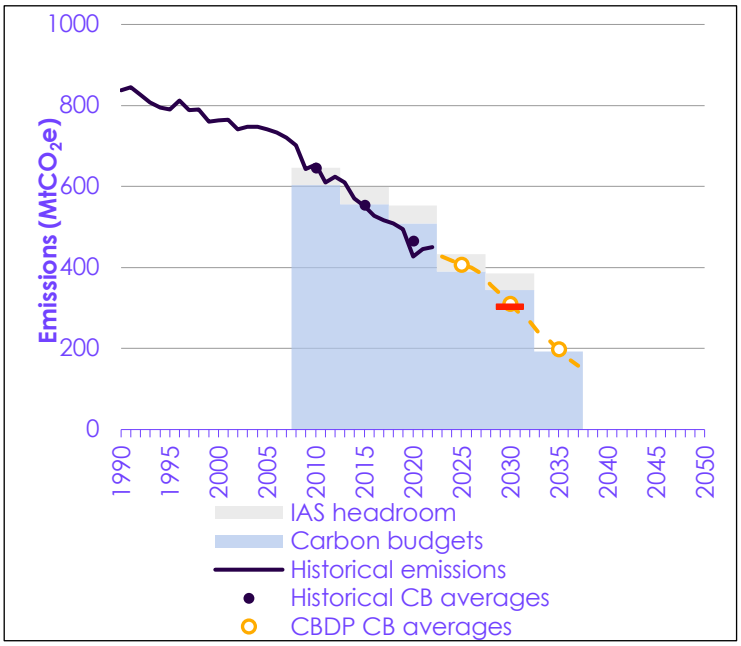
Response to the Ofcom Call for Input: Potential spectrum bands to support utilities sector transformation

The European Utilities Telecoms Council (EUTC), representing European electricity and gas generation, transmission and distribution companies welcomes the opportunity to respond to Ofcom's Call for Input (CFI) on potential spectrum bands to support utilities sector transformation.

Summary

EUTC welcomes the opportunity to respond, especially as many EUTC members are participants in the UK energy sector.

Mitigating climate change and reducing atmospheric carbon dioxide (as shown in UK emissions targets opposite) are global imperatives within which utilities, especially the electricity sector, play a vital role. The UK has committed itself to challenging legally binding obligations which it must plan to deliver. Utility operational telecommunications are an essential enabler of the digital transition which facilitates these changes.



In responding to this CFI, we make a number of detailed points, mainly:

- Wide-area coverage can only be achieved cost-effectively using spectrum below 1 GHz, hence the 1900 MHz may be useful for filling in, but cannot provide a foundational layer of coverage.
- Aligning with global utility 3GPP ecosystems is essential if affordable equipment is to be procured.
- Potential global supply chains for any prospective spectrum band must also take into account security considerations.
- For spectrum bands occupied by current users, monitoring activities may be essential to understand current usage rather than simply current allocation or licensing.
- Decisions need to take into account the timescales within which spectrum might be accessed in the context of 2030, 2035 and 2050 climate targets.

In considering its response to this CFI, EUTC also looks to see whether if the UK adopted a spectrum band not currently used by utilities in Europe, the extent to which there might be scope for other countries to follow a UK lead and allocate the same band to utilities in their own administration.

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EUTC's response to Ofcom's specific questions are below:

Question 1: Have we correctly identified the key changes in the utilities sector that could lead to additional spectrum requirements?

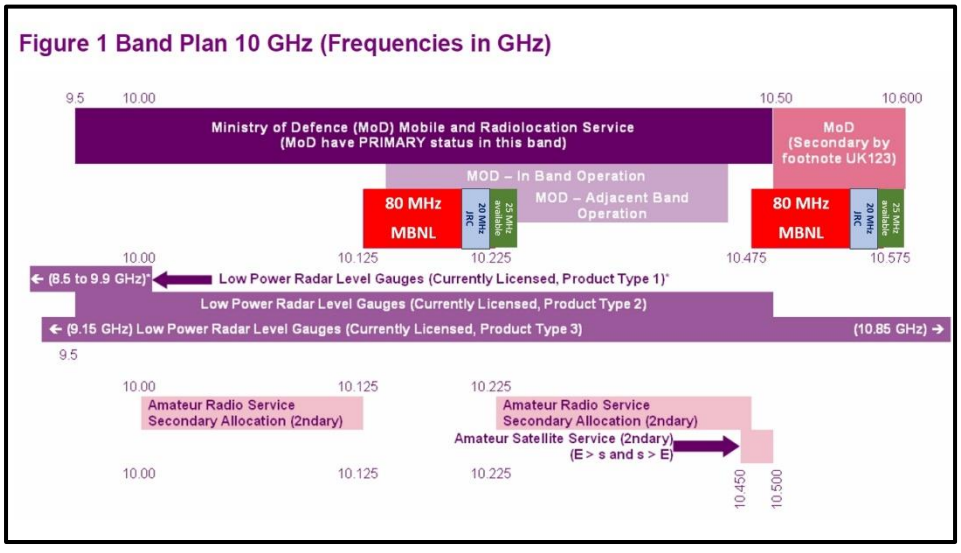
Security is a major issue with nation-state levels of interference in utility networks in order to disrupt economic activity. This drives the imperative for secure and resilient utility telecommunications, and has implications for global supply chains in some spectrum bands.

Question 2: What alternative communication solutions might play a role in meeting the future operational communication needs of the utilities sector, alongside or instead of additional spectrum for a private network?

Power Line Communications (PLC) using the electricity network itself is as an option, especially for smart metering and lower levels of smart grid operations.

Question 3: Are there any other spectrum bands we should consider for use by utilities?

EUTC notes that 380-400 MHz is currently deployed in the UK for their emergency services voice communications using Tetra technology. We observe that the UK Government wishes to close the current Airwave network serving Great Britain and replace it by an alternative Emergency Services Network (ESN) based on commercial mobile services networks. This will release the 380-385 MHz 390-395 MHz spectrum for alternative uses, and we note that 3GPP has commenced preliminary work on identifying this spectrum for mission critical 4G/LTE and 5G services.



As a complementary requirement for the wide-area network using spectrum below 1 GHz, we note that the UK is innovative in making available to the market some blocks of spectrum suitable for high-capacity point-to-point and point-to-multipoint fixed links to support the lower frequency networks. EUTC notes that some utilities are deploying spectrum at 10.5 GHz which reflects a previous situation where utilities had dedicated fixed link bands. We are aware that there is an ambition that MoD might release additional spectrum (shown in green in the plan below) which would be a welcome addition to the existing 2 x 20 MHz to support the expansion of smart grid capabilities.

In the longer, after 2035 when it is possible that terrestrial broadcasting spectrum in 470-694 MHz will be reallocated to Mobile and Fixed Communications Networks (MFCN), it would be approproiate to consider setting aside some of this spectrum for mission critical networks.

Question 4: Do you have any comments on the three bandwidths we have considered that might be necessary to support a private network for utilities? Please reference our capacity analysis in annex 7 where relevant.

It has been reported from utility LTE trials that some applications cannot be supported in 2 x 1.4 MHz channels, requiring a minimum channel bandwidth of 2 x 3 MHz. We also observe that 5G technology currently requires a minimum of 5 MHz bandwidth channels, although work is in hand to seek to reduce the minimum channel bandwidth for 5G to 3 MHz.

Question 5: Do you have any comments on our approach to examining each potential candidate spectrum band, including the factors relevant to assessing suitability, and the capacity and coverage analysis provided in annexes 7 and 8?

Coverage from the base station is not the only issue related to the frequency band; the return path must also be modelled in order that a reciprocal path is established (which cannot be assumed purely from base station coverage). Other analyses suggest a greater difference between 450 MHz and 700 MHz than assumed by Ofcom in this CFI. Also, the argument that coverage can be improved at 700 MHz by increasing power by 3dB and increasing antenna heights applies equally to 450 MHz spectrum, so the relevance of applying this observation only to 700 MHz is not understood. We would also welcome evidence for the basis of the difference in noise figures assumed for 450 MHz and 700 MHz.

Comparisons between 450 MHz and 700 MHz using different powers and antenna heights have been investigated by Western Power Distribution in research reports published in the UK. These reports found that 450 MHz can be similarly improved (and therefore costs reduced) by using higher power and greater antenna heights. The difficulty in using higher powers were seen as regulatory and changing 3GPP specifications to embrace the higher powers. Increasing antenna heights are seen as not only a planning issue, but an environmental concern because of the unwelcomed increased visual intrusion of antennas into the landscape, and opportunity the higher antenna offers for vandalism.

Capacity analysis does not consider latency or surge capacity. Some trials by energy companies indicate that meeting latency requirements can require additional capacity because of the effects of packetization; and surges of data occur during storm scenarios. Because of the drive towards net zero emissions by 2050 which is promoting the electrification of both heating and transportation, and the impact of climate change on the demand for more air conditioning, the requirements for smart grid are pushing communications needs from a minimum of 2 x 3 MHz of spectrum below 1 GHz towards 2 x 5 MHz (eg Germany and Poland).

Question 6: Do you have any comments on our overview of the 400 MHz band in NI? Please consider the specific factors we have discussed in your response.

Use of the band 410-414 / 420-424 MHz in Northern Ireland (NI) clearly has many benefits as it mirrors similar use by ESB in the Republic of Ireland, and enables potential sharing opportunities to optimise connectivity in border regions to the benefit of all communities.

The CFI records the current allocation of the spectrum but does not give an indication of the intensity of usage. It would be valuable to see the rigour of the analysis in Annex A7 of this report applied to current usage of these bands in Northern Ireland.

Question 7: Do you have any comments on our overview of the 450 MHz band in GB and NI? Please consider the specific factors we have discussed (including the coexistence analysis in annex 9) in your response.

The issue is not simply that the 450-470 MHz band in the UK is frequency reversed compared to mainland Europe, but the band is disorganised with a multitude of duplex separations, simplex services and a licence-exempt band. We also think there may be an error in Fig 5.1 in that Business Radio does not have access to the entire band 453-460 MHz.

Ofcom's previous analysis of the opportunity to align this spectrum to the European Band Plan assumed that reorganisation of the band would release at least 2 x 3 MHz of duplex spectrum for other uses, implying that the current band plan represents considerable spectrum inefficiency.

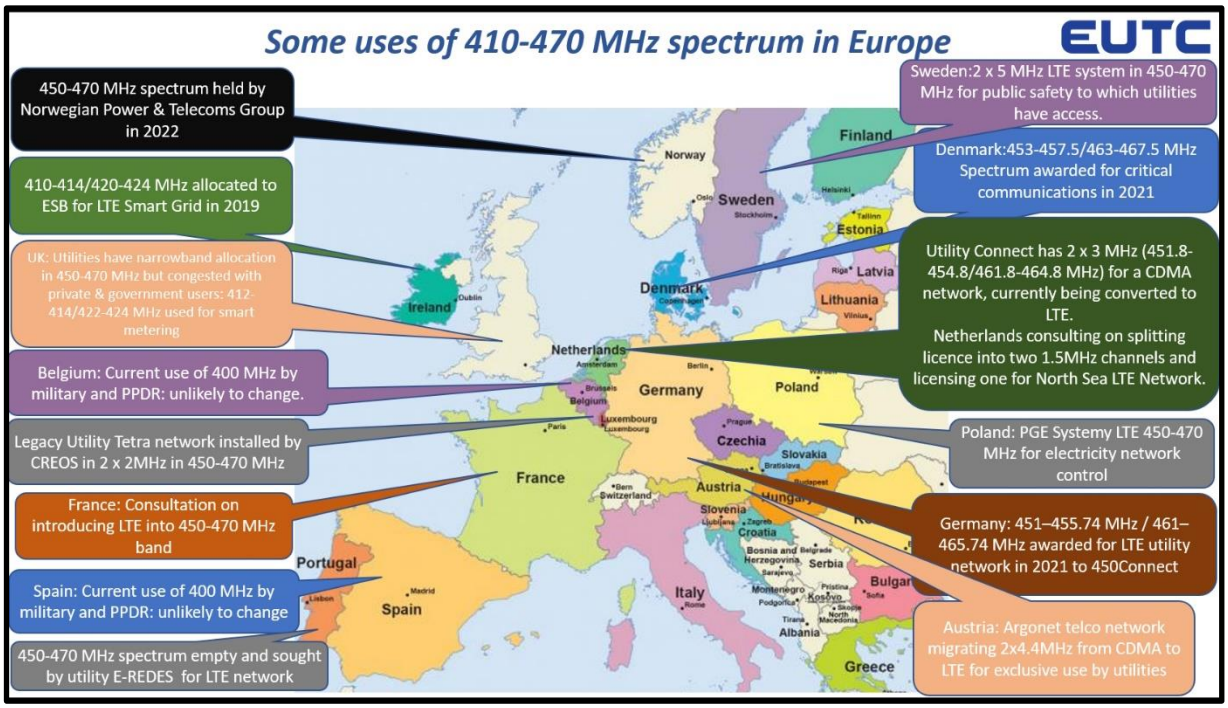
The scenarios for deployment of broadband utility services in the band are innovative, and represent a welcome attempt to resolve this longstanding problem which will have to be addressed by the UK at some point in time.

Utility use of 450-470 MHz by ESB in the Republic of Ireland (ROI) requires protection from mainland GB emissions if the alignment of the band is changed. Any changes in the UK ought to be closely coordinated with RoI. This adds weight to concept of utilities in NI using 410-430 MHz spectrum for utilities to avoid conflict with RoI on the NI/RoI land border.

Question 8: Do you consider that changes in the spectrum environment for the 450 MHz band mean that there is a case for re-examining whether this band should be reconfigured in the UK to align with the harmonised band plan?

EUTC believes this is essential. The current band plan was devised when the 450-470 band accommodated only narrowband analogue services. The band plan could remain largely unchanged when these services migrated to narrowband digital services, but with the introduction of broadband services in the 450-470 MHz band, the current UK band plan becomes obsolete. Most European countries, and many countries in the rest of the world, are introducing broadband LTE services into this band with the expectation that they will eventually be able to migrate to 5G technology. The CEPT band plan can accommodate this

transition, but the current UK band plan cannot. The question is not therefore whether the band should be reconfigured, but when – it is inevitable in the longer term.



With the Emergency Services in 450-470 MHz having largely migrated to the Airwave Tetra network, and ESN capturing virtually all the remaining services, the migration of narrowband utility services in the 450 MHz band offers a unique opportunity to replan the whole band to align with the CEPT band plan.

The replanning of the band can then accommodate critical broadband services whilst retaining a substantial portion of the band for the continuation of narrowband services.

Question 9: Do you have any comments on our overview of the 700 MHz band in GB and NI? Please consider the specific factors we have discussed in your response.

Although at first sight this appears an attractive option as the spectrum is currently vacant, it also represents a significant challenge, for reasons including:

- There is no utility ecosystem in the band and the band has been identified internationally for PPDR. Even if manufacturers develop end-user terminal equipment for this band, the costs are likely to be greater than the 400 MHz bands.
- Because of its identification within Europe for PPDR, there is little likelihood of other countries following the UK and establishing a demand for 3GPP specifications for utility systems in this band. [Utilities generally seek to align with Public Safety in 3GPP to drive through common requirements, but it is unlikely Public Safety organisations would support utility requirements in this band.]
- Base station equipment is of a lesser issue in terms of procurement, but the coverage maps implying that only a small increase is the number of base stations is required at

700 MHz to replicate a 450 MHz network are out of step with other estimates of comparative coverage analyses.

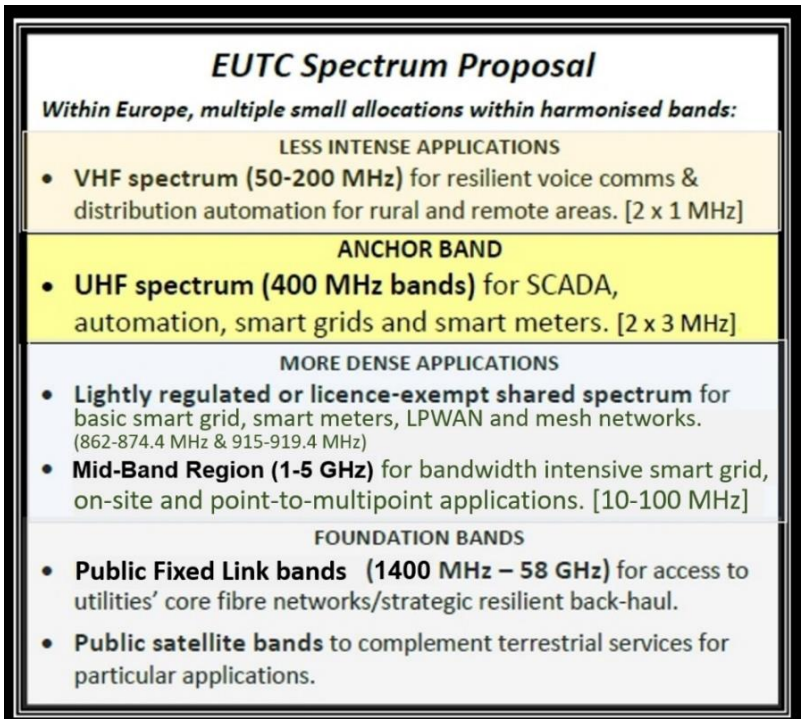
- It is however possible that a 700 MHz network as proposed could provide an early entry into LTE for UK utilities. 700 MHz could also possibly supplement an 'anchor band' in the 400 MHz region introduced at a later date to provide the required essential ubiquitous coverage and additional building penetration. Thus, taking into account the EUTC Spectrum Proposal shown in Question 11, 700 MHz could provide the capacity envisaged being provided above 1 GHz in that proposal.

Question 10: Do you have any comments on our overview of the 800/900 MHz band in NI? Please consider the specific factors we have discussed in your response.

- The challenges in using this band for utilities are well explained in the Ofcom analysis.
- We would point out however that the challenges may be even more severe than outlined because:
    - The Northern Ireland Market is much smaller than the GB market, making it even less attractive for vendors as a unique solution.
    - The use of this band in most other European countries for railways means that there is little prospect of other countries following NI and increasing the market size.
    - NI geography is on average more challenging than the rest of the UK for radio coverage, so the increase in the number of base stations in 800/900 MHz compared to 450 MHz may be significant.

Question 11: Do you have any comments on our overview of the 1900 MHz band in GB and NI? Please consider the specific factors we have discussed in your response.

- The challenges in using this band for utilities are well explained in the Ofcom analysis.
- EUTC has already responded to the previous consultation on the 1900 MHz band, so we shall not repeat all the points made there.
- The 1900 MHz band is too high a frequency to be viable for national utility critical telecoms, but could have a part to play in the broader utilities telecom network by adding capacity in urban areas where frequencies below 1 GHz might lack capacity, or for



special applications such as drones or augmented reality (as specified in Mid-Band Region in the above EUTC Spectrum Proposal.

Question 12: Which band(s) do you consider we should examine further with a view to developing consultation proposals to enable their use in a private network, if this were needed? Please reference the factors we have considered where appropriate and provide separate answers for GB and NI if relevant.

- EUTC believes that it would be most efficient for Ofcom to concentrate their resources on the 400 MHz, 450 MHz and 700 MHz bands.
- Studies should include measurements of actual current usage of these bands as opposed to their allocated uses.
- Special attention needs to be paid to the timescales for access to suitable spectrum in relation to the Climate Change Agenda. This is driving deployment of intermittent renewable generation and electrification of heat and transportations, and these targets cannot be met without corresponding improvements in critical utility network telecommunications.

The European Utilities Telecom Council (EUTC)

The European Utilities Telecom Council (EUTC) is the leading European Utilities trade association dedicated to informing its members and influencing policies on how telecommunication solutions and associated challenges can support the future smart infrastructures and the related policy objectives through the use of innovative technologies, processes, business insights and professional people.

This is combined with sharing best practices and learning from across the EUTC and the UTC global organization of telecommunication professionals within the field of utilities and other critical infrastructure environments and associated stakeholders.

EUTC includes a number of UK utilities and industrial partners operating in the UK.

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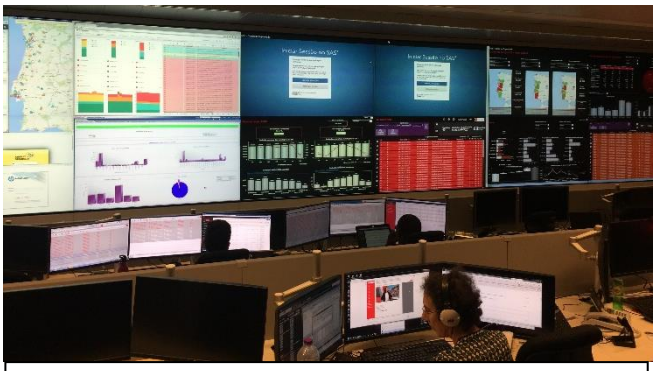

Typical utility distribution control room