

making communications work for everyone

Your response

Question	Your response
Question 1: Have we correctly identified the key changes in the utilities sector that could lead to additional spectrum requirements?	Confidential? – Y / N
lead to additional spectrum requirements?	The FCS notes the urgent need for a viable solution whereby electricity networks can correctly control their networks. The changes are, we believe very significant and will require a more complex control solution. Quite what this entails is not clear. However, the FCS supports the point that new facilities will have to be provided. The FCS notes that the key changes identified in the supporting documentation are focussed on FIXED stations 1. Together with the presumed timing of the introduction of the solution, five years from now, this is a major factor in determining the most suitable strategic choice of obtaining additional operational capability. It appears that so far, a radio-based solution has been assumed. The FCS takes the opposite view. In a situation where radio spectrum is in short supply, and especially if part of the proposal is for high bandwidth services, fixed solutions may prove superior. It is further less attractive if the provision of even limited amounts of radio spectrum results in the disruption of the existing (often critical or even safety-related) UK operations. In particular the consideration of the use of 450 MHz for predominantly fixed usage, which is the PMR band having the best urban and in-building propagation characteristics, is surprising. For this very reason it is already oversubscribed in many areas. Whilst we do not question the desire of some in the utilities for a much richer.
	set of operational capabilities, we remain unsure
	note that a radio spectrum policy solution which
	passed control of significant amounts of radio
	spectrum to a single commercial organisation by government action, and at the same time

	removed all possibility of achieving any form of competition, creating a coercive monopoly, to be an unusual step in the UK. <i>The use of parts of</i> <i>450MHz to allow profit making Utilities to have</i> <i>a predominantly fixed Private Network, at the</i> <i>expense of Public spectrum no longer being</i> <i>available to some mobile PMR users, would be</i> regrettable. The diagram on page seven of the Cfl also refers. The FCS refers again to the predictions calculated in the Network Innovation Allowance document (footnote 1). That document reports a project having been undertaken to predict the required data rates to sustain the intended services. It appears to show that the data rate (theoretical best case) for a 2 x 3MHz bandwidth is only just sufficient. Thus, there is a strong possibility that a 2 x 5MHz radio spectrum assignment will be needed eventually. The FCS recalls that in a previous activity to change the purpose of the 450 – 470MHz band, a 2 x 5MHz proposal was made that, after detailed investigation appeared to require the clearing of the entire 450- 470MHz band due to sideband noise and the consequential need for extensive guard bands. This may be true in this case as well. <i>In addition it is highly likely that the</i> <i>Utilities will demand generous guard bands for</i> <i>a network that controls Critical National</i> <i>Infrastructure?</i>
	As a result, the FCS believes that the new requirements insofar as they affect mobile usage may result in extra demand for radio spectrum. For the envisaged changes to the fixed station use (as noted in the documents), the need for extra radio spectrum is less clear (as noted in the following sections). If means could be found whereby other solutions could be provided, the need for clearing the band and terminating the current critical operations would be removed. Thus, using novel strategies and the re-purposing of the existing Scanning Telemetry band may provide everything needed, for example.
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?	Confidential? – Y / N Whilst the provision of connectivity to control networks via radio resources is a tried and tested strategy at very low data rate (Scanning Telemetry as a case in point). It appears from the material provided with this Call for Input, that the telemetry approach is seen as lacking. Also,

even with a radio solution such as LTE/4G, it appears that cost limitations will mean that other solutions for remote places will have to be found. The FCS notes the rise of the (low latency) satellite service 'Starlink' (widely reported on the internet and more recently, another scheme called 'One Web'). These appear to offer adequate connectivity to remote locations and even closer in, less remote areas. The FCS believe that is will be advisable to establish the extent of the advances such services will make in the timeframe of the proposed private system, prior to any decision on radio spectrum for the proposed private system. Of particular interest is the current All-IP transformation project from Openreach. They will discontinue most, if not all, copper connections by the end of 2025, relying on an All-IP, fibre connectivity scheme. With this timing and extent of the resulting network, it is very likely that the average distance between a suitable fibre network connection point and the utility infrastructure will be much less than it is today and so connection to the Electricity Network using IP over fibre would be a viable alternative to an LTE / 4G solution. Furthermore, the IP network will have been in existence for some years by the time any 4G radio solution could go live. Latency is often guoted on IP networks as a matter of concern. It appears to the FCS that this is rapidly coming down to more acceptable levels. This is already a focus point in the Gaming industry and strategies (and much faster equipment) have already been introduced to reduce latency (referred to as 'PING'). In addition, there are caching schemes that bring the decision points closer, reducing the response time significantly lower. Further progress is to be expected. Some current solutions interrogate externals in sequence. With an internet-style solution, many interrogations could be performed at once, passing the results to handlers higher up in the hierarchy. Those devices are already extremely fast indeed and expected to get faster still. Thus, the latency problem over these systems might be expected to largely be non-existent in five years' time. A further point often included in these discussions is that of 'control of the network'. The FCS notes that views on 'control' differ. As a result, it is recommended that this is investigated thoroughly to obtain a definitive position. It is a

	fact that this has not proved so important in Poland where a POC system appears to have been selected. Video Calls The FCS notes that the estimation of the radio spectrum needed to support video calls is 1MB/s. It would seem more appropriate to carry such a call across a naturally high bandwidth technology rather than any system in the 400MHZ or 450 – 470MHz band. In five years' time, we could expect this to be implemented using a fibre-based link with short- range 5G used for local collection or distribution in and around an installation. The assumed data rate provides for one video stream. The FCS would suggest that more than one camera will be necessary at any installation where video security is required. In the light of the fact that this provision is for a facility to be in operation five years from now, it might also be that low quality surveillance is no longer considered evidence.
Question 3: Are there any other spectrum bands we should consider for use by utilities?	Confidential? – Y / N <i>How about Band III.</i>
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.	Confidential? – Y / N The table at A7.1 would appear to provide reasonable estimations of bandwidth requirements for each of the types of services. The only comment would be that video surveillance may have to be continuously running, from several cameras. Thus, the total capacity that must be provided may be significantly higher than the 1MB/s estimated. The FCS believes that the operational reality in five years' time may show that the totals in Table A7.2 are an understatement. Any policy decision to re-farm the 450 – 470MHz band would be undermined by the fact that even if the whole band were taken (at whatever cost to the critical services it currently supports), there would still not be enough capacity

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? Confidential? - Y / N

As noted above, the FCS would urge that estimates of required bandwidth are not underestimated.

The FCS would urge that when considering any potential candidate spectrum band that they should consider the propagation characteristics that are being exploited by the incumbent mobile users, and in many cases the lack of any viable alternative bands for those uses.

The propagation in the 450MHz band is optimum for urban and indoor propagation and coverage for PMR users. The band allow the use of relatively small and efficient antennas for hand portable radios. The characteristics of the 450MHz band also allow for relatively aggressive frequency re-use. As such 450 MHz is heavily used, and in many areas already it is already impossible to get frequencies for new PMR systems.

The cost per Fixed Station of deploying a Private Utility Network may well be lowest at 400 and 450MHz, but it should not be done at the expense of mobile PMR users of this prime band, where no suitable alternative solution exists.

In the OFCOM for Call for Input document it states "Some of the bands discussed are already heavily used by other users, delivering significant benefits for people and businesses in the UK. "

The FCS believes that any consideration of the 450 MHz band should include an analysis of the costs and disruption and loss of capability that would result of displacement of some users, without a suitable alternative band being available.

The FCS also identifies the need to carry out a realistic assessment of how long in reality it would take to re-tune existing user frequencies and/or re-align the band. Such timescales, and costs, for the 450MHz band may well exceed the requirements of the Utilities.

The FCS believes that an assessment is required for the 450MHz band of the net benefits to the UK economy, the unique services provided within the band, and the effects on any potentially displaced users, particularly those where a suitable alternative band is not available.

Consideration should be given to:

- 1) Public access buildings (shopping centres, stations, underground stations, airports, concert venues, hospitals etc) where safety critical PMR systems are implemented for Security, crowd control and evacuation. Can Public Safety be ensured if the best frequency band for indoor and underground coverage is no longer available to some users?
- 2) The use of such systems in Public Access and private buildings, factories and petrochemical plants etc. to provide efficient and cost-effective operation, business continuity, maintenance, and cleaning, should also be taken into account. Often critical areas will be in basements and plant rooms where 450MHz provides the best propagation.
- 3) The public benefits of 'Shop Watch' schemes within shopping centres, often with basements and underground car parks.
- 4) Within many large urban buildings, especially within London, it is a requirement to provide dedicated 462/457 MHz Fire Brigade fire ground radio equipment. This is best implemented within a Distributed Antenna System designed for 450MHz PMR use.
- 5) The events and public entertainment industry. Extensive use is made of temporary high-capacity 450 MHz radio systems within the events and public entertainment industry for production, broadcast and crowd safety.
- 6) The effect of making it difficult for global companies to do business in the UK should not be underestimated. If we look at the major banks (a quick internet search shows that the banking sector contributed 173.6 billion pounds to the UK economy in 2021) for instance

located within the UK using this UHF spectrum. If things are made increasingly difficult for them, then surely, we are just encouraging them to relocate to France or Germany. We have to wake-up to the fact that the PMR industry enables many businesses to operate efficiently and safely and consideration should surely be focussed on releasing more UHF spectrum for PMR use rather than reducing it or in this case enabling a few private companies to monopolize it at the expense of many.

When considering alternatives for incumbent PMR users the use of Public Mobile Networks may be suggested.

- 1) The use of Public Mobile Networks does not necessarily provide the required coverage within the basements and underground car parks of buildings. In many cases only a dedicated PMR system can provide this.
- 2) For critical PMR users the resilience of the Public Mobile Networks (for non-ESN users) is inadequate, with many base stations having less than an hour, or no, battery backup. A high resilience PMR system for public access buildings, Bank Headquarters, trading rooms, pharmaceutical plants etc. will typically have 10 hours of battery backup.
- 3) For non-ESN users the Public Mobile Networks may well become congested due to a major incident, at the very time a building evacuation or similar may be required. The availability and capacity of a well-designed PMR system is within the control of the system owner.

When considering each candidate band, the relative physical size of high gain base station antennas should be considered. (For a given gain a 450MHz panel antenna will be approx. 2x the height of a 900 MHz antenna, and 4x that of a 1900 MHz antenna.) It may be impractical to deploy the physically large high gain 400 and 450MHz antennas on existing structures.

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.

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. Confidential? – Y / N

See answers to the previous questions. The 400MHz band is similarly challenging in England. There is an additional need to protect certain key installations that are likely to remain in place. However, we do note that this was the preferred band in Ireland with a recent award of 2x3MHz in the lower part of the sub-bands. The remaining going to compatible technologies as required. Clearly the assignment's adequacy for the support of significant amounts of video content remains a question. This is important in relation to cross-border coordination with similar Smart Grid deployments in NI. The FCS further notes that in relation to the 400MHz award for the SmartGrid system, the clearing of the 450-470MHz band was considered impractical thus removing that band from consideration.

Confidential? – Y / N

The use of the 450-470MHz band has been considered before and found not viable. Most recently in 2017. In that case, the proposal was to locate an IMT2000-style system in the band. This examination was conducted under the guidance of the ERC. It was considered that that even if the whole band was cleared of the current users, there would only be enough radio spectrum for one operator having a system of 2 x 10MHz with the rest of the band being sterilised for Guard Band. The conclusion was that this would not be appropriate for the UK as there was concern over being able to provide a nationwide service due to difficulties of providing a viable re-use plan. However, more serious, it was also noted that the proposal effectively required Her Majesty's Government to implement policies that would result in the creation of a monopoly through regulation. This



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

could be considered a coercive monopoly. In relation to the illustration provided at page 27, the affected incumbents amounted to 3600 Business Radio licences, 7% of PMSE users and further Emergency Services users. This is a very good example of the seriousness of the loss of critical services were any removals of those incumbents to take place. It is important to recall that the illustration is for the smallest amount of spectrum considered. However, the current proposal is for over twice that radio spectrum (2 x 3MHz). Therefore, the number of incumbents would in practice, be much higher than for the example. Please recall that the FCS anticipates that even this would prove inadequate, and a more prudent amount of 2 x 5MHz might be considered from the outset. Thus, the example therefore actually highlights that the number of affected incumbents is likely to be 'all of them'. Also, these figures don't include the necessary guard bands. It is highly likely that the Utilities will demand generous guard bands for a network that controls Critical National

Confidential? – Y / N

No. The current situation in the 450-470MHz band remains largely as it was. It will be very difficult to develop the necessary spectrum resource for the proposed utility radio system in that band. We note that with the apparent complete absence of a viable alternative band into which the current incumbents could be relocated, the question is therefore, in reality, not one of 're-locating' but of 'terminating' the affected services use of PMR. As many of these services are critical in nature, this would appear an unsupportable approach. As noted in answer to Question 5, the use of Public Mobile Networks as an alternative will not match the required capabilities of current safety critical PMR systems.

We further note from the Cfl that the systems currently occupying the Scanning Telemetry Band are considered out of date. Perhaps one thing that could usefully be done is to upgrade those systems to significantly increase their

	performance. As noted above, taking in to account the likely growth in the requirements in the long term and the impending opportunity of using non-radio solutions, it is not clear that a radio solution in the 450-470MHz band is an optimal solution for the proposed Private Network.
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.	Confidential? – Y / N No
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.	Confidential? – Y / N No.
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.	Confidential? – Y / N The FCS notes that the 1900MHz band remains unused. It clearly is a strong contender for the Utility Private Network should that continue to favour a radio solution. We also note that the US uses this band for their needs regarding utility radio spectrum. However, the US has adopted a FDD spectrum arrangement. Ours is currently TDD. This may affect the ease with which equipment can be obtained. This relatively unused band would allow quick deployment of a Private Network, in sharp contrast to the expected extended timescales and costs to clear and/ or re-align the 450MHz band. High gain base station antennas for this band are of a realistic size for deployment on existing structures.

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. Confidential? – Y / N

As noted above, the FCS prefers that the whole question of using a radio solution for the proposed private network be re-considered. We believe that there is significant opportunity to address much of the future requirement through other means.