Potential spectrum bands to support utilities sector transformation

Consideration of bands at 400 MHz, 450 MHz, 700 MHz, 800/900 MHz and 1900 MHz

BT's response to Ofcom call for inputs issued on 29 June 2023

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BT Group

Contents

Executive summary

1. BT welcomes this opportunity to contribute to Ofcom's work on consideration of potential candidate spectrum bands that might be suitable to support future operational communications by the utilities sector.
2. We agree that Ofcom should get further evidence of the future communication requirements for utilities from Government, sector regulators and others before moving to further consultation on making any specific spectrum band available for dedicated use by utilities. Given Ofcom's bias against intervention, it is important to first establish clearly the reason it needs to do so in this instance.
3. It is not clear to us that separate spectrum for the utilities sector is necessary or is the most efficient solution to meet their future needs: other solutions, such as leveraging the capabilities of existing national mobile networks and fixed networks to deliver the required connectivity, are more likely to be most suitable.
4. Of the candidate bands that Ofcom has discussed, we have particular interest in the 1900 MHz band. We are an existing licensee and will require use of this band to deliver an important component of the UK Emergency Services Network. We are engaged with Ofcom's separate consultation process on this band and believe market mechanisms in parallel with licence variations would be the preferred route to secure optimal use of that spectrum.
5. BT is the existing licensee in spectrum adjacent to the 700 MHz frequencies that Ofcom is also considering as a possible option for utilities. We agree with Ofcom's analysis on the feasibility of adjacent band working. We further agree on the possible need for interference mitigation measures to be taken by networks that may be deployed adjacent to the spectrum assigned to EE and the suggestion that technical and commercial discissions between the parties be considered.
6. BT has no views on the other frequency bands that Ofcom is examining.

1 Introduction

BT[1] welcomes this opportunity to provide its views on Ofcom's call for inputs (CFI) on potential candidate spectrum bands that might be suitable to support future operational communications by the utilities sector[2].

As a current licensee in one of the bands under consideration (1900 MHz) and adjacent band licensee in another (700 MHz), we have a direct interest in these proposals. Also, as operator of the UK's biggest and fastest mobile network, covering more places than others, and as provider of the Emergency Services Network, we are well placed to comment on the practical aspects of providing the future connectivity that utilities may require.

In **section 2** we have provided our views on the future communication requirements of the utilities. This builds on our extensive existing engagements with this important sector, including development of innovative solutions to address their future needs.

In **section 3** we provide information and our views on each of the potential candidate bands that Ofcom has identified.

Finally, in **section 4** we provide views on next steps.

2 Requirements of the utilities

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

BT works closely with the utilities sector to better understand their future communications requirements and opportunities to modernise and to explore innovative solutions to the challenges they face. Ofcom has correctly identified some of the changes in the utilities sector and in addition we provide the following insights from BT's perspective.

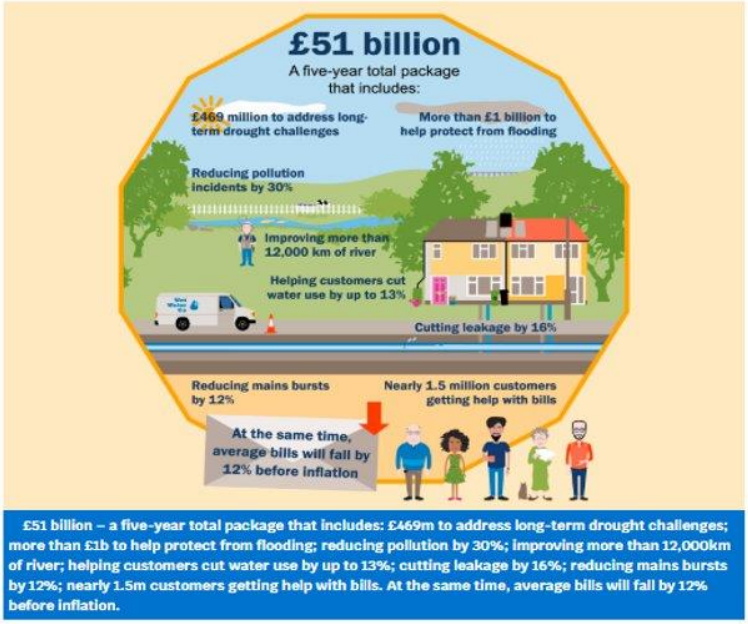
Water utilities

The scale of the challenges and the required investments to meet these are huge (see Figure 1). To meet these challenges will undoubtedly require improved an innovative connectivity.

BT has created the Partner Advisory Board which is an established eco-system of financially robust expert companies to consult with the water industry and ensure we help to address the challenges through use of technology.

[1] BT, including our mobile subsidiary EE Ltd.
[2] https://www.ofcom.org.uk/__data/assets/pdf_file/0029/263567/utilities-cfi-June-2023.pdf

Figure 1 – Challenges facing water industry



Source: Ofwat[3]

Investment and pricing plans are set over 5 year periods and include leakage, consumption and pollution incident reductions as part of Ofwat pricing reviews[4].

Water quality in rivers is under scrutiny and in need of attention. The solution being explored by Yorkshire water[5] provides an example of new connectivity challenges that can arise.

It is, however, not clear that a private mobile network with dedicated spectrum is the best solution to provide the necessary new connectivity that may be required as part of the technical solutions to address these challenges.

Electricity/Gas

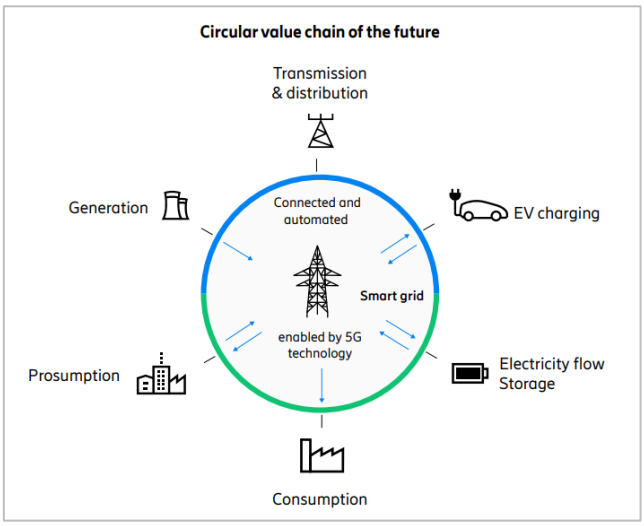
The UK's ambition to increase renewable energy technologies will require the grid capabilities and flexibility to be near real time in order to balance the grid effectively with schemes such as demand side response.

Regulatory requirements such as the gas boiler ban, and the electrification of vehicles will increase demand and the need for bi-directional flow of electricity. Homes and cities will eventually need to utilise their own electricity sources where possible, utilising technologies such as heat recovery, solar, battery storage and air/ ground source heat pumps.

[3] Ofwat final determinations https://www.ofwat.gov.uk/regulated-companies/price-review/2019-price-review/final-determinations/
[4] See Page 16 of https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Policy-summary.pdf
[5] https://www.yorkshirewater.com/news-media/news-articles/2023/yorkshire-water-installs- 21-water-quality-devices-on-river-wharfe/

The increasingly circular value chain (see Figure 2) will require flexibility, security, bi-directional flow and real-time balancing capabilities – this can only be supported by new technology underpinned by a robust connectivity solution.

Figure 2 – Energy value chain



Source: Ericsson[6]

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?

We encourage Ofcom to firstly addresses the question of why it needs to intervene and provide spectrum specifically for utilities before moving to take steps to identify specific bands. This would be consistent with Ofcom's established regulatory principles where it has a bias against intervention unless it is required.

Some of the applications discussed may be well served by fixed network solutions, or by fixed wireless solutions or home network solutions. Where fixed or mobile communications solutions are needed, these could be provided over existing public mobile networks, including use of network slices to provide a private network. This would not require a separate spectrum assignment dedicated to 'utilities'.

Public mobile network based solutions

The advantages of use of existing public mobile networks for the connectivity required include:

- **Cost**: the costs of constructing and operating the network are shared between all users and uses.
- **Coverage**: the public networks have been established over decades and have extremely high levels of geographic coverage.

[6] Page 12, https://www.ericsson.com/4a651d/assets/local/enterprise/reports/connected-energy-utilities-report.pdf

- **Timescales**: public networks are in place now; new networks take years to deploy.
- **Quality** (capacity and speed): the spectrum typically deployed on public networks can support much higher peak speeds and traffic than a small channel bandwidth in a single frequency band.
- **Efficiency** of spectrum use: capacity supports numerous users and applications that may require different amounts at different times, but can also be dynamically reserved or prioritised for particular users when needed.

BT has experience of using the existing public mobile network and bringing parties interested parties together to solve particular issues facing various industries.

The emergency services network (ESN) provided by BT is a good example of a dedicated network that operates on the same spectrum as the public mobile network:

- Over 300,000 emergency services users, including Police, Fire and Rescue and Ambulance, will use the 4G voice and data services provided by the Emergency Services Network (ESN). It will also be used by government agencies and other first responders like immigration enforcement and inshore rescue services.
- The BT/EE 4G network is set to transform the country's emergency services for the better, giving them cutting-edge communication technology to respond quickly to incidents in even the most rural and remote areas – helping to improve public safety.

A further example of where BT has experience in delivering critical network infrastructure is RANDYIANZ[7] – This serves the financial services market and is provided by BT. Although this is a slightly different scenario to the utilities sector, there are parallels in that a company such as BT can pay a key role in bringing all interested parties together and developing a solution that meets the requirements of the industry.

On internet of things, which is of potential relevance to utilities' requirements:

- The comprehensive planning work BT/EE has already undertaken assures the best possible NB-IoT coverage across our [✂] active cell sites. BT/EE's strategy is to [✂]. Where coverage gaps are identified BT/EE will use the most appropriate infill technology option to complement our network solution. Infill technologies may include LoRaWAN and Satellite options.
- [✂]

Other non-MNO solutions

Our experience has shown that the non-telco suppliers have not had the robust financial stability in supply, provisioning and in-life service support required for UK Critical national Infrastructure (CNI) and may not match the sustainability pledges of national Mobile Network Operators (MNOs) such at BT/EE.

We have seen deployments using licence-exempt spectrum and proprietary protocols leaving assets stranded without connectivity. The market is demanding financially robust organisations to step in

[7] https://www.globalservices.bt.com/en/solutions/products/radianz-services

and provide stability and scale they are accustomed to providing. Recent tenders are now requesting Comms Service Providers to lead on the submissions for Smart Networks.

Battery life is a critical consideration in how the network talks to the end device, in water for example each visit to replace a device can be c£250 (+carbon footprint impact). A meter should have a life of c12-15 years to avoid repeat visits to change the battery. The communications profile needs careful refining and testing to make sure the battery isn't drained too quickly.

There have been material cases where proprietary network installations have been evident, however, due to financial pressures, the supply chain has not provided the network connectivity effectively leaving stranded assets. BT would recommend the use of open standards based technology in licensed spectrum which has more options in terms of vendor choice, removing risk.

The vendors are critical to the eco-system as they need to manufacture devices which compliantly work on the network. BT have found many devices will work with LoRaWAN, which is recognised as a higher demand protocol across EMEA. However, the UK would need to build out this network on top of the existing cellular networks which exist today. This type of service relies on 3rd party consent (council buildings, churches etc) to install powered gateways to connect the end device to the network. [✂]

The device supply chain is critical when considering network connectivity as most already have solutions which comply to certain protocols which are used internationally.

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

We have no suggestions for other candidate bands to be dedicated to utilities.

[✂]

For smart water network monitoring, the BT approach is to use the LPWAN NB-IoT protocol which is a licenced open standard, something which was deployed in the award-winning trial at Sheffield for Yorkshire Water (YWS)[8] . NB--IoT works in our 1800MHz band used for 4G and has the added benefit of Extended Coverage (EC) functionality which is particularly important for utilities requiring coverage underground or difficult to reach areas.

BT also has, or may in future have, access to wider connectivity options to create complete coverage as shown in **Error! Reference source not found.**.

[✂]

Whilst building a network takes time and huge continual investment, there is also the requirement to provide security protection which is an ongoing additional material investment. For context, BT has 3,000 security specialists that are on hand to protect our clients, BT and our national security against 6,500 security attacks each day.

[8] https://www.yorkshirewater.com/news-media/news-articles/2020/hadfield-nb-iot-installation/

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.

[✂]

3 Comments on candidate bands

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?

We have no comments.

3.1 400 MHz

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.

We have no comments.

3.2 450 MHz

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.

We have no comments.

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?

We have no comments.

3.3 700 MHz

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.

BT set out its views on the 700 MHz band in our response to the PSNI consultation.[9] In that consultation response we said:

> We note, and tend to agree with, Ofcom's view that although there is risk of interference in some scenarios, compatibility between 700 MHz supplementary downlink (SDL) use in a public mobile

[9] https://www.ofcom.org.uk/__data/assets/pdf_file/0023/249017/bt.pdf

network and Public Protection and Disaster Relief (PPDR) should be possible but might require some mitigation measures, such as additional filtering on PPDR base stations. On the basis that Ofcom will not require any specific mitigation measures to be adopted by 700 MHz SDL networks or any constraints to be imposed on holders of the 700 MHz auction licences, we have no objection to Ofcom's proposals from a viewpoint of technical compatibility with adjacent services.

[✂]

As Ofcom notes in the present consultation document, if the 700 MHz PPDR band were to be used for a private network in future, users would need to engage with BT/EE to understand the potential for technical and commercial arrangements to manage the risk of interference from SDL base stations in the 700 MHz SDL band.

3.4 800/900 MHz

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.

We have no comments.

3.5 1900 MHz

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.

BT provided its views on the future options for the 1900 MHz band in its response to Ofcom's March 2023 consultation on that band.[10] As we set out in our response to that document, we plan to use our 1900 – 1910 MHz spectrum licence to deliver the requirements for extended coverage of our network to meet ESN requirements.

Ofcom has said it is exploring whether spectrum currently assigned to H3G in 1915-1920 MHz could support the power levels to meet the ESN requirement. We are yet to see the results of this technical study. We understand this is option might become relevant if Ofcom were to revoke existing licences in the 1900 – 1920 MHz band and make the spectrum available for new uses / users after changing the technical constraints that currently limit how the spectrum may be used.

Our position on accommodating new use of the band or users is essentially that market mechanisms, such as trading and leasing, should be used to support any change of use or users in the 1900 – 1920 MHz band. To facilitate that, Ofcom, if requested, should work with licensees to explore what changes to the technical conditions might be possible if needed to support any commercially negotiated changes to the use or licensees in the band.

[✂] and since our current licence conditions are consistent with our planned use of the band we have not requested any further variation to our current licence.

We note that the Annual Licence Fees that Ofcom consulted on in 2021 would, if they had been implemented, have represented a further barrier to spectrum trading as we believe they were excessive even if intended to reflect estimated market value.

[10] https://www.ofcom.org.uk/__data/assets/pdf_file/0029/262793/bt.pdf

4 Next steps

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

We consider it premature to move forward with specific bands before the utilities' future connectivity requirements are confirmed by relevant sector regulators and there is clearer evidence that separate dedicated spectrum is needed, e.g., why the use cases cannot be supported on existing public networks, or demonstrating how it is more efficient to deliver the solution with a separate network and separate spectrum.

If Ofcom were to ultimately proceed with making dedicated spectrum available that is suitable for utilities' requirements, we believe the most appropriate mechanism would most likely be by auction in a manner that supports technology and service neutrality to the maximum extent possible.

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