence applications networks need in order to build new (DSO) business models. Networks need to build much more complex and advanced transacting capabilities and achieve distributed real-time data processing across their networks.

In conclusion, enabling spectrum for grid automation today would be a small step that would create a tipping point for the innovation and smart capability that all licensed network operators are currently seeking. Waiting for an organic evolution in operational telecommunications technology to provide this tipping point is not an option. We cannot be seen as a laggard on the world smart grid telecoms arena.

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