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What additional details do you want to keep confidential?:

No

If you want part of your response kept confidential, which parts?:

Ofcom may publish a response summary:

Yes

I confirm that I have read the declaration:

Yes

Additional comments:

The FCS is grateful to Ofcom for the opportunity to contribute to the efforts to safeguard the use of the UHF bands for the benefit of the UK. The current work in progress in relation to licensing policies is considered to be extremely valuable and relevant. The FCS compliments Ofcom on their achievements to-date and

looks forward to continue to support these efforts as the work progresses.
Many of the services in the UHF 2 band particularly support operations that are vital to the UK and should not be disrupted.
The FCS notes the extreme complexity of spectrum management in these bands and the corresponding difficulty and cost that would be associated with making major changes. The FCS has no evidence that supports any need for re-alignment of the UHF2 Band.
The deployment of wideband services in UHF2 is not seen as practicable. However, there is a growing awareness that mission-critical wideband service may be needed in some other band.
About the FCS
FCS is the not-for-profit industry association for companies which deliver professional communications solutions to business and public sector customers in the UK. Be it voice or data; via radio, mobile, copper or fibre; the FCS Mission is to champion and defend the role of the professional communications provider in the converging market place.

Question 1: Do you agree with Aegis?s conclusions on congestion of current use of 420-470 MHz spectrum? Are there any other signs or areas of congestion that Aegis have not identified from their review?:

The FCS strongly agrees that the current situation of steadily worsening congestion is unsustainable. It is believed that most large metro areas of the UK will suffer serious levels of congestion as reported by the licensing system under the current policies within the next five years.
The FCS agrees with Ofcom that on shared channels, there is a significant difference between the concept of congestion as recorded by the licensing system whereby assignment of additional radio spectrum licences is inhibited and congestion where end-users actually experience the effects of congestion in their daily operations.
The situation of congestion of exclusive channels as noted by the licensing system and that seen in the field is believed to accurately match. There currently are not enough exclusive channels to meet the need in metro areas. Solutions that need exclusive channels are therefore already facing challenges in these areas. Some FCS members report that customers who need channels in congested areas are simply not applying for them as they believe there is no chance they will get them. This, of course, only serves to significantly distort Ofcom’s perception of demand in these bands.
Ofcom are very well aware of the assignment congestion and has already conducted some work to show that at least one metro area is already saturated (meaning that licences can no longer be assigned in a particular area) and several others are becoming worryingly close to saturation.
The industry notes that, at its root, congestion on shared channels in the field is easy for the user to detect on unprotected analogue systems. However, on digital systems or protected analogue systems, it remains a statistical phenomenon. Measurements of first-time call success on a very large scale are notoriously difficult to do. However, it is quite easy to perform calculations showing that the effect is real and already present. Some members have reported that users may to have to re-try far too often (but not yet at an “intolerable” level in most cases).
The introduction of data services is making matters much worse. These services may have characteristics that are not compatible with the concept of uncoordinated sharing. This is already a matter of concern with far too many examples in evidence. The issue is not the time the data unit transmits but the

amount of time that is denied to other users. This is a function of duty cycles, periodicity and other factors relating to all sharers on that same channel.
The FCS is becoming increasingly concerned about the introduction of data into service. We look forward to working with Ofcom to identify solutions.
Aegis concluded that the growth will come from BR systems which will both grow in number and in the proportion of the channel they utilise compared to today due to an increase in the uptake of narrowband data services. They further indicated that the utilities industries will drive congestion through the needs of smart grids . The FCS is not sure that the needs of smart metering are so certain to drive significant congestion compared to BR. The design of the smart metering systems could be such as to be very efficient and in any event, these systems appear to have spectrum available to them in UHF1.
The FCS refers to responses to this Call for Input made by other organisations such as the JRC. Attention is particularly drawn to the comments made in relation to smart grids which the FCS considers to be more challenging than smart meters at this time.
The user-experience remains critical to the UK industry. The FCS understands that Ofcom are already aware that the alleviation of congestion as indicated by the licensing system through the strategy of simply increasing the sharing number such that more than two users can share a channel at the same location, carries certain dangers. Simple probability theory clearly demonstrates that the first-time call success probability is reduced as more users share a channel. Combining this with the introduction of more data service (whereby a higher percentage of the assigned 50% of the channel available resource may be occupied in a manner denying service to others), results in a concern that the systems will start to fall short of their fundamental resilience and access objectives. Again, the FCS notes that the current definition of occupancy in a capacity sense is not sustainable. Such definitions are a complex matter. However, the current sharing limit of two users per shared channel may very well be overly conservative. The FCS notes that even a shift from two to three sharers represents an immediate increase in the capacity (and probably utilisation very soon afterwards) of 50%. So a saturated region within London (say) would immediately move from 100% take-up of the available licences and a situation where no more licences can be assigned to only 67% and a much easier assignment environment. It is for this reason that the FCS is keen to support work being undertaken by Ofcom in regard to the sharing efficiency. Furthermore, were the permissible sharing number to be increased to three or even four, it could both meet demand for shared assignments AND offer the opportunity to have excess channels that could be redefined as exclusive channels thus alleviating serious assignment difficulty in that sector also.
The FCS sees that demand for general wideband systems in the future could make the congestion situation very much worse overall. At present, the majority of BR users also make use of supplementary wideband services that are supported on consumer cellular mobile radio networks. This is very convenient but also concerning because the operational reliance placed on these supplementary services may be increasing. For now, the use of these services provides confirmation that Business Radio users also need data services.
At present, many users are able to operate with their supplementary data services provided on a “best efforts” basis. However, management teams often have obligations that mean they cannot take service from lesser resilience platforms when better alternatives are available. Due diligence obligations will therefore steadily drive those users towards higher resilience solutions. In fact, as data schemes become ever-more central to the success of the overall operation, the desire for higher resilience will grow generally.
The cellular industry has many predictions of the growth of data traffic over the next few years. These are often based predictions from the wired community.

The predictions show extremely wide variations in traffic levels but are always extremely large. There are no known corresponding figures for the Business Radio sector. But, even if the growth in data were to be only a small fraction of that predicted elsewhere, the amount of over-the-air traffic generated would dwarf the current over-the-air traffic on BR systems.
The FCS does not believe that such a shift in demand could be supported by any current BR band because the volume of traffic would be so large. Thus a completely new band may be required.
In relation to the use of the band by the emergency service (ES), the FCS believes that it would be imprudent at this stage to assume that the current emergency services allocation (of over 7MHz) will become permanently available for other uses for many years or perhaps not at all.
The FCS has no evidence that the consumer version of LTE will ever be able to sustain a mission-critical communication in accordance with the current understanding of what “mission-critical” means. This leaves the current ‘variants’ of LTE (that are already in evidence in other countries) as possible solutions. This approach may require a second layer of technical solution and may not be capable of deployment without further special arrangements, including spectrum arrangements.
The FCS notes that M2M communications has been a part of BR operations for many years in the form of telemetry solutions. However, we do stress that these operational solutions have been somewhat limited to highly specialised situations and general deployments have only been undertaken by a small number of organisations . Nevertheless, there is clearly some level of increased application for these types of systems, particularly as the operational environment gets more complicated. From the perspective of the FCS membership however, this is very much business as usual. Modest growth in this type of work is to be expected but whether it is worth identifying M2M as some fundamentally different type of operation is questionable.
The reader is referred to the response of the JRC in this regard.
In relation to Licence-Exempt use and Short-Range Devices, the FCS notes that the lack of guarantee to the end user over the level of interference makes these modes of operation much easier to manage. Thus there is no great need to take specific action in the opinion of the FCS. However, were the amount of radio spectrum devoted to these services to be increased, the impact on neighbours could well be detrimental to the benefits delivered to the UK delivered by existing operations hosted in the remainder of the UHF bands.
In summary, the FCS sees little opportunity for any significant change in use of the band and so there is little potential for any new type of user.

Question 2: Do you agree with Aegis?s conclusions on the future demand and use of 420-470 MHz spectrum over the next ten years? Are there any other future uses or areas for future demand that Aegis have not identified from their review?:

See Question 1

Question 3: Do you agree with Aegis?s conclusions that there is not yet any UK demand for wideband services in the 450-470 MHz band (which could for example, be used to improve rural mobile coverage)? Please provide any supporting evidence for your position.:

The FCS does agree that there is little demand foreseen for large volumes of wideband over-the-air traffic supported by spectrum in the 450-470MHz range. However, as noted above, the reasoning is completely different. Instead of deployment in the UHF bands, we see a need for such services to be supported in another band.
The FCS does not consider the deployment of a consumer technology such as CDMA or LTE at 450MHz to be attractive due to the complexity of the current arrangements in the UHF bands in the UK and the lack of user demand (service already being available through other means). There simply isn’t enough spectrum in the 450-470MHz band to make an attractive service, capable of carrying a reasonable volume of business . Thus the venture might be commercially challenged from the outset. In addition, we would further note that at least a measure of re-alignment would be necessary to permit the deployment of these services. Presumably, the costs of the re-alignment and the acquisition of replacement radio spectrum would fall to the operators of the new services.
The FCS considers (above) that were mission-critical wideband services to be needed in volume, the spectrum capacity would definitely be insufficient and so a new band would certainly be required. Thus large-scale mission-critical wideband services are not expected in the 450-470MHz band.
The FCS further notes that typical channel access protocols that are used in longer-range wideband systems call for polite access. Usually this means that if a channel is detected to be in use, the equipment attempting access will switch to a free channel. In the case of UHF spectrum, it is extremely likely that ALL the channels will be in use and so the unit attempting access will fail to find an available channel and therefore will not send the communication. Thus, considering the needs of business or mission-critical operation and certainly safety-related use, hosting such a wideband service in the UHF bands is very likely to fail to meet the resilience goals and therefore is pointless. More channels are needed.
The FCS conclusion is therefore if, for some reason, a decision to re-purpose the band is taken such that the band is moved to wideband use, another band for professional use must be found in advance such that the migration can be completed to make way for the new services. Of course, extensive Government intervention will be required to achieve this unless the entire cost is made to fall to the new operators.

Question 4: Have you experienced degradation in your systems? performance which you consider to be caused by continental interference in the last 12 months? If yes, what approach did you take towards managing and minimising interference?

Please provide any supporting evidence which explains the frequency, impact, duration, time, location and cause (whether suspected or investigated) of the interference with respect to your specific sector(s).:

In support of this Call for Input, the FCS conducted a survey of its membership to answer this question. Member companies having systems located along the East coast of England were asked if they experienced interference from the continent in the UHF2 band. The result of the survey was that the number of interruptions to service reported was zero. That is, there were no problems in communications resulting from continental interference.

The members did report that they can detect power in the band coming from the continent, but with proper site engineering, it caused no interruptions of service. The FCS does not doubt that some other services may be experiencing interference. Furthermore, there may be instances of difficulties arising from the continent. However, the position remains that the FCS has no evidence whatsoever supporting any need for band re-alignment.
In view of the likely costs of re-alignment, the FCS therefore concludes that re-alignment of the UHF2 band cannot be justified at present.
The FCS accepts that were the amount of power in the UHF2 band coming from the continent to radically increase in the future, it may cause some interruptions of service. However we note that the design of the systems on the continent is different to the old Radiocomm2000 service that used very high powers on very high masts. Today’s service on the continent is better designed it is believed. This may mean that it is less likely that we will reach a state where the interference becomes unacceptable.

Question 5: Is there additional information relevant to the configuration of the 420-470 MHz band that we should consider in developing our approach to its future management? Please provide any evidence to support your views.:

The FCS notes that the affected areas of the UHF2 band lie to the east and are generally in less congested areas. Before undertaking any national re-alignment of the band to avoid interference, it may therefore be useful to consider retaining the current band alignment indefinitely into the future and approach the continental interference issues using a mixture of judicious assignments and site engineering requirements (antenna directivity and even potentially employing various types of shields). Were site engineering techniques thought to capable of improving the situation, it would be a small matter to update FCS1331 to include the necessary measures to give guidance to installers. The FCS further notes the implications of a national realignment to systems located on the West coast.
The FCS again notes the concern that the emergency services may well consider it imprudent to vacate their allocation in the UHF2 band, thus complicating any re-alignment considerably.
Nevertheless, several FCS members have undertaken informal studies of the impact of any re-alignment project. Their conclusion is that were the alignment to be conducted very gradually over a period of years and were the necessary spectrum to be available to switch to, costs could be more easily controlled than were the transition to be attempted in a shorter timescale. More importantly to users, the potential disruption to important services could be much reduced.
Were a rapid transition sought, the level of intervention would be correspondingly increased. However, unlike the situation in which the previous alignment project was discussed, the industry has re-structured itself to be more adept at modern solutions.
Some FCS members have expressed some concern that the industry as a whole may no longer have the numbers of qualified radio engineers it once had. Thus the rate at which the changes could be accomplished would be reduced until such time as the necessary technical expertise could be developed.

Question 6: Do you agree with the potential solutions Aegis have proposed for managing the 420-470 MHz band to both meet the continued growth in congestion and demand from incumbent spectrum users, and to facilitate the deployment

of wideband technologies? Are there any other solutions which you consider we should examine that Aegis have not identified from their review?

Please provide any evidence to support your position and reference each solution in your response as appropriate.:

The FCS agrees that there are a number of issues that are certain to make managing these bands very highly specialised in the future. The FCS would like to express its gratitude for the work done so far by Ofcom staff in relation to these issues.
The subjects considered by Aegis for areas of attention by Ofcom are, we believe, already under examination. We look forward to continuing to make contributions as this work progresses. Here we make the following comments:
1. The subject of congestion is already subject to a lot of effort by industry and Ofcom. We make no further comment here except to say we very much support this work.
2. Licensing and assignment arrangements are equally under examination with work already in progress.
3. Whilst the FCS accepts that as a matter of policy, Ofcom will wish to look at licensing fees, we believe this is unlikely to achieve any useful impact. Much of business radio spectrum use is to support essential operational requirements. Thus there is no direct causal link between the amount of spectrum in use and the prime goal of the entity. In general, the users need a defined amount of spectrum and that is very much the end of the discussion. Increasing the price won’t change anything. However, this comment assumes that the intention of spectrum pricing remains to encourage efficient use of the spectrum rather than towards raising tax revenues.
4. Prioritising spectrum towards business-critical applications is, we believe fundamentally flawed because practically all BR use is already business-critical, mission-critical or even safety-related.
5. We would again urge caution over any reliance on the availability of the emergency services allocation on at this stage.
6. The FCS does not agree that the deployment of wideband service presents a strong argument for re-configuring the band. This is, as stated above, because we do not believe the band is of sufficient capacity to support the likely wideband service requirements that may arise.
7. The FCS would support an analysis of a strategy of keeping the current UHF2 Band alignment (even for the very long-term) and seeking to use novel management methods and perhaps site engineering to alleviate the problem. This approach is felt to be the most cost-effective, simplest and least disruptive. The FCS notes that that the majority of the issues could be addressed fairly simply because of the low levels of congestion along the East coast.
8. The FCS considers the deployment of consumer solutions based on CDMA or LTE to be sub-optimal both for reasons of lack of viable business case and the technical grounds arising from interference to near neighbours. We would further note that at least a measure of re-alignment would be necessary to permit the deployment of these services. Presumably, the costs of the re-alignment and the acquisition of replacement radio spectrum would fall to the operators of the new services.
9. The opportunity to develop a viable business case for a spectrum manager organisation has been examined several times. The FCS understands that this remains very difficult.

Question 7: Do you have any further comments relevant to how we might manage spectrum between 420-470 MHz? :

It appears obvious to the FCS that there is a vast un-tapped resource in UHF1 that would certainly transform the congestion issue were it to be made available. It is recognised that the UK has defence obligations in relation to this band. However, whilst it is accepted that this would be an enormous task, were these obligations to be relieved, significant improvements in the spectrum position could be achieved.

Question 8: Do you have any comments on our proposed programme of work, the outcomes from which we will use to inform future decisions on how we manage the 420-470 MHz band? Are there any additional areas you consider we should explore?:

As stated above, the FCS strongly supports the existing programme of policy work being undertaken. Much of the work naturally leads to further examinations based on conclusions reached.
However, the FCS would make the following comments.
1. Prioritisation: The scope of work currently envisaged is very large indeed. This naturally gives rise to considerations of a prioritisation of the tasks. The FCS considers work items such as assignment policies, licensing and effective strategies to avoid continental interference without the need to inflict significant difficulty on the entire country to be high priority. Efforts to re-align the band to permit the deployment of public wideband services or efforts to identify spectrum fee changes would appear to be very unlikely to achieve anything useful and so could be de-prioritised (or even abandoned entirely).
2. A new spectrum band for mission-critical wideband: The FCS again stresses that we consider it very likely that the requirements of users will “creep” to include business-critical, mission-critical or even safety-related wideband communication on a fairly large scale. If the current national networks were to be radically changed such that they could offer such a service this would be of great interest to many users. In this case, the current operational paradigm could be migrated to the new systems without too much trouble. However, were the requirements to “creep” with no such opportunity to satisfy the demand using consumer networks, the only solution is to find alternative means to develop the desired resilient capability. This may well entail deployment is different spectrum. The FCS does not believe the UHF bands have sufficient capacity for extensive growth of data traffic, even if the UHF2 band were to be vacated by the emergency services.